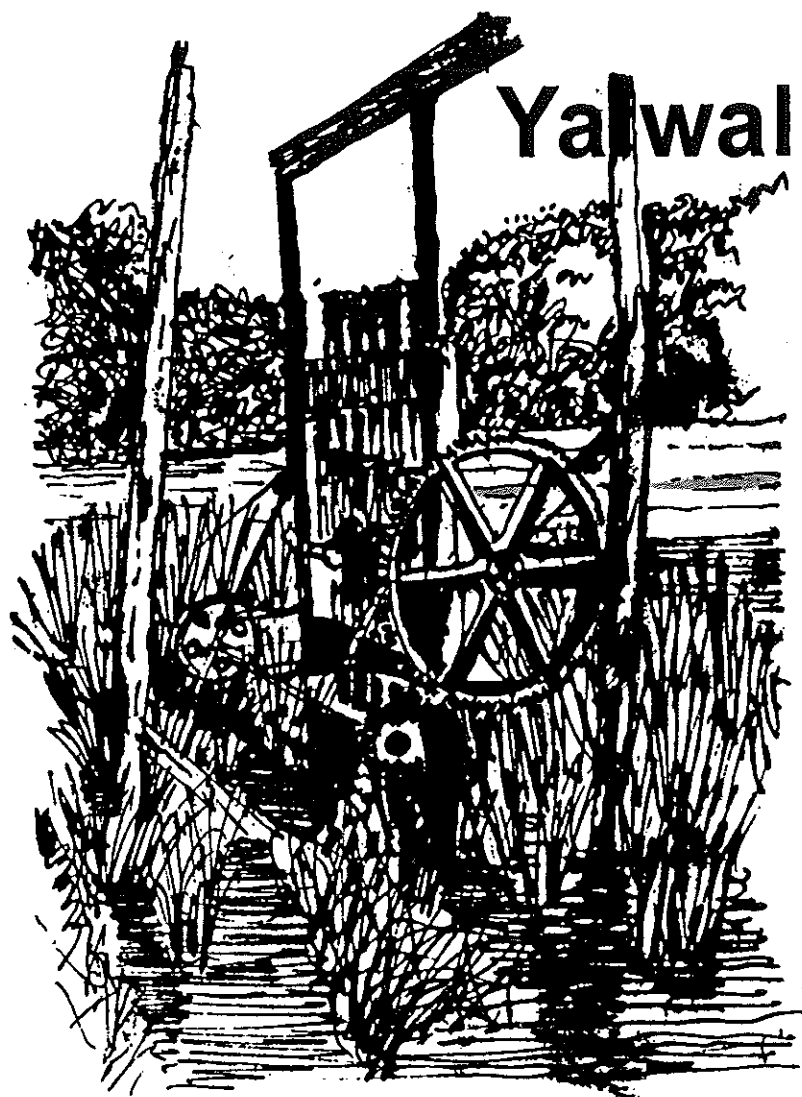




Recreation/Tourism Concept Development Plan

Draft
February 2001

Foreword

This Concept Development Plan follows on from the recommendations of the Yalwal Management Plan, which was completed in December 1999. The management plan was prepared to protect the Danjara Dam water storage and the area's natural, cultural and other attributes from the adverse impacts of inappropriate recreational activities and visitor behaviour.

Shoalhaven City Council (SCC) commissioned the Concept Development Plan, which was funded under the Federal Government's Regional Assistance Programme, administered by the Department of Employment, Workplace Relations and Small Business. In obtaining this funding assistance the work of the Shoalhaven Area Consultative Committee (ACC) is acknowledged, together with the support of Joanna Gash, Federal MP and Wayne Smith, State MP. The National Parks and Wildlife Service (NPWS) and the Department of Land and Water Conservation (DLWC) are also acknowledged for their continuing support in the implementation of the Yalwal Management Plan.

The Concept Development Plan was prepared under the direction of a Steering Committee of the Yalwal Management Group, comprised of the following members:

- John Gould – Shoalhaven Water Manager (SCC)
- Bill Tomkinson – Shoalhaven Water
- Sue Feary – NPWS
- Karen Fowler – DLWC
- Milton Lay – Shoalhaven Area Consultative Committee (ACC)
- Russ Evans - consultant

Other Yalwal Advisory Stakeholder Groups also provided input to the Concept Development Plan.

The study for the Concept Development Plan was undertaken by Nelson Consulting Pty Ltd, with the input of the Steering Group members. In this regard Russ Evans, in particular, is acknowledged for his contribution.

Nelson Consulting was also assisted by a number of sub-consultants including Patterson Britton and Partners (consulting engineers) and David Beaver (landscape architect). A number of other SCC and NPWS staff also provided valuable information for the study.

Summary

(i) Introduction

The Yalwal locality includes Danjera Dam, associated picnic/camping areas and old gold mine workings. These are surrounded by Morton National Park, Ettrema Wilderness Area within the national park, Crown land and privately owned land (see Figure 1.2).

(ii) Study Objectives

In accordance with the Yalwal Management Plan the Concept Development Plan was to *identify recreational and economically viable tourist opportunities compatible with sound management policies for water storage and natural and cultural values.*

The short-term objectives of the Concept Development Plan are to address adverse recreational impacts (primarily from concentrated trail bike and 4WD use) and visitor safety (primarily due to hazards associated with old gold mine workings).

The long-term objectives are to attract new visitors to Yalwal and change current visitor expectations and attitudes, so that conservation values are recognised and the area's full range of visitor experiences can be appreciated.

(iii) Study Preparation

The study included:

- a description of the key values and attributes of Yalwal;
- market analysis covering local and regional visitation, accommodation, tours and tourist attractions; and
- physical site analysis to assess mine hazards and identify site servicing options, particularly with regard to effluent disposal.

The outcomes of these study components were used to identify opportunities, constraints and options for recreation and tourist development at Yalwal.

Recommended site development works, management recommendations and development guidelines were:

- based on the study objectives and Yalwal's key attractions;
- developed from an assessment of site capacity and potential visitor markets; and
- refined through consultation with the Steering Committee and stakeholder organisations represented on the Yalwal Advisory Committee.

A financial analysis was also undertaken to identify the net costs of implementing the Concept Development Plan. This was based on capital investment, operational costs and potential revenue from visitors.

(iv) Site Development

The proposed site development works, shown in Figures 4.1 to 4.4, aim to retain the 'remote, bush character' of Yalwal, control camping within the reserve, allow visitors to appreciate the mine workings area in safety, and attract more day visitors and a broader range of visitors through provision of facilities for a range of low-impact recreational activities.

The facilities would cater for in excess of recorded peak visitation levels at Yalwal and are primarily based on utilising existing cleared areas and tracks. On completion of the site development works, the reserve capacity would be 50 camping sites (or approximately 150 campers) and 52 formalised parking bays for day visitors, or approximately 150 day visitors at any given time.

Site development works include:

- A 'gateway' treatment on Yalwal Road at the Council house comprising landscaping, an information booth, signs and carparking.
- Upgrading the Council house for ranger accommodation (location 1, **Figure 4.1**).
- Formalising camping at the NPWS rest area to provide both car-based and walk-in camping (location 2, **Figure 4.1**).
- Minor leveling and landscaping of the existing small designated car-based camping areas to define individual campsites and associated parking (location 3, **Figure 4.1**).
- Developing the 'main camping area' for picnicking and group camping (location 5, **Figure 4.1**) including terminating the existing loop access road at the proposed carpark to this area. Facilities would comprise a shade structure and seating at the water's edge and pontoon for fishing/viewing; swimming area delineated by buoys; shade trees; picnic shelter with tables, gas barbecue and sink/washing up facilities; and new toilet block. During peak times, this area would be used for walk-in overflow camping.
- Constructing a timber platform, for fishing/viewing, and interpretive signage at the canoe launching area (see location 12, **Figure 4.2**).
- Widening the upper loop road for two-way traffic to the proposed southern picnic area (location 14, **Figure 4.2**, near the cemetery and mine workings area) and Yarramunmun Tops Fire Trail.
- Using location 22 (opposite the southern picnic area, see **Figure 4.4**) in the short-term for overflow camping, and in the future for 'wilderness cabin' accommodation. Location 21 is also a potential cabin site.
- Installing composting toilets at picnic/camping areas to eliminate the risk of pollution of Danjera Dam (topography, soils and servicing constraints preclude the use of other effluent disposal methods). Water would be provided via rainwater tanks or pumped from Danjera Dam.
- Rationalising tracks. This would entail closing off tracks to private vehicles to reduce erosion, damage to vegetation and conflict with pedestrians, and to permit regeneration/planting of surplus tracks (tracks to be closed are shown as hatched on **Figures 4.1** and **4.3**).
- Formalising walking tracks through the mine workings area to address safety issues associated with tunnels, shafts and potential rock falls; and to provide visitors with an appreciation of the history of the area. Three interconnecting loop walking tracks are proposed.
 - Loop Walking Track No.1 (see location 7, **Figure 4.1**). This would be a relatively easy, short, self-guided walk with directional markers, via Yalwal Cemetery (location 6), Golden Crown Open Cut incorporating a viewing platform and interpretive signs (location 8), and Chapmans Battery with interpretive signs (location 9).
 - Loop Walking Track No.2 (see location 15, **Figure 4.2**), incorporating Golden Crown processing plant remains, tramway and tunnels; boardwalk over Sawpit Creek; and the Albion Tunnel (access would be permitted part way into this tunnel).
 - Loop Walking Track No.3 (see location 19, **Figure 4.3**), including spur track to Ison/Sandeman/Underwood/Thomas Cut area; spur track to Pioneer Tunnel (entry would be permitted about 100 m into this tunnel to a drop chute); Homeward Bound Workings (picnic area) and high level tunnel. The walking track would pass through the tunnel into the open cut area where, to address public safety, the track would be via a raised boardwalk with viewing platforms.

(v) Design Guidelines

Design guidelines for site development have been formulated to protect the landscape and heritage values of Yalwal. These include:

- generally maintaining a basic level of facilities at Yalwal so that the 'remote' character is maintained;
- using 'traditional Yalwal' construction materials, eg timber, corrugated iron, consistent with the heritage values of the site;
- cabins to be of a modest scale with horizontal forms preferred (ie long, low structures) to integrate with the landscape; and
- facilities and future cabin designs to be based on ecologically sustainable development principles, eg energy efficient, use of solar power.

(vi) Interpretation, Marketing and Promotion

The old gold mine workings at Yalwal are considered to be the key feature of Yalwal (ie, what sets it apart from other bushland reserves within the region) and its prime attraction. Not only do they provide a sense of history but a sense of adventure through the exploration of tracks, tunnels and open cuts.

Accordingly, the main theme for interpretation is Yalwal's gold mining history. As Yalwal becomes more popular other key values of the area could be interpreted, eg geology, ecology, water catchment, Aboriginal sites and cultural heritage, the building of Danjera Dam and stocking with fish.

Initially the following information/interpretive material should be produced:

- updated version of the brochure - *Protecting Yalwal and Your Water Supply*;
- walking track brochure; and
- entrance booth display.

Promotion of Yalwal could be achieved through the Nowra Visitor Centre and NPWS Fitzroy Falls Visitor Centre, expanding to other visitor centres and NPWS/tourist websites as site development proceeds.

To increase week day, off-season and off-peak visitation to Yalwal, the primary target groups are:

- 'day visitors' (families, individuals, small groups <8 people);
- 'excursions' (large groups >8 people, comprising tourists, seniors, students, scouts, clubs and other organisations); and
- 'group campers' (large groups >8 people, comprising eco-tourists/cultural heritage tourists, scouts, students, clubs and other organisations).

(vii) Staffing and Site Planning

Due to the history of anti-social behaviour and criminal activities at Yalwal a permanent, full time ranger, accommodated in the Council house is recommended. Two temporary, part-time, three year positions are also proposed, ie interpretation officer and Aboriginal ranger, together with a fee collector (during peak times) paid on a commission basis.

Other management recommendations are the preparation of:

- A mines areas management plan (based on further search and mapping of mine hazards) and conservation plan as per the Yalwal Management Plan Conservation Policy.
- A visitor code of conduct/minimum impact code to be displayed at entry points and in main picnic area and also to be made available in brochure form.

- An interpretation plan.
- An emergency response plan, including procedures in case of fire and flood.
- A marketing strategy, including logo (eg Chapmans Stamper) for the reserve.

(viii) Fees and Booking System

To provide revenue to contribute to the implementation of the Concept Development Plan, the following, average, per person entry and camping fees are proposed:

- day visitor \$2.00
- camper \$5.00
- group campers \$4.00
- excursions \$1.50

Fees for tours and other services (average, per person) are also recommended, eg:

- guided tours \$5.00
- ranger guide for excursions \$1.00

These fees are based on those applicable to other public reserves and national parks. The introduction of fees should be accompanied by a booking system. Campsites, tours etc could be booked through the Nowra Tourist Information Centre and NPWS Visitor Centres. A ballot system for camping may also be required at peak times.

(ix) Site Development Costs

The total cost of the recommended site development works is approximately \$1.4 M. Staging is proposed to assist in funding the development. Priority has been given to those works (ie Stage 1, then Stage 2 works shown in Figures 4.1 and 4.2) which:

- address the most pressing management issues; and
- can be used to promote the area to potential visitors with an interest in passive recreational activities and cultural heritage.

The estimated costs for Stage 1 (refer to Figure 4.1 for details), Stage 2 (see Figure 4.2) and Stage 3 (see Figure 4.3) are as follows:

Stage 1	Stage 2	Stage 3
\$620,000	\$194,000	\$386,000

Estimated Revenue and Operational Costs for selected years are as follows:

	Year 1	Year 3	Year 10
revenue	\$ 1,308	\$ 1,948	\$ 365
operating costs	\$170,758	\$189,802	\$150,553

After Year 3, it has been assumed that tours operated by staff would be taken over by commercial operators on a commission basis. Accordingly, revenue decreases along with operational costs, a large component of which is salaries in Years 1-3.

As is apparent from estimates of revenue and operating costs, effective management of Yalwal could not be substantially funded through commercial returns. This is consistent with other similar public parks and reserves. It must be remembered that costs are currently incurred by Council and others in dealing with management

issues. These issues would be addressed through implementation of the Concept Development Plan and benefits would flow from:

- protection of the Danjera Dam water supply;
- ensuring public safety; and
- reducing environmental damage to the area.

(x) Main Recommendations

The main study recommendations are summarised below:

- Implementation of site development works as described above in Section (iv).
- Employment of a full time ranger.
- Production of information/interpretive material, ie:
 - updated version of Protecting Yalwal and Your Water Supply;
 - walking track brochure; and
 - entrance booth display.
- Preparation of:
 - a mine workings conservation plan and management plan;
 - a visitor code of conduct/minimum impact code;
 - an interpretation plan;
 - an emergency response plan; and
 - a marketing strategy.
- introduction of a booking system and fees for reserve entry, camping and other services.

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1 Background

1.1 Study Location

Yalwal is located in the Shoalhaven Local Government Area (LGA), approximately 30 minutes drive (26 km) west of Nowra, which is 159 km south of Sydney (see **Figure 1.1**). It falls within the northern part of the South Coast Tourism Region, which is noted for its beaches and national parks and opportunities for active outdoor recreational pursuits, such as bushwalking and fishing (Tourism NSW 1999).

Various areas of publicly owned land in the vicinity of Yalwal are under the control of Shoalhaven City Council (SCC), NSW National Parks and Wildlife Service (NPWS), the Department of Land and Water Conservation (DLWC) and State Forests. Yalwal is managed in accordance with the Yalwal Management Plan (Shoalhaven Water 1999) and SCC, NPWS and DLWC are currently developing a Memorandum of Understanding (MOU) to formalise co-operative management arrangements.

The Yalwal locality includes Danjera Dam, associated picnic/camping areas and old gold mine workings. These are surrounded by Morton National Park, Ettrema Wilderness Area within the national park, Crown land and privately owned land.

Danjera Dam discharges to Danjera Creek which joins Yarramunmun Creek to become Yalwal Creek, a tributary of the Shoalhaven River. Sawpit Creek is the main creek flowing through the old gold mine workings to Danjera Dam.

1.2 Brief History of Yalwal

The following information has been compiled from the *Shoalhaven City Council Heritage Study 1995-1998* (Peter Freeman Pty Ltd et al 1998), *Yalwal Management Plan* (Shoalhaven Water 1999) and the draft guide to The Two Rivers Track (Evans et al, in preparation).

The original inhabitants of the Yalwal area were thought to be the Wandandian people, who belonged to a broad language group known as Dhurga. The Wandandian country extends from the Shoalhaven River to Ulladulla.

In the 1840s grazing was established in the area, with the first permanent residents being stockmen who worked on the stations. This included the Fletcher brothers David and Edward; the Fletchers still own property at Yalwal today.

Silver was found in Yalwal Creek in 1849 followed by gold in 1852, reflecting the discoveries elsewhere in NSW at this time. First attempts at reef mining began on the west bank of Danjera Creek on a Claim made in 1871 (The Pinnacle). Other Claims quickly followed on both sides of Danjera Creek, with the greatest concentration on the slopes adjacent to Sawpit Gully.

The *Pioneer* mine was begun in 1872 followed by the *Eclipse* in 1874. Irregular and often sparse occurrences of payable ore eventually changed the form of mining from underground to quarrying with associated larger processing works and transportation shafts, tunnels and tramways.

The *Homeward Bound* was developed in 1874 and by 1875 had a five head stamp battery. In 1887 a cyanide plant was in use followed by a 10 head stamper. Between 1882 and 1900 this mine produced 24,000 oz of gold. North of the *Homeward Bound*, the *Pioneer* crushed with 40 heads between 1890 and 1892. Both the *Pioneer* and *Homeward Bound* introduced new cyanide plants in 1898.

Gold production peaked in the 1890s when the *Golden Crown* opened on Sawpit Gully. World War I effectively ended commercial mining at Yalwal and the major items of equipment were dismantled and sold in 1916. Sporadic work continued

through the 1920s and 1930s and even into the 1960s, when Leo Chapman worked several leases and built the stamper which remains at Yalwal today.

During the 1880s the Yalwal village had a School of Arts, three stores, a cemetery, bank, hotel and post and telegraphic services. A school was opened in 1881 and Yalwal was proclaimed a "village" in 1892.

Much of what remained of gold mining activities and the village of Yalwal was destroyed by a wildfire in 1939. The village site was subsequently flooded by the damming of Danjera Creek in the late 1960s, with Danjera Dam being completed in 1971. A picnic area with basic facilities, established soon after completion of the dam, quickly became a de facto camping area.

Most of the mines are above the water level of Danjera Dam but the sites of the processing plants are mostly under water. A few walls, anchor blocks and other relics remain. The original village butcher's shop, run by the Fletchers, is located on their property to the east of the dam.

1.3 Site Description

Danjera Dam has a catchment area of 114 km² (most of which is within Morton National Park) and maximum capacity of 7,800 ML. It has a maximum depth of 30 m, the wall of the dam is 278 m long and the stored waters extend about 7 km upstream to Belmore Flat (Shoalhaven Water 1999).

The Council owned reserve adjacent to the dam is approximately 0.38 km² in area. The old mine workings cover approximately 0.56 km² and are Crown land. The Yalwal site, for the purposes of this report, is that covered by the Management Plan (Shoalhaven Water 1999) and includes the above and also a Council owned house and the NPWS rest area (see **Figure 1.2**). Although not directly included in the site, the Yalwal historic cemetery (located on Crown land) is considered in this report.

Vehicle access to Yalwal from Nowra is via Yalwal Road (the last 17 km of which is unsealed) and a low level bridge (built in the late 1960s) over Yarramunmun Creek. From Canberra unsealed road access is available via Main Road 92 (Braidwood to Nowra) and Deans Gap Road to Yalwal Road. Access is also possible via the Yarramunmun Tops Fire Trail which leaves Main Road 92, a short distance west of Tianjara Falls. Deans Gap Road is rough in places and the Yarramunmun Tops Fire Trail is in very bad condition and may eventually be closed to the public, pending the outcomes of a current wilderness assessment (Evans et al in prep., Feary pers. comm.). See **Figure 1.1**, which shows access routes.

Yalwal also serves as one of the track heads for the Two Rivers Walking Track, which links Grassy Gully on the Shoalhaven River with Yadbore on the Clyde River. Formal camping areas along the track are located at Coolendel (privately run), Yalwal and Yadbore. The walking track was developed by the Shoalhaven Community Development Aboriginal Corporation, SCC and NPWS. Section 1, Shoalhaven River to Yalwal, was opened in 1997 (Evans et al in prep.).

The Council house (see **Photo 1.1**) is located on the south side of Yalwal Road, to the east of the bridge (**Photo 1.2**) over Yarramunmun Creek. Land closer to Yarramunmun Creek, on the northern side of the road, is within Morton National Park. NPWS carried out works in this informal camping area in 1999 to address erosion problems caused by previous unrestricted vehicle access. This 'rest area' now includes formal access roads and carparking and will shortly include a composting toilet and interpretive signage. It provides for pedestrian access to the adjoining Ettrema Wilderness Area, picnicking and informal short-stay camping.

On the western side of Yarramunmun Creek is a parking area and signage setting out conditions of entry to Yalwal and the location of designated camping areas.

Two small designated camping areas (see Photos 1.3 and 1.4) are located either side of the Yalwal access road, downstream of Danjera Dam, before it splits into a one-way loop road. Two smaller cleared areas, either side of the road, beyond the designated camping areas are also used by campers.

The lower loop road leads to a boat launching area and then onto the main picnic/camping area (Photos 1.5 and 1.6). This is a relatively large, cleared area which looks over, and provides direct access to Danjera Dam. It contains several wood barbecues, rubbish bins and a toilet block (flushing toilets). A pump house is located to the south-west of the picnic area and supplies water via a pipeline to two storage tanks that service the toilet block. Wastewater is directed to a septic tank, adjacent to the toilet block, with effluent discharged into an adsorption trench.

The loop road cuts through the main picnic/camping area closer to the waters edge and continues uphill to join with the upper loop road along a ridge. The roads meet at a large cleared area which is used for informal camping and parking. To the west of the access road and cleared area is bushland and views to the ridgeline on the western side of Danjera Dam. To the east is cleared farm land and a group of farm buildings. This property also includes the old Yalwal village butcher's shop. A short walk from the end of the formal access road is the Yalwal historic cemetery. Photos 1.7 and 1.8 show this area. A sign has been installed at the cemetery showing the layout of graves and the names of those buried there, including three children from one family (who all died from diphtheria in the space of 48 hours) and members of the pioneering Fletcher family. It was installed as a joint bicentennial project by the NSW Bicentennial Council, SCC, Shoalhaven Geneological Society and the Royal Australian Engineers. A number of unmarked graves are believed to be located to the west of the cemetery.

South-west of the cemetery, at the end of the formal access road lies the old gold mine workings area. This comprises a number of informal vehicle and walking tracks, many of which are part of the tramways associated with the transportation of ore to processing sites (see Figure 1.3). Photos 1.9, 1.10, 1.11 and 1.12 show Chapmans Battery on the edge of Danjera Dam, the Pioneer Tunnel and the Homeward Bound Tunnel and open cut respectively.

1.4 Key Values and Attributes of Yalwal

1.4.1 Geology

The geology of Yalwal has been called "complex volcanics". It is one of few places near Sydney where streams have cut through the sandstone cap to reveal the underlying volcanics. This includes bands of igneous rocks, such as dolerite and rhyolites, and metamorphic quartzite, schist and slate.

Also close to Yalwal is an interesting geological feature called the "Chimney Stack Pinnacle", a block of sandstone about 27 m high and only 2 m wide at the top, which has slid away from the parent cliff. It is one of the best examples of a "gliding block" within the Sydney Basin and has been noted in geological journals both in Australia and overseas (Shoalhaven Water 1999, Evans et al in prep.).

1.4.2 Landscape

High vantage points around Yalwal provide spectacular views over Danjera Dam to a wilderness backdrop. *The ruggedness of the area and its aura of remoteness explain why it is popular for camping, walking and "off-road" driving and riding* (Shoalhaven Water 1999). The presence of the dam provides for a variety of scenic views, ranging from open water views at the main picnic/camping area to water glimpses, fringed by bushland, at other locations. In addition to this, the open cut

mines provide a sense of the unexpected, as views unfold at the end of tracks and tunnels.

1.4.3 Ecology

The volcanic soils in the Yalwal valley support a forest dominated by Forest Red Gum *Eucalyptus tereticornis*. This type of forest is seldom present in protected areas, being characteristic of high nutrient soils and hence subject to clearing for farm land. The Grey Gum-Stringybark forest in the southern part of the area is also of botanical interest because of the prevalence of *Eucalyptus beyeriana*, which is at its southern limit. Within the region, this ironbark is only known to occur in Grey Gum forest at Yalwal, most probably due to the presence of volcanic soils rather than sandstone derived soils.

Five regionally rare plant species have been recorded at Yalwal, with several threatened and/or rare plants known to occur in the district. Burrawangs *Macrozamia communis* (a cycad with palm-like fronds up to 2 m in length), which are so typical of the Burrier district, are also a feature at Yalwal.

Unique or uncommon habitats found at Yalwal include:

- Danjera Dam, which provides deep water habitat that is not present elsewhere in the district.
- The tree species *Eucalyptus tereticornis* and *Eucalyptus beyeriana*, the former regarded as an important habitat tree and the latter an important source of nectar.
- The mine tunnels, which provide habitat for some bat species – the Eastern Horseshoe-bat was recorded near the tunnels.

The number of mammal and bird species recorded at Yalwal reflects the diversity of habitats and its proximity to large tracts of undisturbed forest habitat in the adjacent Ettrema Wilderness Area. The presence of one threatened species, the Yellow-bellied Sheath-tail-bat, has been confirmed (Kevin Mills & Associates 1998, Shoalhaven Water 1999).

1.4.4 Water Catchment

The catchment of Danjera Dam includes Yalwal and the Ettrema Wilderness Area. Since the dam was commissioned in 1972, there have only been a few occasions when it has become necessary to release water to supplement Shoalhaven's water supply. However, in the future the dam is likely to play a more important role due to:

- the increasing population of the Shoalhaven and hence rising demand for water; and
- because economic and environmental constraints make it more difficult to provide new, alternative sources of water.

Danjera Dam also has a role to play in sustaining downstream riverine ecology, through the periodic release of water to maintain 'environmental flows' (Shoalhaven Water 1999).

1.4.5 Cultural and Heritage Values

Many of the valleys and ridgelines around Yalwal and within Morton National Park were routes used by Aborigines for movement throughout the hinterland and between the highlands and coast. After European settlement many of these ancient routes became an important part of the early bridle trail network used for movement of stock (NPWS 1998).

A number of Aboriginal sites have been recorded in the Yalwal area comprising scatters of stone artefacts and grinding grooves. The most recent recording was a

stone artefact site in the vicinity of the NPWS rest area. The archaeological significance of this site was assessed as moderate based on:

- the medium size of the site, both in terms of the number of artefacts and the area over which they were distributed;
- the local rarity of this site type (based on limited archaeological investigations of the general area); and
- the high level of site disturbance.

Representatives of the Nowra Local Aboriginal Land Council (LALC) also identified the site as having moderate significance to their people (AASC 1999).

The Yalwal mine workings have been assessed as being of regional heritage significance both for their historic and scientific values. *Although the Yalwal Goldfields were not proclaimed until 1878 discovery of silver in 1849 followed by gold in 1852 makes them contemporary with the first 'gold rush' fields at Majors Creek (south of Braidwood) and elsewhere. The scale and nature of the surviving evidence illustrates the complexity of mining operations and the contribution the mine made to the economy of the Shoalhaven district. The mine has potential to illustrate late nineteenth and early twentieth century reef mining techniques* (Peter Freeman Pty Ltd et al 1998).

The small cemetery is also important as a relic of the mining community....and for its incidental demonstration of the harshness of life in a remote mining settlement (McGowan & O'Keefe 1998).

1.4.6 Recreation and Tourism

Yalwal is located close to Nowra and is within a four hours drive of the major population centres of Sydney, Wollongong and Canberra. Convenient access from southern and south-western Sydney and from Wollongong has attracted overnight visitors primarily from these areas. Peak day use visitation has been estimated at about 60 people, with over 100 campers recorded for the October 1999 long weekend (SCC letter dated 28/5/2000).

Yalwal is currently popular with trail bike riders and 4WDs, particularly as a stop for 4WD trips on the Yalwal/Yarramunmun/Tianjara/Twelve Mile/Braidwood Road loop. Tourism and recreational opportunities and attractions at Yalwal (consistent with the vision for the area, see Section 1.5.2) include the historic cemetery, exploring the old mine workings, canoeing, swimming, picnicking and camping. Yalwal is also a track head for the Two Rivers Walking Track and provides access to the Ettrema Wilderness for bushwalking, orienteering and other adventure and training exercises.

Yalwal provides an alternative experience to the nearby beaches and coastal area and Danjara Dam provides opportunities for still, freshwater recreational activities in an essentially natural setting.

1.4.7 Education

The features of Yalwal and its accessibility for small student groups make it a suitable area for the study of geology, water catchment management and gold mining history. Its proximity to Morton National Park and the Ettrema Wilderness Area within the park also provides opportunities for nature study, appreciation of Aboriginal culture, training/outdoor education programs and adventure tours.

1.5 Planning Framework

1.5.1 General Plans and Strategies

Draft Local Environmental Plan No. LP 277, SCC 2000

Land at Yalwal is zoned Environment Protection 7(c) (Water Catchment areas) with the Council house located on land zoned 7(d1) (Scenic). The Shoalhaven Local Environmental Plan (LEP) currently prohibits tourist facilities in the 7(c) zone.

Draft LEP No. LP 277 provides for an "allowance clause" to make camping and tourist facilities permissible at Yalwal with the consent of Council, provided proposals are consistent with the aims and objectives of the Yalwal Management Plan. Matters which need to be adequately addressed for any development to proceed include visual impact, heritage conservation, management of riparian buffers, effluent management, water quality, erosion control and the size and scale of the development.

Draft Heritage Local Environmental Plan, SCC 2000

The draft LEP provides protection for the Yalwal gold mines, cemetery and town site. Any development in the vicinity of these items/areas must be compatible with their heritage significance.

The Future of Tourism in the Shoalhaven, Manidis Roberts Consultants and Dain Simpson and Associates 1996

The objectives of this strategy include to *establish visitor products based on the environmental and cultural assets to provide a broader visitor experience, capable of appealing to new markets.*

Shoalhaven Parks Draft Recreation Strategy, SCC 1999

The goal of this strategy is to *improve the quality of life in the Shoalhaven by creating a diversity of recreation opportunities whilst protecting and enhancing the natural and built environment.* The strategy also encourages commercial provision of recreational opportunities.

A community survey carried out as part of this strategy found that walking/cycle trails and informal parks and gardens were the most valued 'facilities' within the Shoalhaven.

Shoalhaven Parks Draft Walking Tracks Strategy, SCC 2000

The aim of this strategy is to provide and promote (in consultation with stakeholder groups) a range of quality walks for residents and visitors. The strategy also encourages the design and construction of walking tracks in accordance with established guidelines and standards, and in a manner which protects the environment.

Morton National Park, Budawang National Park Draft Plan of Management, NPWS 1998

Included in the objectives for Morton National Park is the provision of opportunities for low-key day and overnight recreational use on the edges of the park. The Yalwal area of Morton National Park is noted as providing opportunities for day and overnight use in a rugged natural setting. The plan provides for a basic day use facility with formalised parking and toilets at the NPWS rest area. It is also noted that *provision of a formal camping facility in the area may be desirable but investigation is needed to determine the most appropriate location for this amongst the different land tenures* (ie NPWS, SCC, DLWC and State Forest controlled lands).

1.5.2 Yalwal Management Plan

The Yalwal Management Plan was prepared to protect the Danjera Dam water storage and the area's natural, cultural and other attributes from the adverse impacts of inappropriate recreational activities and visitor behaviour. Accordingly, one of the desired outcomes of the management plan is to change visitor expectations and attitudes towards Yalwal, so that conservation values are recognised and the area's full range of visitor experiences can be appreciated.

The Management Plan (Shoalhaven Water 1999) identified the vision for Yalwal as:

- *A place where people may capture something of the pioneering spirit of the early settlers and miners who helped lay the economic foundation in the Shoalhaven district.*
- *An opportunity to enjoy almost pristine bushland typical of the plateau, valleys and streams of the south coast of NSW and ready access to its underlying geology.*
- *An example of how public visitation and tourism may be achieved and managed without damage to the natural and cultural environment or threat to the integrity of the adjacent water supply.*

The objectives of the Management Plan are set out below.

Primary Objective

- *To ensure that the Danjera water supply system is safeguarded against pollution, siltation and other threats to its integrity.*

Other Objectives

(subject to compatibility with primary objective)

- *To protect the natural and cultural environments of the area from damage through inappropriate human activities and other factors.*
- *To identify recreational and economically viable tourist opportunities compatible with sound management policies for water storage and natural and cultural values.*
- *To provide for outcomes which are economically sound and feasible to administer.*

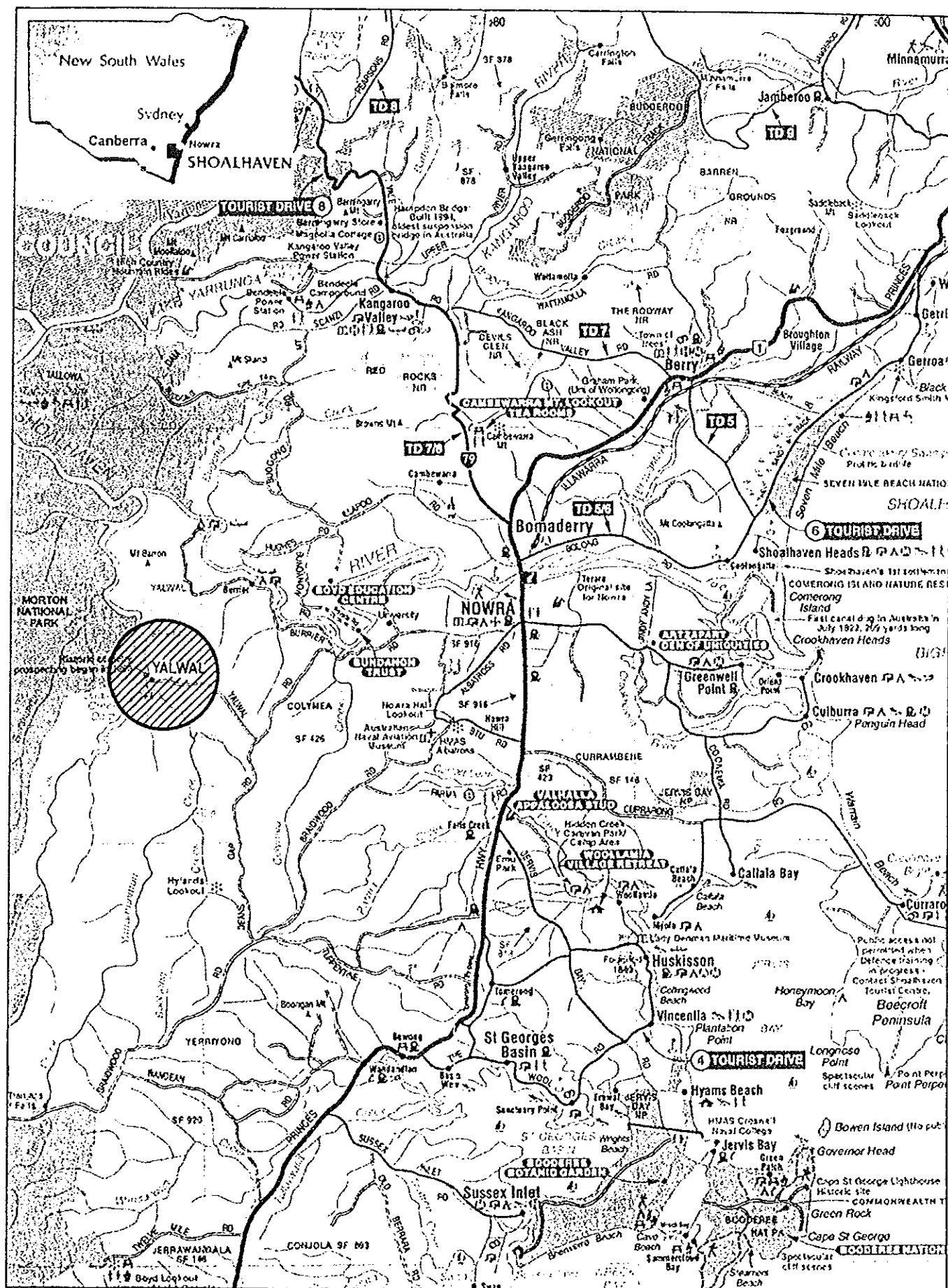
The management plan included a *Background and Discussion Paper on Yalwal's Tourism Potential* (Dain Simpson & Associates 1998).

In February 2000, Shoalhaven Water called for proposals to progress recommendations contained in the plan associated with recreation and tourism. These recommendations/suggestions included:

- provision of group camping facilities (eg kitchen and shelter) targeting school groups;
- on-site management of the area;
- built tourist accommodation (for example cabins utilising 'clean' energy and environmentally sensitive waste disposal systems); and
- development of a 'mining heritage park' to re-create the history of the area (including identification of safe walking routes through the old mine workings).

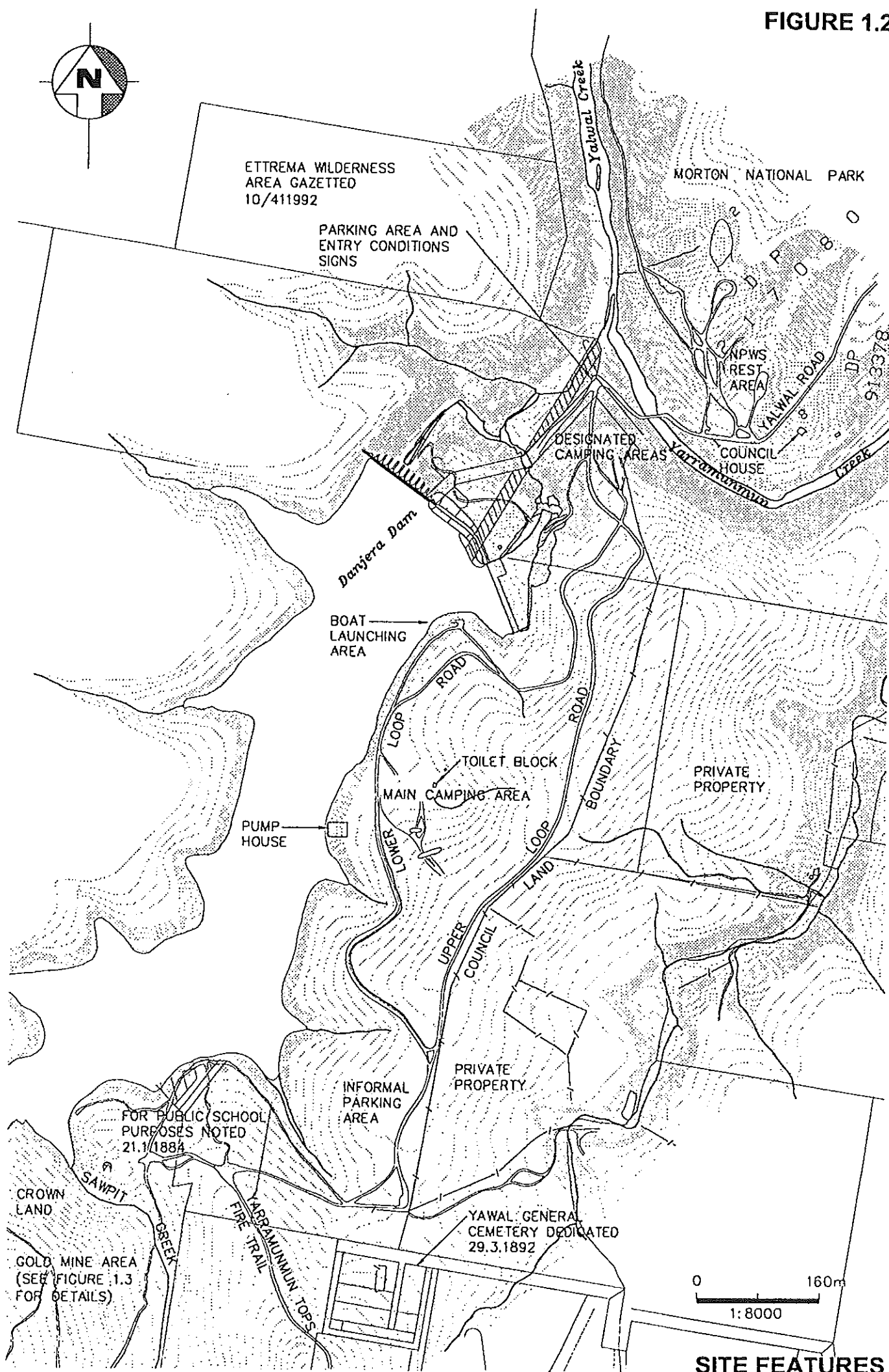
These and other options for Yalwal are the subject of this report.

FIGURE 1.1



SOURCE : CARTOSCOPE, 2000

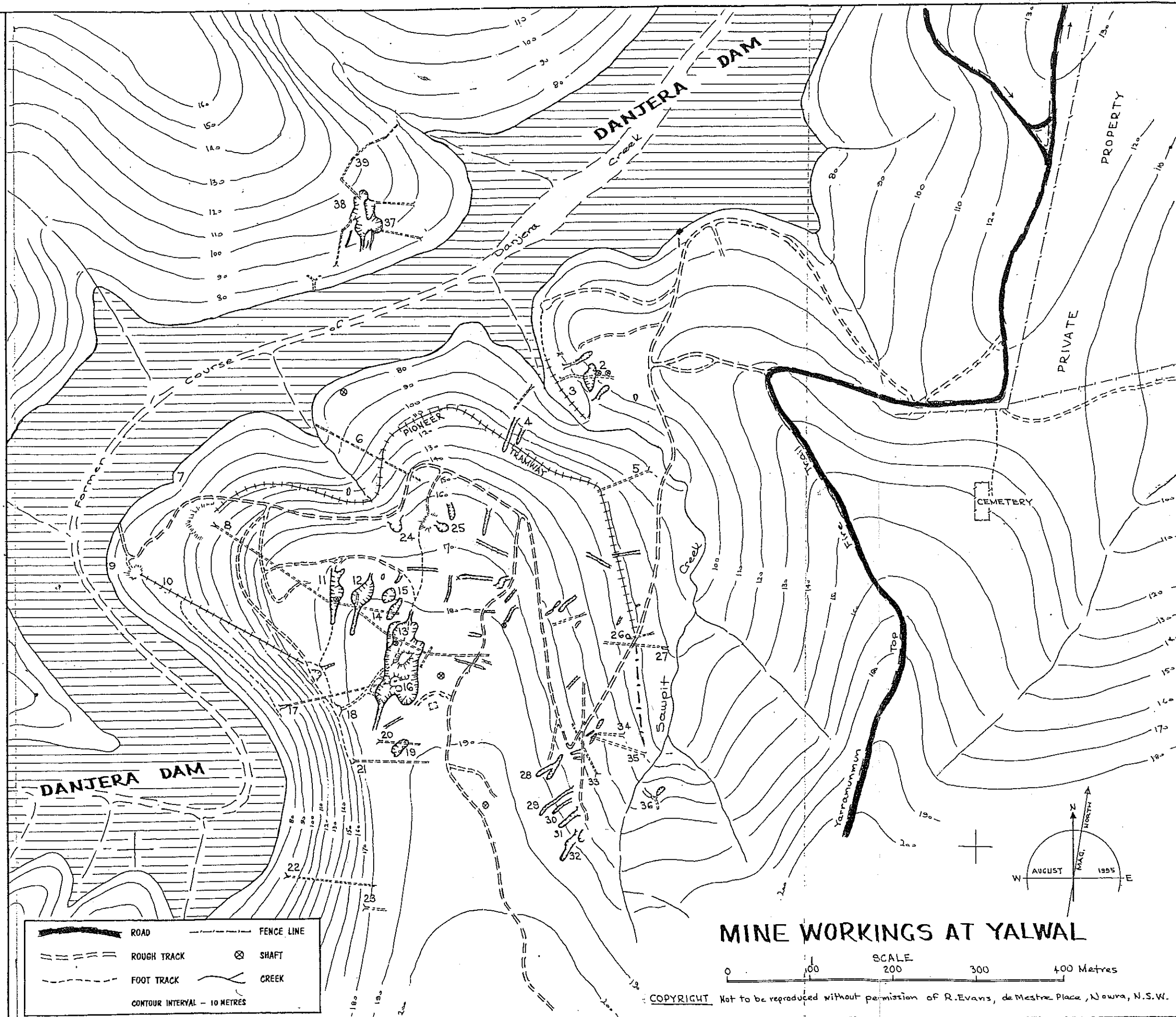
FIGURE 1.2



SITE FEATURES

FIGURE 1.3

- | MAP NO. | FEATURE |
|---------|----------------------------------|
| 1 | CHAPMAN BATTERY |
| 2 | GOLDEN CROWN MINE |
| 3 | TRAMWAY |
| 4 | HIDDEN TREASURE MINE |
| 5 | ALBION TUNNEL |
| 6 | PAUL'S TUNNEL |
| 7 | PIONEER WORKS |
| 8 | PIONEER TUNNEL |
| 9 | HOMeward BOUND WORKS |
| 10 | INCLINED TRAMWAY |
| 11 | PIONEER No.1 OPEN CUT |
| 12 | PIONEER No.2 OPEN CUT |
| 13 | PIONEER No.3 OPEN CUT |
| 14 | PIONEER CROSS CUT |
| 15 | SPENCER WORKINGS |
| 16 | HOMeward BOUND OPEN CUT |
| 17 | HOMeward BOUND LOW LEVEL TUNNEL |
| 18 | HOMeward BOUND HIGH LEVEL TUNNEL |
| 19 | STAR QUARRY |
| 20 | STAR No.1 TUNNEL |
| 21 | STAR No.2 TUNNEL |
| 22 | STAR No.3 TUNNEL |
| 23 | PINCOMBE ADIT |
| 24 | VICTORY QUARRY |
| 25 | FOUNTAIN HEAD WORKINGS |
| 26 | BLACK LOBE WORKINGS |
| 27 | USHER TUNNEL |
| 28 | CALEDONIAN WORKINGS |
| 29 | ISON CUT |
| 30 | SANDEMAN CUT |
| 31 | UNDERWOOD CUT |
| 32 | THOMAS CUT |
| 33 | SIR JULIAN LEG ADIT |
| 34 | GOLDEN QUARRY No.1 ADIT |
| 35 | GOLDEN QUARRY No.2 ADIT |
| 36 | GOLDEN QUARRY No.3 ADIT |
| 37 | PINNACLE WORKINGS |
| 38 | ECLIPSE WORKINGS |
| 39 | ECLIPSE TUNNEL |



MINE WORKINGS AT YALWAL

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PHOTO 1.1

COUNCIL HOUSE



PHOTO 1.2

BRIDGE OVER YARRAMUNMUN CREEK



PHOTO 1.3

WESTERN DESIGNATED CAMPING AREA



PHOTO 1.4

EASTERN DESIGNATED CAMPING AREA



PHOTO 1.5

MAIN PICNIC / CAMPING AREA (TOILET BLOCK IN BACKGROUND)



PHOTO 1.6

MAIN PICNIC / CAMPING AREA (TOILET BLOCK IN BACKGROUND)



PHOTO 1.7

YALWAL HISTORIC CEMETERY

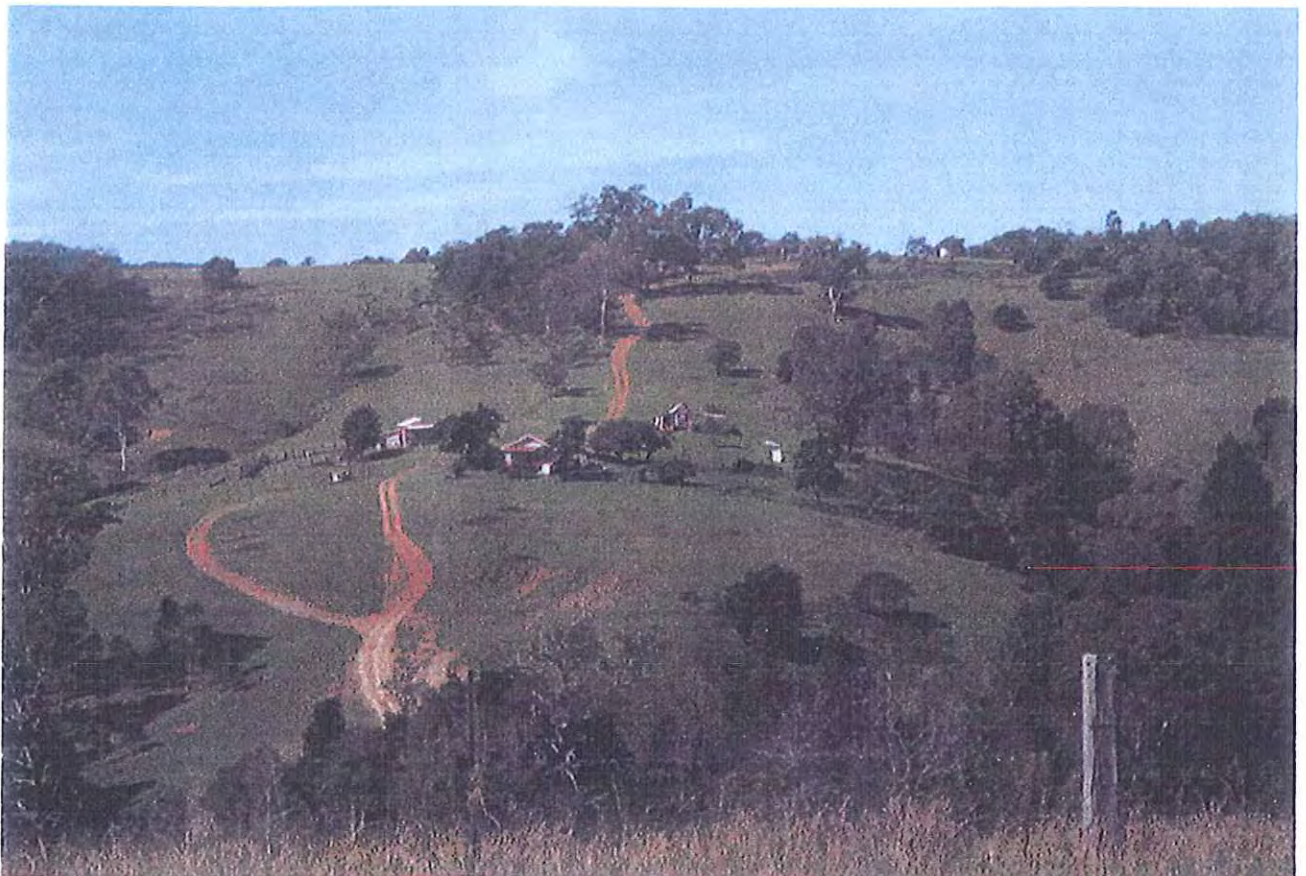


PHOTO 1.8

VIEW TO FARM BUILDINGS



PHOTO 1.9

CHAPMANS BATTERY



PHOTO 1.10

PIONEER TUNNEL



PHOTO 1.11

VIEW TO DANJERA DAM FROM HOMEWARD BOUND TUNNEL



PHOTO 1.12

HOMEWARD BOUND OPEN CUT WITH HOMEWARD BOUND TUNNEL IN MID-GROUND

2 Opportunities and Constraints

2.1 Visitation and Accommodation

Further information can be found in **Appendix A, Market Analysis.**

2.1.1 Background

Yalwal Visitation

Table 2.1
Peak Yalwal Visitation 1999-2000

	Easter*	Anzac Day long w'end	1999 2 May (Sunday)	16 May (Sunday)	October long w'end	2000 27-28 May (weekend)
day visitors			55-60	60		
campers:			nil			60
main area	45	32		15	>100	
other areas	10	11				
NPWS area	30			30		
vehicles:				10		27
4WDs			23	23		
sedans			1	9		
bikes (reg)	8	2		10		11
bikes (unreg)	12	3	2	9		2

note: *poor weather

source: SCC letter dated 28/5/2000

- Average weekly two-way traffic movements for Yalwal Road, between 3 April 2000 and 14 May 2000, ranged from about 27 to 99 (the traffic counter did not function continuously during this period). The peak daily two-way traffic volumes for Easter Friday, Saturday, Sunday and Monday were 128, 206, 203 and 196 respectively.
- Visitation tends to be higher between Autumn and Spring.
- Since February 1999 (due to an increase in the number of patrols) it appears that the number of unregistered motor bikes has decreased.
- Since closure of the Yalwal Creek Fire Trail in mid 2000 and construction of formal carparking, the type of visitor to the NPWS rest area has changed, ie more family groups and fewer 4WD and trail bike groups.
- During the 1999 Easter holidays about 50% of visitors were at Yalwal for the express purpose of motor bike riding with the remainder pursuing passive recreational activities.
- 16 May 1999 – six canoes were using the dam.
- Between about May 1999 and May 2000 the number of 4WD 'convoys' passing through the reserve as part of the Yalwal/Yarramunmun/Tianjara/Twelve Mile/Braidwood Road 'loop' has increased (Yalwal appears to be a 'morning tea' destination and toilet stop).
- Most visitors are from Wollongong and Sydney southern and south-western suburbs (SCC 28/5/2000).
- There appears to be little use/awareness of Yalwal amongst Nowra residents.

South Coast/Shoalhaven Visitation

- It appears that visitation to the south coast has decreased since 1994/95 but that length of stay has increased to 3.9 nights, which is amongst the highest in NSW.
- For the year ended June 1999, most overnight visitors visited the south coast in January (18%) followed by April (10%) and February and May (9% each).
- The percentage of visitors for these peak summer and school holiday periods was 1 to 2% higher than the State average, apart from the month of January when visitation was 6% higher than the State average.
- Most visitors to the south coast are a parent with youngest child aged 6-14 (15%), older non-working married person (14%), parent with youngest child aged 5 or less (13%).
- Most overnight and day visitors go to the beach (56% and 21% respectively), visit friends or relatives (29% and 17%), go fishing (25% and 9%) and visit national parks/go bushwalking/visit rainforests (23% and 9%) (BTR 2000).

South Coast/Shoalhaven Accommodation

- Most visitors to the south coast stay in accommodation provided by friends or relatives (28%), a caravan park or commercial camping ground (23%) or self-catering cottage or apartment (19%) (BTR 2000).
- A 1994/95 survey (MRC and Dain Simpson 1996) found that most visitors to the Shoalhaven stayed in a guesthouse (27%), caravan park (25%), motel (21%) or holiday home/home of friend or relative (21%).
- Shoalhaven has a high percentage of unoccupied dwellings (28.7%) assumed to be holiday homes, located mostly in the coastal towns and villages (SCC undated).
- The south coast has a high number of caravan parks compared to other regions in NSW.
- In 1995/96 there were about 72 caravan parks in the Shoalhaven LGA, providing about 10,000 sites with the average annual occupancy rate being approximately 67% (ABS 1995-1996).
- In the southern highlands/coastal region between Wollongong and Batemans Bay there are 34 formal camping areas (including Yalwal, see **Figure 2.1**) within 19 publicly owned parks and reserves (eg National Parks, State Forests, riverside reserves) plus bush camping areas – in addition to Yalwal, three State Forests in this area are popular with 4WDs (Lewis and Savage 1999).
- Some of these State Forests, or parts of the forests, came under NPWS control on 1 January 2001 under the Regional Forest Agreement. The remaining sections of Yalwal State Forest, north of Danjera Dam, have been added to Morton National Park or have become Bundundah Reserve. Colymea State Forest, east of Yalwal, has become, in part, Colymea State Recreation Area and may include camping facilities in the future.

Environmental Study Sites/Student Excursions/Tours

- A survey of southern NSW organisations (Wollongong to Victorian border and to just west of the ACT) identified 63 environmental study sites in this area.
- Most of these sites demonstrate forest management, coastal/estuary management or are remnant rainforest, with Nerrigundah demonstrating old mine workings and an old gold mining town.
- There are two field study centres located in southern NSW – Bournda and Mt Kembla, the Boyd Education Centre is located on the Shoalhaven River

(Rumbalara Field Studies Centre 1995) with the Minnamurra Rainforest Centre being another important environmental education destination in the region.

- Primary schools tend to visit youth camps, field study centres and local parks.
- Although primary schools conduct more excursions they require considerable support through either programs or displays.
- Secondary schools tend to visit national parks and coast/wetland areas.
- Secondary teachers use excursions as an opportunity to show areas of contrast to the local area, or use sites capable of covering environmental issues at a local level.
- Almost half the excursions lasted a full day, with those lasting several days tending to be primary school excursions interstate or to youth camps.
- Factors influencing a teacher's choice of venue were cost, contrast to school environment, being close to school, having hands on activities, part of a wider study (eg streamwatch, or a catchment study), the programs available at the site, the venue being relevant to a particular study topic and the site's features (eg striking rainforest).
- Local parks and national parks were chosen because they were close and cheap, excursions to dams were also identified as relatively inexpensive.
- Dams were used to study water quality and youth camps were used for bushwalking and sport/recreation activities (eg canoeing, abseiling).
- Primary schools generally undertook more identification activities (eg catching water bugs) whereas high school students did more water studies and scientific research (eg measuring phosphorous levels and turbidity) (Howard 2000).
- There are approximately 30 schools in the Shoalhaven LGA; and two TAFE colleges (Nowra and Bomaderry) and a campus of the University of Wollongong at Nowra.
- There are 31 organisations currently licensed with NPWS to undertake group activities in parks within or close to the Shoalhaven area (eg Morton, Budderoo and Budawang national parks and Bundonia State Recreation Area).
- Of these, approximately 26 are commercial operators (10 South Coast/Southern Highlands-based, 9 Sydney-based) with the remainder being schools or non-profit organisations, engaged predominately in outdoor sports activities (two involve camping).
- Services/activities offered by commercial operators fall roughly into the following categories: 'adventure tours' focusing on outdoor sports (9 operators); sightseeing/less strenuous 'bush experiences' (9 operators); corporate training/personal development (3 operators); environmental education (1); bushwalking (1); cycling (1); motor bike tours (1); and 4WD tours (1).
- It appears that six of the operators offer camping; only one of the 'bush experience' tours offers a 'cultural' component (bush tucker) and wildlife component (spotlighting); and only one of the 'adventure tours' specifies an environmental studies component.
- In the Shoalhaven/Southern Highlands area there are approximately six NPWS 'Discovery' tours currently available. These are essentially single activity tours operating during school holidays. Activities include cycling, canoeing, rock platform walks, bushwalking, spotlighting and wildlife surveys (obviously with an education/conservation focus).

2.1.2 Constraints to Visitation/Level of Facilities/Accommodation

- Yalwal is not serviced by a reticulated water supply system.

- Effluent disposal directly into the soil is not recommended due to the moderate to low permeability of the soil and proximity to Danjara Dam (and hence risk of pollution) – see **Appendix B**.
- Mains power is not available and the closest connection to the supply grid is approximately 13 km to the east.
- Mobile telephone coverage is not available at the picnic area and throughout the mine workings.
- Yalwal is fairly 'remote' in the context of an emergency situation due to restricted access and communications.
- Seasonality of visitation to Yalwal and the Shoalhaven as a whole.
- The current anti-social behaviour of some visitors to the area and criminal activities, eg car break-ins and theft.
- Access road is not suitable for large coaches.
- School programs may require considerable support in terms of activities, equipment and transport in order to offset resource constraints faced by schools (Howard 2000).
- Development of commercial tours would be dependent on interest from the private sector.
- The type of activities that could be offered are constrained by Yalwal's proximity to the Ettrema Wilderness Area.

2.1.3 Opportunities

Increase day use by Shoalhaven residents:

- between 1991 and 1996 Shoalhaven had the largest increase in population outside the Sydney Region
- approximately half the Shoalhaven population is located close to Yalwal (ie Nowra-Bomaderry, Shoalhaven Heads, Berry, Greenwell Point and Kangaroo Valley (which is the fastest growing area in this part of the LGA)
- in 1996 there were approximately 8,000 primary school students and 5,300 secondary school students in the Shoalhaven LGA (SCC undated).

Make Yalwal more attractive for families and independent retirees:

- a higher percentage of the Shoalhaven population is aged 12 years and under and 55 years and over than the State average (SCC undated).

Promote low-impact activities:

- rangers report that freshwater fishing and canoeing on the dam are becoming increasingly popular (letter dated 28/5/2000)
- Yalwal provides the opportunity to study a variety of topics, eg history, indigenous and non-indigenous culture, geology, catchment management, water quality and water supply
- Yalwal provides a point of access for longer bushwalks between points of interest, eg stage 1 of the Two Rivers Walking Track links gold mining relics at Grassy Gully and Yalwal
- the Ettrema Wilderness Area provides opportunities for backpacking, dispersed bushwalking, orienteering and similar activities.

Promote Yalwal as a heritage attraction:

- there are opportunities to develop tours with a heritage theme, as most tours in the region focus on outdoor sports and sightseeing

- the Yalwal Management Plan (Shoalhaven Water 1999) suggested creation of a 'mining heritage park' (see further discussion on this aspect in **Section 2.2**).

Provide alternative accommodation to camping:

- MRC et al (1996) identified a market for 'wilderness cabins' in the Shoalhaven area.
- NSW Tourism Commission (1990) noted the potential for tourist facilities adjacent to national parks in the Illawarra/South Coast region.

2.1.4 Issues to be Considered

- servicing (see **Section 3.8**), including communications in case of fire or flood
- littering
- informal fire pits
- vandalism of toilet blocks, signs etc
- 'paddock bashing', abandoned/stolen vehicles
- security of parked vehicles
- motor bikes ridden at high speed/conflict between walkers and vehicles
- illegal discharge of fire arms
- track erosion
- provision of fire wood

2.2 Gold Mine Workings and Cemetery as a Tourist Attraction

Further information can be found in **Appendix A, Market Analysis**.

2.2.1 Background

- The mine workings and cemetery would be classified as a "minor destination attraction". Typically these attractions rely on local marketing and depend on visitors being attracted to the region for other reasons – ie visitors will usually be unaware of the attraction before they visit.
- Museums and historic sites comprise 3% of all attractions in regional NSW, however, they are more prevalent on the NSW South Coast (Shoalhaven, Eurobodalla and Bega Valley LGAs), making up 20% of all attractions.
- Most attractions in regional NSW are low-yield and low-profit. Two thirds of respondents to a Tourism NSW (1999) questionnaire achieved less than 1,000 visitors on average per week. Just over half the cultural and educational attractions reported revenues below \$250,000. It is difficult to maintain a quality presentation and facility with these low levels of attendance and even for the attractions reporting gross revenues between \$250,000 and \$500,000 per annum, about two-thirds have great difficulty in maintaining profitability (Tourism NSW 1999).

2.2.2 Constraints to Development of a Tourist 'Theme Park'

It has been suggested that a mining heritage theme park be established in the old gold mine workings area, comprising for example, the re-creation of a mining village and activities such as panning for gold. The development of a theme park is not considered appropriate at Yalwal and it would highly unlikely that such a development would be financially viable. The reasons for this are outlined below.

- Yalwal is not located on a major transport corridor or tourist route, therefore transit travellers can not be targeted.

- The remains of old Yalwal town are under water, ie there are no historic buildings to provide an authentic experience of what the old town was like.
- A theme park exists in the region, ie Mogo Goldfields Park to the south of Batemans Bay in the Eurobodalla LGA.
- This attraction and visitation to other gold mine workings (eg Mount Coman Mine at Nerrigundah, Mt Dromedary goldfields) largely rely on other draw cards, such as arts and crafts and cafes, eg Old Mogo Town and Tilba Tilba (see Figure 2.2 for locations).
- Seasonality of visitation to Yalwal and existing low visitor numbers.
- Difficulties of site servicing for provision of facilities that would attract sufficient tourists to financially support a built/staffed attraction.
- A theme park could detract from the heritage significance of the site.

2.3 Interpretation

2.3.1 Opportunities for Interpretation

The following factors provide opportunities for the interpretation of the history of Yalwal, together with past gold mining techniques.

- Most visitors to Yalwal express an interest in the mining history of the area and inquire whether it is safe to enter the mine tunnels etc.
- There is considerable published and unpublished information/historical photographs available on the history of Yalwal and its people.
- The Fletcher family provides a link through Yalwal's mining history to present day farming (interpretation of historic sites is more effective if it can be linked to family histories).
- Former tramways can be used as walking tracks.
- Several tunnels are stable and other mine workings can be managed such that they do not pose a safety hazard to visitors.
- Currently tours with a heritage focus are limited.

Other features and key values of Yalwal (as described in **Section 1.4**) also provide opportunities for interpretation of the area's geology, ecology, water catchment values, Aboriginal sites and indigenous cultural heritage.

2.3.2 Issues to be considered

- History of malicious damage to Council property and damage/theft of signs at Yalwal.
- Minimum disturbance of mining relics.
- Conflict between walkers and 4WDs/motor bikes.
- Accessibility to some features for the less physically fit/less adventurous.
- Public safety at some of the mine workings
- Attracting different visitor groups.

2.4 Target Groups

Table 2.2 provides a description of visitor groups which could be targeted in marketing and promotional activities, to attract a broader range of visitors to Yalwal. To increase weekday, off-season and off-peak visitation to Yalwal, primary target groups should be 'Day Visitors', 'Excursions' and 'Group Campers'.

Table 2.2
Target Groups

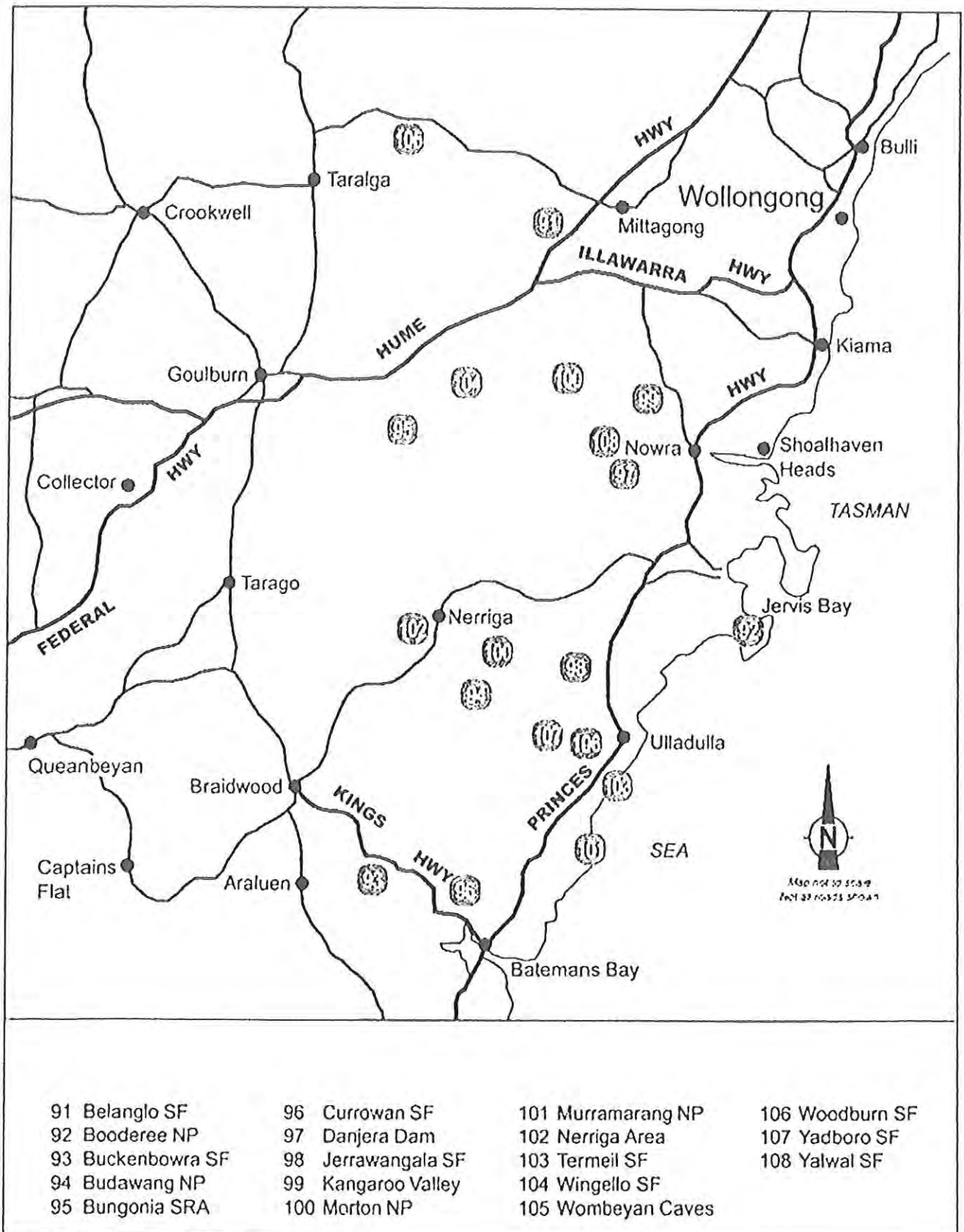
Target Groups	Description	Duration of Visit	Travel Mode	Motivations for Visit	Activities
Day Visitors	families, individuals, small groups (<8 people)	half-day full day	private vehicle	to relax and experience the scenic and peaceful atmosphere of Danjara Dam and the bush to visit points of cultural, ecological or geological interest	picnic/bbq, walk, visit mine workings, fish, swim, canoe
Excursions	large groups (>8 people) comprising tourists, seniors, students, scouts, clubs and other organisations	half-day (typ.) range from 30 mins to full day	minibus, truck, convoy of private vehicles	to view the scenery and soak up the ambience of the outdoors to experience the outdoors in a hassle free manner with a guide/leader to study cultural, ecological or geological areas of interest to participate in organised events	visit mines, take guided tour, picnic/bbq, health and fitness activities, educational activities, other group activities
Campers*	families, small groups (<8), individuals	overnight and weekend (typ.) several nights	private vehicle	to find respite from the urban environment and the pressures of city living to enjoy leisurely outdoor activities close to camp	walk, visit mine workings, picnic/bbq, swim, fish, canoe
Group Campers	large groups (>8 people) comprising 'nature-based'** tourists, scouts, students, clubs and other organisations	overnight (typ.) 2-3 nights	minibus, truck, convoy of private vehicles	to experience the outdoors in a hassle free manner with a guide/leader to study cultural, ecological or geological areas of interest to participate in organised events	health and fitness activities, educational activities, other group activities, visit mines, take guided tour, walk, picnic/bbq, swim, canoe, fish
National Park Visitors	individuals, groups, families comprising 'serious' bushwalkers and backpackers, students, service personnel, armed forces, scouts	overnight or several nights in Morton National Park	minibus, truck, private vehicles	to experience remoteness and practice self-reliance to participate in structured activities, generally with a leader	use Yalwal as a start or finish point for bushwalking or start/finish/base for 'training' activities relating to fitness and survival skills, personal development or adventure, environmental education and awareness

notes:

* this group currently includes 'sports campers' ie motor bike riders, 4 wheel drivers who would not be targeted

** this includes cultural tourism, adventure tourism and eco-tourism

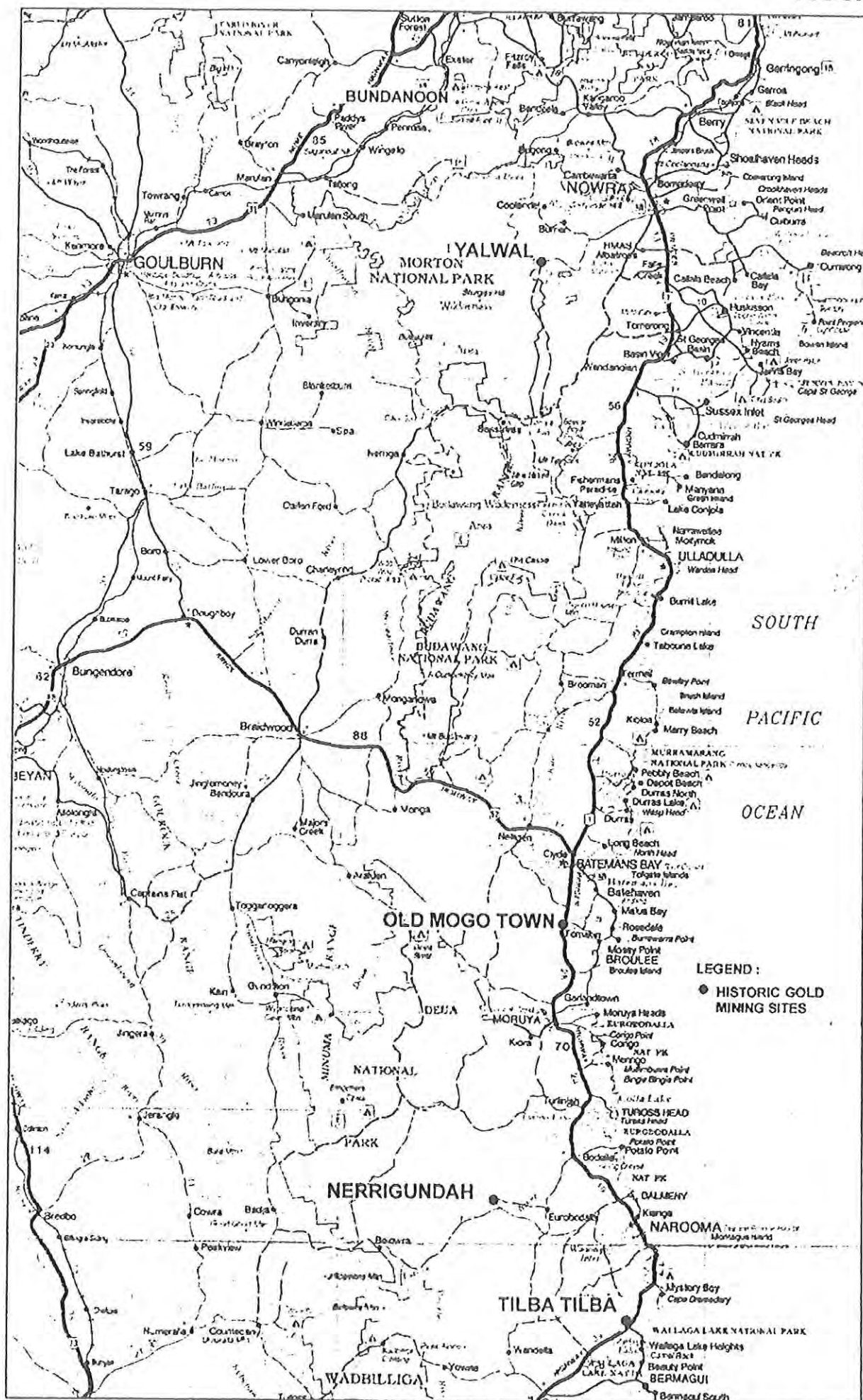
FIGURE 2.1



SOURCE : LEWIS AND SAVAGE 1999

PARK, FOREST AND RESERVE CAMPING AREAS

FIGURE 2.2



3 Site Development and Management Options

3.1 Camping and Picnic Areas

The following options are based on utilising existing cleared areas at Yalwal, formalising traditional camping areas and providing basic amenities, providing dispersed visitor facilities and providing new facilities for a range of low-impact recreational activities. Refer to **Figure 1.2** for localities.

- re-establish camping at NPWS site below dam wall and provide toilets
- formalise and landscape camping sites in designated camping areas between the bridge and loop road and install toilet
- develop main picnicking/camping area for day use and group camping (with picnic area closer to waters edge) and improve canoe launching area – this would include formalising parking; upgrading the existing toilet block, barbecues and rubbish bins; providing shade and shelter with barbecue and wash-up facilities, seats and fishing/viewing platforms and delineating a swimming area
- develop new small picnic areas, eg old Homeward Bound workings (see **Figure 1.3** for location) and at head of Yalwal Dam for canoeists
- formalise parking near cemetery as a starting point/track head for the mine workings area and provide picnic tables/shade trees
- in peak times, overflow camping for individuals could be permitted in the proposed group camping area and the open area north of the cemetery (with provision of port-a-loos – transport and servicing may be an issue)
- there may also be opportunities in the future for the lease or purchase of adjoining private property (by Council or commercial interests) for camping or the development of cabins.

3.2 Cabin Accommodation

As noted in **Section 2.1.3** there is a market for alternative accommodation and holiday experiences to those provided by traditional caravan/tourist parks and rental flats/units along the NSW South Coast. The growing eco-tourism industry has also created a demand for alternative accommodation in natural settings. These factors could be exploited at Yalwal in the longer term, through development of 'wilderness cabins'.

Cabins could be located off the access road, north of the main picnic/group camping area (as per the Yalwal Management Plan) or in the open area north of the cemetery (the overflow camping area noted in **Section 3.1**). The cabin sites shown in the Yalwal Management Plan are located between the smaller designated camping areas and the main picnic/camping area, off the main access road (in the relatively flat areas indicated by widely spaced contours in **Figure 1.2**). The easy access to Danjera Dam and water views are an advantage of this area. However, visitors staying at cabins would be aware of other people staying in cabins, campers, day visitors and vehicle noise and dust.

Due to these adverse factors an alternative site, north of the cemetery, is suggested. This is a large area which lends itself to buffer and screen planting to separate cabins from each other (and from the proposed southern picnic area/parking area (near the cemetery) as outlined in **Section 3.1** and walking tracks to the gold mine workings). It is remote from areas of Yalwal which are/would be subject to concentrated use, ie proposed main picnic/group camping area and smaller camping areas. Part of the existing lower loop road could also be utilised as a 'private' access to the cabins.

Proximity of cabins to the Yalwal historic cemetery has been raised as an issue, however, it is not considered that development in this area would have an adverse impact on the heritage significance of the cemetery as:

- the cabin site is physically removed from the cemetery and separated from it (approximately 250 m to the north) by the access road/Yarramunmun Tops Fire Trail (see **Photo 1.7**);
- screen planting could be successfully employed to minimise any visual impact of the cabins on the cemetery; and
- cabins would be long, low structures built from 'traditional' materials such as timber and corrugated iron (see **Section 6.7.4** for guidelines for built elements) and, in terms of size and scale, would not be significantly different from the farm buildings on adjoining private property which are currently visible from the cemetery (see **Photo 1.8**).

3.3 Reserve Entrance and Other Facilities

Although there is a small parking area with entrance signs between the NPWS rest area and the small designated camping areas, a formal 'gateway' entrance and information booth could be developed adjacent to the Council house. This would be a logical place for visitors to stop and seek information/assistance before proceeding on to camping and picnic areas and the mine workings area. The existing parking area and signs could be retained to reinforce entry conditions.

Other facilities which could be provided near the Council house are a locked compound for general storage and secure parking for bushwalker's cars left overnight.

3.4 Tracks

To control out of hours activities a locked gate could be installed on the access road south of the small designated camping areas, ie remainder of reserve open say 7.30 am and closed at dusk. A key could be issued to groups camping in the proposed main picnic/group camping area for after hours access. Alternatively a locked gate could be installed at the picnic/group camping area. Installation of locked gates would need to take into consideration whether 24 hour public access was needed to/from the Yarramunmun Tops Fire Trail (as noted in **Section 1.3** this trail may eventually be closed to private vehicles).

Currently there are a proliferation of tracks at Yalwal which could be rationalised and designated either for pedestrians or motor vehicles/motor bikes/mountain bikes. The Yalwal Management Plan (Shoalhaven Water 1999) suggested closing off the upper loop access road and widening the lower loop access road. Closing off the lower loop access road before the main picnic/ camping area is an alternative. This would eliminate through traffic providing a safer, quieter and more pleasant environment for visitors. The upper loop road could be made two-way for visitors to the mine working area and current through traffic on the Yarramunmun Tops Fire Trail.

A number of existing tracks and tramways within the old mine workings area could be formalised to provide a series of interconnecting loop walks. This would provide visitors with a number of options, depending on available time and general fitness/mobility levels. Different tracks could feature different aspects of the history of Yalwal and past gold mining practices. For example a short, self-guided walk taking in the Cemetery/Chapmans Battery/Golden Crown Open Cut and focusing on families and their history at Yalwal (see **Section 3.5** Interpretation for further discussion). Other walks could continue on from Chapmans Battery and through the remainder of the mine workings area, with surplus tracks being closed off where necessary.

3.5 Interpretation

The following interpretive techniques could be used to highlight the natural and cultural heritage features of Yalwal.

- a display of historical photographs showing the old Yalwal village and the mine processing plants as a permanent display at the reserve entry, or as a movable display for use at the Nowra Visitor Centre or schools.
- a booklet (for sale) on the people/families buried in the cemetery and/or promotion and sale of existing publications at tourist and visitor centres, ie *Yalwal Gold* (David Glasson, undated), *The Two Rivers Track* or sections relating to Yalwal (Evans et al, in prep)
- interpretive signage at Chapmans Battery providing information on Yalwal village, school, gold mining history and the stamper itself
- viewing platform at Golden Crown Open Cut with hand rail and interpretive sign about mining methods, ie open cut, vertical cuts, tramways, shafts and tunnels.
- numbered posts on longer tracks with historic information provided in an accompanying pamphlet. Features which could be highlighted (refer to **Figure 1.3** for locations) include:
 - old dry stone wall on edge of track west of Chapmans Battery
 - tunnels visible on the north side of the dam
 - remains of Golden Crown processing plant and Golden Crown Tunnels
 - Albion Tunnel, Black Lode workings, Caledonian Workings, Ison cut, Sandeman Cut and Underwood Cut
 - burrawangs (cycads) along track between Caledonian Working and Pioneer Tunnel, Homeward Bound Works on the water's edge (which could be formalised as a picnic area)
 - Homeward Bound Tramway and Tunnel and Pioneer Open Cuts
- pamphlets could be produced on other features of Yalwal including Aboriginal sites and cultural heritage, geology, vegetation, fauna and water catchment values.

3.6 Site Activities and Tours

The following tours and activities could be considered for Yalwal:

- guided walks of mine workings on a monthly or seasonal basis (eg Autumn and Spring when visitation is highest) – these could be run by reserve staff or others if there is sufficient interest, eg the Shoalhaven Historical Society or commercial operators.
- Discovery Ranger Program type activities at Yalwal or inclusion of Yalwal in existing programs, eg 4WD tours, bushwalks, natural and cultural heritage (European and Aboriginal sites) walks on a monthly or seasonal basis depending on demand.
- annual events to encourage different user groups, eg biathlon event, Two Rivers Walk, fishing competitions.
- canoe hire or franchise.

3.7 Staffing and Management

Purchase, by Council, of the house on the access road to Yalwal provides the opportunity to accommodate an on-site manager at Yalwal. On-site presence could be by:

- on-site ranger – Council ranger or possibly a ranger jointly funded by Council and NPWS with responsibilities covering Yalwal and adjacent areas in Morton National Park
- part-time Aboriginal ranger (particularly given indigenous interest in the area as evidenced by a current land claim), part-time interpretation officer
- permanent caretaker or local resident/landowner to act in a caretaker role
- fee collector, paid on a commission basis
- 'campground host' – provision of free accommodation at Council house during holiday periods (eg October long weekend, Christmas holidays and Easter) for individual/family in return for management of campsites and picnic areas, eg litter collection, cleaning toilets, fee collection etc
- part-time manned information booth.

To minimise visitor impacts and ensure visitors are satisfied with their 'Yalwal experience' it will be necessary to control visitor numbers to ensure the reserve capacity is not exceeded. The user pays principle should also be applied, so that those who benefit from upgraded and new facilities contribute to their management and upkeep. Options include:

- a campground booking system and reserve entry and camping fees (if a campground host approach was adopted, an 'honour system' or rangers would need to collect camping fees at other times)
- campsites could be booked through the Nowra Tourist Information Centre, NPWS Visitor Centre at Fitzroy Falls, NPWS Nowra Office and/or Shoalhaven City Council - a ballot system may also be required at peak times as the area becomes more popular
- Pre-booked group camping (eg schools, scouts, clubs, tour groups) in the proposed main picnic/group camping area, primarily during weekday and off-peak times - this area could be used for overflow camping from the smaller campgrounds for peak time bookings.

3.8 Site Servicing

See **Appendix B, Physical Site Analysis**, for more details.

3.8.1 Water

The option of installing rainwater tanks at the Council house has been investigated, however, the small roof area (less than 100 m²) precludes this as a secure water supply option. Rainwater tanks, however, could be used to provide water to hand basins at various toilet locations throughout the area.

A pump house (see **Figure 1.2**) currently transfers water from Danjera Dam to two storage tanks that supply the picnic/group camping area toilet block. Given the security of supply from the dam, the existing water tanks could be used to supply the picnic/group camping area. Water would gravitate from the storage tanks to a number of supply points, including the washing-up area and new toilet block.

The proximity of the small designed camping areas (see **Figure 1.2**) to the dam suggest that it is feasible to provide a pumped water supply, similar to that installed

for the existing toilet block. A pump house could be constructed to transfer water directly from the dam to these sites.

The pumped water supply from the dam to the small camping areas could be extended to water storage tanks at the Council house. These storage tanks could supply water to the residence and NPWS rest area.

Care is needed to locate the pump house and water off-take so as to maintain integrity of the supply. The off-take must guarantee supply during draw down of the dam and be isolated to prevent contamination from nearby swimming and boat launching areas.

3.8.2 Wastewater

The existing wastewater system consists of a toilet block, septic tank and adsorption trench. Sanitary plumbing fixtures include two water closets in the women's toilet and one water closet and urinal in the men's toilet. Wastewater is directed to a septic tank, located adjacent to the toilet block and effluent is discharged to an absorption trench.

The isolation of Yalwal from a reticulated sewerage system necessitates on-site management of wastewater. All on-site wastewater treatment systems must be designed in accordance with Council's Development Control Plan (DCP) No.78. The DCP includes minimum site requirements for the on-site disposal of effluent.

Treatment systems investigated included:

- septic tanks
- aerated wastewater treatment systems (AWTS)
- wet composting systems
- waterless systems (composting toilets).

The main picnic/group camping site is located in a steep sided gully sloping toward Danjera Dam. The borehole investigation determined that the soil was medium dense to dense and generally consists of clays and poorly sorted sands and gravels. The results of the infiltration tests indicated low to moderate vertical soil permeability that is expected to reduce with depth within the weathered rock profile. The investigation recommended that effluent not be directly disposed of into the soil.

The proximity of the dam presents a risk of contamination from effluent that would migrate horizontally towards the water storage. Therefore effluent disposal pits or groundwater injection bores are not recommended. The potential for surface runoff to contaminate the water supply also precludes the option of surface irrigation of effluent at the main picnic/group camping site.

A cost-effective pump-out service could not be provided at Yalwal without a major upgrade of the access road, therefore composting toilets are recommended to service the areas near Danjera Dam. Composting toilets also minimise water demand.

Wastewater from the Council house would include both blackwater and greywater. The existing septic tank and absorption trench system could be maintained to treat these wastes.

3.8.3 Energy

Power

Mains power is not available at Yalwal, therefore alternative energy sources need to be identified to supply the Council house. Conventional low voltage, solar powered

lighting would be suitable for the proposed main picnic/group camping toilet and major shelter facilities.

A range of renewable energy source technologies are currently available to provide 240-volt power. This would allow conventional lights and appliances to be used at the Council house. Options include:

- solar system with no back up;
- solar hybrid system with LPG/diesel generator back-up; and
- automated solar, wind and generator system.

Photovoltaic requirements can only be determined during detailed design, once a power load profile has been established.

Fuel

Provision of firewood for barbecues is labour intensive, is subject to theft for use in private homes and can lead to large campfires in excess of cooking requirements. Options for campfires/barbecues include:

- purchase or provision of firewood as part of a camping/reserve entrance fee;
- installation of a large gas bottle for the proposed main picnic/group camping area shelter with gas lines to other barbecues in this area; and/or
- encouraging the use of fuel stoves.

3.8.4 Solid Waste

Solid waste management must ensure the integrity of the water supply, therefore it is considered that the most appropriate method of waste management is to remove pollutant sources from the site. The area should continue to be serviced by a regular Council maintenance crew, whose responsibilities would include:

- removal of rubbish;
- servicing toilet facilities; and
- maintaining water supply.

Rubbish bins (including recycling bins) should be provided in designated picnic and camping areas which are accessible by car, and for the future cabins. For walk-in picnic areas visitors would be expected to take out what they brought in. The frequency of rubbish removal would be subject to seasonal demand. Daily collections may be required during peak times.

3.8.5 Telecommunications

A telephone mast is provided to service private property, however mobile telephone coverage is not available at the camping and picnic areas and throughout the mine workings.

Development of the site would require at least basic communications facilities to be provided at the Council house. These could include a NPWS VHF radio, UHF CB radio and possibly a police radio.

Future stages may involve utilising the existing telephone mast to extend mobile phone coverage to Yalwal.

3.8.6 Road Access

Upgrading/sealing of Yalwal Road is not considered necessary for the level of development proposed. An unsealed access is in keeping with the character of the area (bushland setting) and basic level of facilities to be provided. It will also act, to some extent, to limit visitor numbers as an unsealed access will continue to make the

area less attractive to people seeking a more sophisticated level of facilities. The level of access also makes the area unsuitable for large tourist coaches.

3.9 Consultation on Management Options

Information on management options and a preliminary site development plan were forwarded to Yalwal Advisory Stakeholder Groups (see organisations listed below) for comment, and with an invitation to meet and discuss the plan in more detail.

- Australian Conservation Foundation*
- Australian Institute of Mining and Metallurgy*
- local private landowners*
- Nowra Aboriginal Land Council*
- Shoalhaven 4WD Club
- Southern Bass Fishing Club*
- Shoalhaven Bushwalkers
- Shoalhaven Historical Society

Representatives from those organisations marked with an asterisk attended a site visit/inspection on Sunday 22 October 2000.

The main comments provided are summarised below:

- On-site manager/ranger living at the Council house is critical to the success of the proposed improvements.
- Currently there is no interest in developing tourist/farm stay type accommodation but if the Fletchers decided to sell it could be an option.
- The long association of the Fletcher family with Yalwal could be acknowledged through naming a picnic or camping area after family members.
- Emphasis should be on 'low-impact' camping and sustainable effluent management.
- The Concept Development Plan should consider access/sites for campervans.
- Other features of Yalwal, in addition to the old gold mine workings, should be interpreted: eg geology, the building of Danjera Dam, stocking of the dam with Australian Bass.
- Fisheries regulations should also be included in reserve signage.
- One group expressed a preference for moving Chapman's stamper out of the shallows of Danjera Dam to dry land. *It is not considered appropriate to move the stamper as, from a heritage conservation perspective, it should stay in its original location. Also, being partly in the water reduces access and vandalism risk and also makes people ask why it is in the water – providing an opportunity to explain about Yalwal village and Danjera Dam.*
- Danjera Dam should be catch and release only (the dam has to be stocked with fish as there is no natural recruitment) with fishing methods restricted to lures and flies, ie no bait fish etc (due to potential pollution/garbage disposal problems).
- Unmarked graves are located at Yalwal in the vicinity of the historic cemetery, including those of Chinese miners.

4 Proposed Site Development

The proposed site development works aim to retain the 'bush character' of Yalwal (ie basic level of amenities), control camping within the reserve, allow visitors to appreciate the mine workings area in safety, and attract a broader range of visitors through provision of facilities for a range of low-impact recreational activities.

4.1 Site Capacity

4.1.1 Day Visitors

At the main picnic/group camping area, allowance has been made for 60 day visitors (consistent with recorded peak visitation levels, see **Table 2.1**) with the southern picnic area (near the mine workings area), catering for about 30 people and the NPWS rest area (with 10 carparks) also catering for about 30 people. Excluding parking for camping a total of 52 formalised parking bays are proposed which would cater for 150 day visitors, assuming car occupancy was three people.

Given that visitors will come and go throughout the day, maximum day visitation could be about 25% higher, or approximately 200 people, given that some people will just stay for a couple of hours to do the mine walk or go fishing, or stay for a half day for picnics etc.

4.1.2 Camping Sites

The number of proposed camping sites for Yalwal is based on catering for recorded peak visitation levels (see **Table 2.1**), utilising existing cleared areas and the retention of separate camping areas with fewer sites (rather than a large camping area(s)) to preserve the 'bush camping experience'.

A total of 30 campsites (assuming an average of three people per site, approximately 90 people) is suggested for the smaller camping areas and facilities to cater for approximately 40 campers (say 13 sites) at the main picnic/group camping area. An allowance for overflow camping is also made, say approximately seven sites, giving a total of 50 sites overall, or approximately 150 campers.

Facilities have been sized for this number of people (although port-a-loos may be required for overflow camping at peak times, eg Easter) and, together with the proposed booking system, set the maximum number of campers for Yalwal.

4.1.3 Cabins

The number of future cabins (three cabins catering for a maximum of six people each) is based on the size of the cleared areas at locations 21 and 22 (see **Figure 4.4**), the need to provide landscaping/screen planting to provide a sense of remoteness and to separate this type of accommodation from camping and picnic areas.

A small number of cabins should be provided so they provide 'a unique experience in a natural environment', distinct from traditional cabin accommodation in formal tourist parks. A maximum of six people per cabin is also recommended to cater for family groups/small groups of friends/families and friends, rather than bunk house style accommodation, which is available close by at Coolendel. Facilities for large groups would be catered for in the main picnic/group camping area.

The decision on whether cabins should be built at location 21 and/or 22 should be based on some visitor research and should follow review of the Concept Development Plan, once earlier stages are implemented. As noted in **Section 3.2**, location 21 has the advantage of being 'tucked away' in an alcove in the side of the hill but suffers from the proximity of the access road to the main picnic/group

camping area. The problem of traffic noise and dust would be exacerbated with vehicles negotiating the steep hill. This would not enhance the 'wilderness' qualities of cabins in this accommodation.

Cabins at location 22 could be sited further away from through traffic and the larger site gives more flexibility for siting and screening. In addition, the access road is relatively level at this point.

4.2 Site Development Works

Site development works are shown in **Figures 4.1 to 4.4** and comprise the following elements.

A 'gateway' treatment on Yalwal Road at the Council house comprising landscaping, an information booth, signs and carparking. This would provide a formal entrance to the reserve before the NPWS rest area was reached. It would also be the point at which the reserve was closed if it had reached capacity, or for public safety reasons such as flooding of Yarramunmun Creek. Upgrading of the Council house is also proposed for ranger accommodation.

Camping would be re-established at the NPWS rest area (location 2, **Figure 4.1**). NPWS has stopped vehicle access to the top of the hill in this location and rehabilitated severely eroded vehicle tracks. As noted in **Section 1.4.5** a large Aboriginal site exists in this area. It is not feasible to permit vehicle-based camping any longer at the top of the hill, however, the area is suitable for walk-in camping. Car-based camping would be catered for adjacent to the eastern loop road. Camping sites would be identified by numbered pegs. An additional composting toilet and tap is proposed off the eastern loop road and, in the longer term, a footbridge connecting this area with the walk-in camping area on the other side of the intermittent creek.

Minor leveling and landscaping would be carried out in the small designated camping areas (location 3, **Figure 4.1**) to define individual campsites and associated parking. Campsites would be identified with a numbered peg and water and toilet facilities provided.

The main picnic/group camping area would be developed for picnicking and group camping (location 5, **Figure 4.1**). The existing lower loop access road would be widened for two-way traffic and would terminate at the carpark to this area. As noted in **Section 3.4** this would provide a safer, quieter and more pleasant environment for day visitors and campers.

The main picnic/group camping area would comprise a shade structure and seating at the water's edge and pontoon for fishing/viewing; swimming area delineated by buoys; shade trees; picnic shelter with tables, gas barbecue and sink/washing up facilities; new toilet block and 'animal proof' bins. A maintenance track would provide access to the toilet block and shelter and for groups to off-load tents and other equipment (see **Figure 4.5** for more details). During peak times, when it was necessary to use this area for overflow camping from the smaller campgrounds, it would be walk-in camping only.

A timber platform would be constructed opposite the canoe launching area (see location 12, **Figure 4.2**) for fishing/viewing and dip netting/water sampling by students. Interpretive signage would be installed outlining construction of Danjera Dam, stocking of the dam with fish and the reasons for fishing regulations (ie catch and release only for the dam because there is no natural recruitment).

The upper loop road would be made two-way and become the access road for the proposed southern picnic area (near the cemetery and mine workings area) and

Yarramunmun Tops Fire Trail. As noted in **Section 1.3** signs showing the layout of the cemetery and those buried within were installed as a Bicentennial project.

In the short-term location 22, **Figure 4.4**, opposite the southern picnic area would be used for overflow camping. To allow for future development for cabins, no formal camping facilities would be provided. Port-a-loos would be needed until establishment of facilities at the southern picnic area or in addition to this, depending on visitor numbers.

Composting toilets would be installed at all formal, car accessible picnic/camping locations at Yalwal to eliminate the risk of pollution of Danjera Dam from septic seepage and human waste from camping areas without facilities (NPWS is about to install and monitor the performance of a composting toilet in the existing 'rest area' which will provide valuable information on suitability and maintenance requirements). Water would be provided via rainwater tanks or pumped from Danjera Dam. Amenities at the head of Danjera Dam for canoeists are not proposed due to servicing difficulties.

Carparking would be formalised at picnic and camping areas and the boat launching area. Overflow parking for the main picnic/group camping area would be provided at location 16, see **Figure 4.3**. Tracks would also be rationalised. This would entail closing off tracks to private vehicles to reduce erosion and damage to vegetation and to permit regeneration/planting of surplus tracks (tracks to be closed are shown as hatched on **Figures 4.1** and **4.3**).

A boom gate would be installed on the track leading off the fire trail to the mine workings area (see **Figure 4.1**). This is necessary to stop private vehicle access to the mine workings area which has resulted in track erosion and is incompatible with the development of walking tracks. In the future, if the Yarramunmun Tops Fire Trail is closed to private vehicles, the boom gate would be moved to the end of the southern picnic area, which would become the track head for walks to the cemetery and mine workings area.

Walking tracks would be formalised through the mine workings area and signage provided to:

- address safety issues associated with tunnels, shafts and potential rock falls in open cuts; and
- provide visitors with an appreciation of the heritage values of Yalwal.

Three interconnecting loop walking tracks are proposed:

Loop Walking Track No.1 (see location 7, **Figure 4.1**). This would be a relatively easy, short, self-guided walk with directional markers, via:

- Yalwal Cemetery (location 6)
- Golden Crown Open Cut (location 8) incorporating a viewing platform with hand rail for public safety and interpretive signs about mining methods, ie open cut, vertical cuts, tramways, shafts and tunnels.
- Chapmans Battery (location 9) with interpretive signs providing information on Yalwal village, school, gold mining history and the stamper itself. The stamper timbers would be replaced and the roof re-installed to provide some protection from the weather.

Loop Walking Track No.2 (see location 15, **Figure 4.2**), incorporating:

- Golden Crown processing plant remains, tramway and tunnels (safety barriers would be installed at tunnel entrances)
- boardwalk over Sawpit Creek
- Albion Tunnel (access would be provided to this tunnel).

Loop Walking Track No.3 (see location 19, **Figure 4.3**), incorporating:

- Black Lode Workings
- spur track to Ison/Sandeman/Underwood/Thomas Cut area (barriers and signage would be installed in this area for public safety)
- spur track to Pioneer Tunnel (entry would be permitted about 100 m into this tunnel to immediately before the first drop chute)
- Homeward Bound Workings (picnic area) – Homeward Bound tramway, high level tunnel (the walking track would pass through the tunnel into the open cuts, see **Photos 1.11** and **1.12**)
- Homeward Bound Open Cut – Pioneer open cuts (to address public safety in this area the walk would be via a raised boardwalk with viewing platforms).

Directional markers, together with markers indicating features of interest would be installed along Loop Walking Tracks No.s 2 and 3. In the longer term, an additional link would be constructed between these tracks, together with new walking tracks linking camping areas with each other and the mine workings area (see location 17, **Figure 4.3** and locations 20 and 24, **Figure 4.4**). The Homeward Bound Workings picnic area would comprise a formal fireplace and seating only, due to the difficulty of servicing toilets and removing garbage from this area.

4.3 Staging of Capital Works

Staging of the site works described in **Section 4.2** is proposed to assist in funding the development. Priority has been given to those works which:

- address the most pressing management issues; and
- can be used to promote the area to potential visitors with an interest in passive recreational activities and cultural heritage.

The installation of easily damaged features, such as major interpretive signs, would be postponed to the latter stages of development, when it is anticipated that vandalism issues would have been largely addressed and the area would be attracting visitors with more of a conservation ethic.

Initially a three stage development is proposed, as described below and shown in the Site Development Concept Plans, **Figures 4.1** to **4.3**. Future development is also described below and shown in **Figure 4.4**. The numbers below relate to locations shown on the Site Development Concept Plans. **Section 6.7 Development Guidelines**, also provides more information.

4.3.1 Stage 1

- | | |
|-----------------------------------|--|
| 1. Council House | Upgrade existing cottage to provide a ranger's residence. |
| 2. Existing NPWS Rest Area | Re-establish camping – 10 sites. Formalise camping and delineate camp sites off eastern loop road. Install composting toilet and tap. In the longer term, construct footbridge to camping area on western side of creek. |
| 3. Camping Areas | Re-grade and landscape existing camping areas to provide approximately 10 well defined and numbered camping sites (with associated parking areas) on each side of the existing access road. Provide a composting toilet and tap. |
| 4. Loop Access Road | Widen for two-way traffic and close off lower loop road at picnic/group camping area. |

- | | |
|---|---|
| 5. Picnic Area/Group Camping Area: | Construct carpark and install boom gate for maintenance access (20 car spaces plus mini bus parking). Restore road, grass and landscape area closest to dam as picnic area, install picnic tables and barbecues. Construct covered area with barbecue, sink/washing up area and tables for group camping area behind picnic area. Install composting toilet block (facilities to cater for 40 campers and 60 day visitors). |
| 6. Track Head | Provide a brochure box at pedestrian 'gate' to cemetery area. |
| 7. Loop Walking Track No.1 | <p><i>Cemetery-Chapmans Battery-spur track to Golden Crown Workings-informal parking area:</i></p> <ul style="list-style-type: none"> - install track markers - close-off surplus tracks - address track erosion - install boom-gate on track leading off Yarramunmun Tops Fire Trail to close off public vehicle access to mine workings area. |
| 8. Spur Track to Golden Crown Workings | Formalise track to Golden Crown Workings. Install viewing platform. |
| 9. Chapman's Battery | Restore stamper and reconstruct roofing. |
| 10. Mine Workings Area | Install simple barriers and signs at mine workings where public safety is an issue ie: Golden Crown tunnel entrances, drop chute in Pioneer Tunnel, Homeward Bound quarry face, Pioneer open cut area tunnels and shafts and Ison/Sandeman/Underwood/Thomas cut area. |
|
4.3.2 Stage 2 | |
| 11. Council House | Provide a visitor's information sign and booth, carparking spaces and landscaping as a 'gateway' treatment for Yalwal. Construct fenced compound for general storage and secure parking for bushwalker's cars left overnight. |
| 12. Boat Launching Area | Construct jetty for viewing/fishing at northern end with interpretive sign. Delineate parallel parking area. |
| 13. Picnic Area/Group Camping Area | Construct gazebo/shade structure at waters edge. Install pontoon for fishing/viewing. Delineate swimming area with buoys. |
| 14. Southern Picnic Area | Develop a small landscaped picnic area with shade trees, tables, tap and toilet, north of the cemetery. Formalise carpark along cleared ridge area. Install planting to delineate carparking area from overflow camping area. |
| 15. Loop Walking Track No.2 | <p><i>Incorporating Golden Crown processing plant remains, tramway and tunnels and Albion Tunnel:</i></p> <ul style="list-style-type: none"> - install track markers - construct track with boardwalk over creek from Golden Crown Tramway to Albion Tunnel/existing track |

4.3.3 Stage 3

- | | |
|--|---|
| 16. Overflow Parking | Delineate overflow parking area, north of main picnic/group camping area. |
| 17. Picnic Area/Group Camping Area | Construct walking track from picnic/group camping area to mine workings area. |
| 18a. Chapman's Battery
18b. Golden Crown Workings | Provide interpretive signage. |
| 19. Walking Track No.3 | <p><i>Albion Tunnel-Black Lode Workings-spur track to Ison Cut etc-spur track to Pioneer Tunnel-Homeward Bound Workings-Homeward Bound tramway, high level tunnel, open cuts:</i></p> <ul style="list-style-type: none"> - install track markers - close-off surplus tracks - address track erosion. |
| 19a. Spur Track | Upgrade barriers and signage as appropriate to Ison/Sandeman/Underwood/Thomas Cut area. |
| 19b. Spur Track to Pioneer Tunnel | Upgrade barriers and signage. |
| 19c. Mine Workings Picnic Area | Formalise picnic area at Homeward Bound workings. |
| 19d. Homeward Bound Tunnel | Level out floor. |
| 19e. Open Cut | Construct elevated boardwalk with viewing platforms from tunnel through, or adjacent to, open cuts. |

4.3.4 Future Development

- | | |
|--|---|
| 20. Camping Areas | Construct walking track linking camping areas and boat launching area. |
| 21/22. Cabins | Construct cabins (three cabins in total, each catering for a maximum of six people) in cleared areas off access road and/or in overflow camping area north of the cemetery. |
| 23. Yarramunmun Tops Fire Trail | Relocate boom gate and close fire trail to public vehicles. |
| 24. Loop Walking Track No.s 2 & 3 | Construct connection between walking tracks from creek crossing on track No.2 to exit from open cuts on track No.3. |

7. Loop Walking Track No.1

Cemetery - Chapmans Battery - spur track to Golden Crown Workings - informal parking area:

- install track markers
- close-off surplus tracks
- address track erosion
- install boom-gate to close off vehicle access to mine workings area.

8. Spur Track to Golden Crown Workings

- Formalise track to Golden Crown Workings. Install viewing platform.

9. Chapman's Battery

- Restore stamper and reconstruct roofing.

10. Mine Workings Area

- Install simple barriers and signs at mine workings where public safety is an issue ie:
 - Golden Crown tunnel entrances
 - drop chute in Pioneer Tunnel
 - Homeward Bound quarry face
 - Pioneer open cut area tunnels and shafts
 - Ison / Sandeman / Underwood / Thomas cut area.
- Install a locked gate with access for authorised vehicles only (eg, emergency services, ranger, maintenance).

4. Loop Access Road

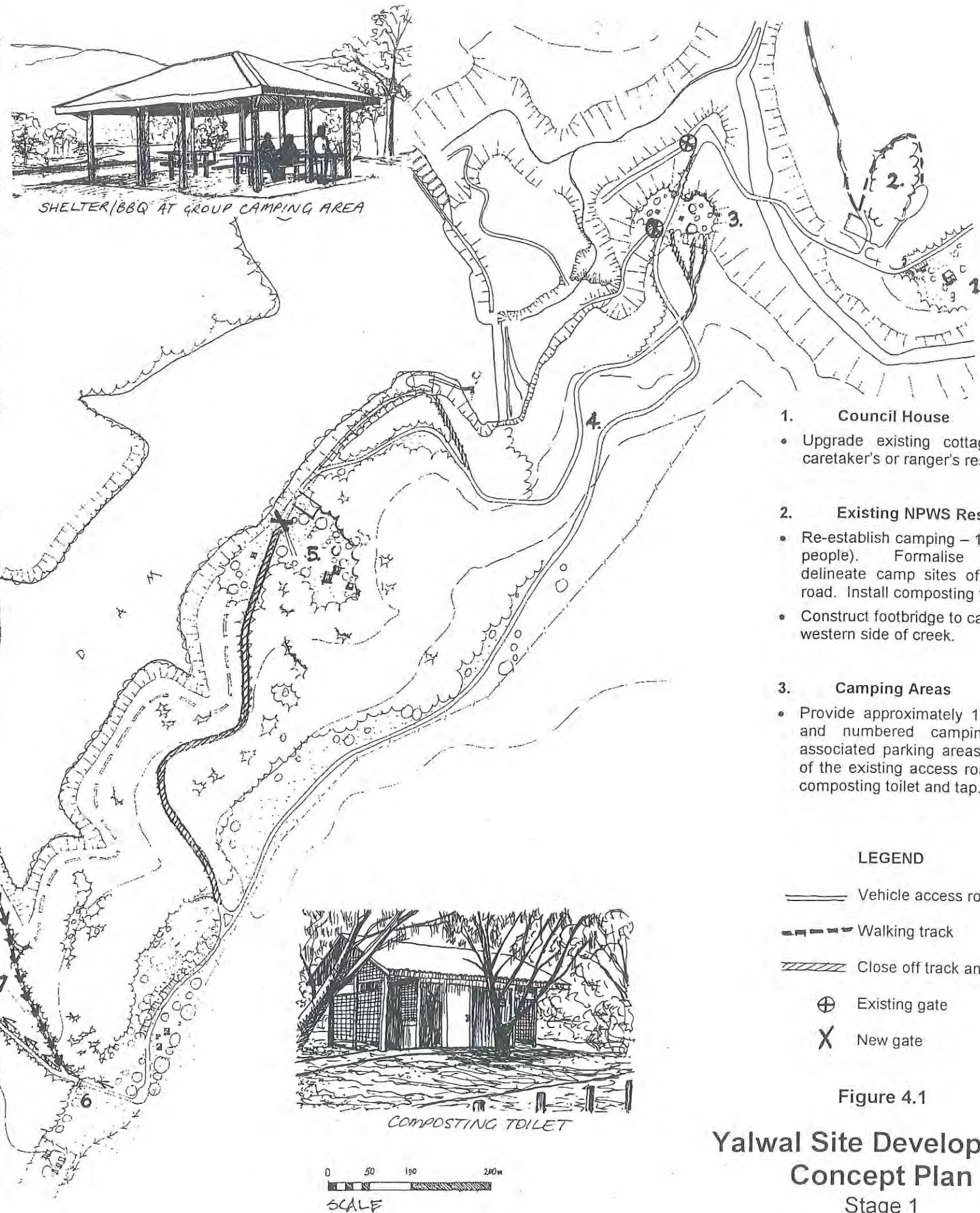
- Widen for two-way traffic and close off lower loop road at picnic/group camping area.

5. Picnic Area/Group Camping Area:

- Construct carpark – say 20 car spaces plus mini-bus parking.
- Install boom gate for maintenance access.
- Restore road, grass and landscape area closest to dam as picnic area, install picnic tables and barbecues.
- Construct covered area with barbecue, sink/washing up area and tables for group camping area behind picnic area.
- Install composting toilet block (facilities to cater for 40 campers and 60 day visitors).

6. Track Head

Provide a brochure box at pedestrian 'gate' to cemetery area.



1. Council House

- Upgrade existing cottage to provide caretaker's or ranger's residence.

2. Existing NPWS Rest Area

- Re-establish camping – 10 sites (say 30 people). Formalise camping and delineate camp sites off eastern loop road. Install composting toilet and tap.
- Construct footbridge to camping area on western side of creek.

3. Camping Areas

- Provide approximately 10 well defined and numbered camping sites with associated parking areas on each side of the existing access road. Provide a composting toilet and tap.

LEGEND

- Vehicle access road
- - - Walking track
- /// Close off track and restore area
- ⊕ Existing gate
- X New gate

Figure 4.1

Yalwal Site Development Concept Plan Stage 1



INFORMATION SIGN

12. Boat Launching Area

- Construct Jetty for viewing/fishing at northern end.
- Delineate parallel parking area.

13. Picnic Area/Group Camping Area

- Construct gazebo/shade structure at waters edge.
- Install pontoon for fishing/viewing.
- Delineate swimming area with buoys.

14. Southern Picnic Area

- Develop a small landscaped picnic area with shade trees, tables, tap and toilet.
- Formalise carpark along cleared ridge area. Install planting to delineate carparking area from overflow camping area.

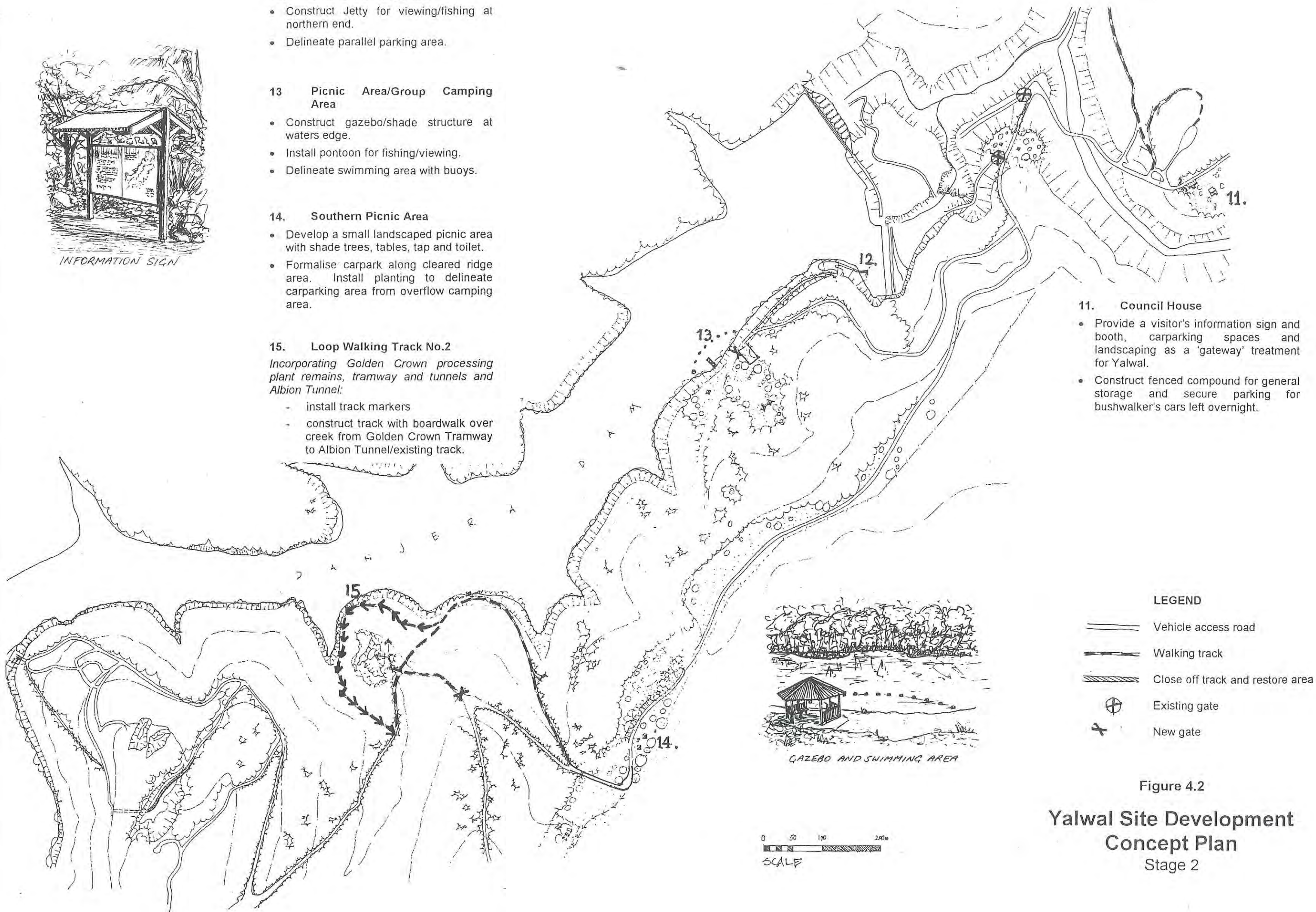
15. Loop Walking Track No.2

Incorporating Golden Crown processing plant remains, tramway and tunnels and Albion Tunnel:

- install track markers
- construct track with boardwalk over creek from Golden Crown Tramway to Albion Tunnel/existing track.

11. Council House

- Provide a visitor's information sign and booth, carparking spaces and landscaping as a 'gateway' treatment for Yalwal.
- Construct fenced compound for general storage and secure parking for bushwalker's cars left overnight.



LEGEND

- Vehicle access road
- - - Walking track
- ▨ Close off track and restore area
- ⊕ Existing gate
- ✕ New gate

Figure 4.2

Yalwal Site Development Concept Plan Stage 2

19. Walking Track No.3

Albion Tunnel-Black Lode Workings-spur track to Ison Cut etc- spur track to Pioneer Tunnel-Homeward Bound Workings-Homeward Bound tramway, high level tunnel, open cuts:

- install track markers
- close-off surplus tracks
- address track erosion.

19a. Spur Track

- Upgrade barriers and signage as appropriate to Ison / Sandeman / Underwood / Thomas Cut area.

19b. Spur Track to Pioneer Tunnel

- Upgrade barriers and signage.

19c. Picnic Area

- Formalise picnic area at Homeward Bound workings.

19d. Homeward Bound Tunnel

- Level out floor.

19e. Open Cut

- Construct elevated boardwalk with viewing platforms from tunnel through or adjacent to open cuts.

16. Overflow Parking

- Delineate overflow parking area.

17. Picnic Area/Group Camping Area

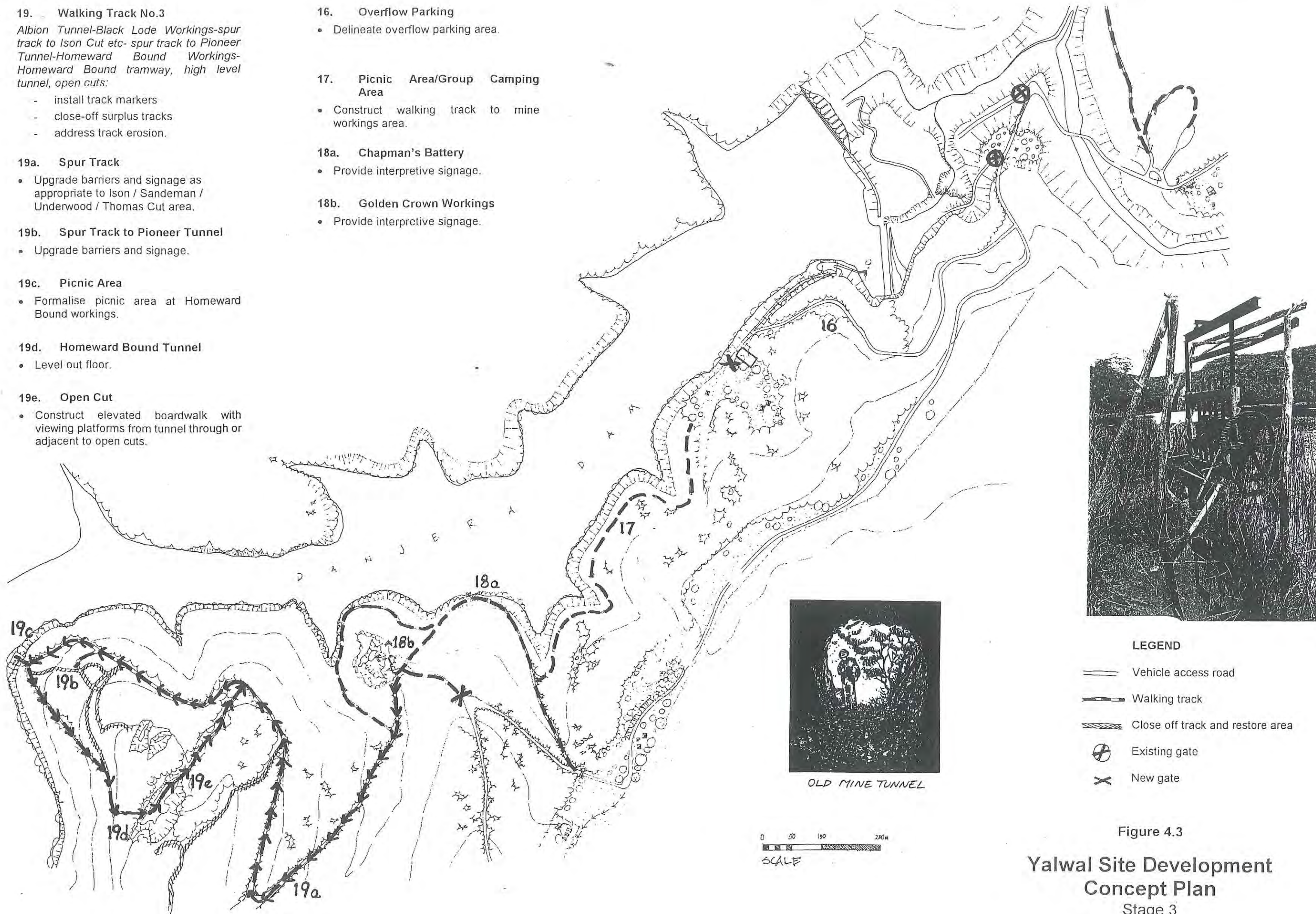
- Construct walking track to mine workings area.

18a. Chapman's Battery

- Provide interpretive signage.

18b. Golden Crown Workings

- Provide interpretive signage.





TRACK WITH INTERPRETIVE SIGN

20. Camping Areas

- Construct walking track linking camping areas and boat launching area.

21. Cabins

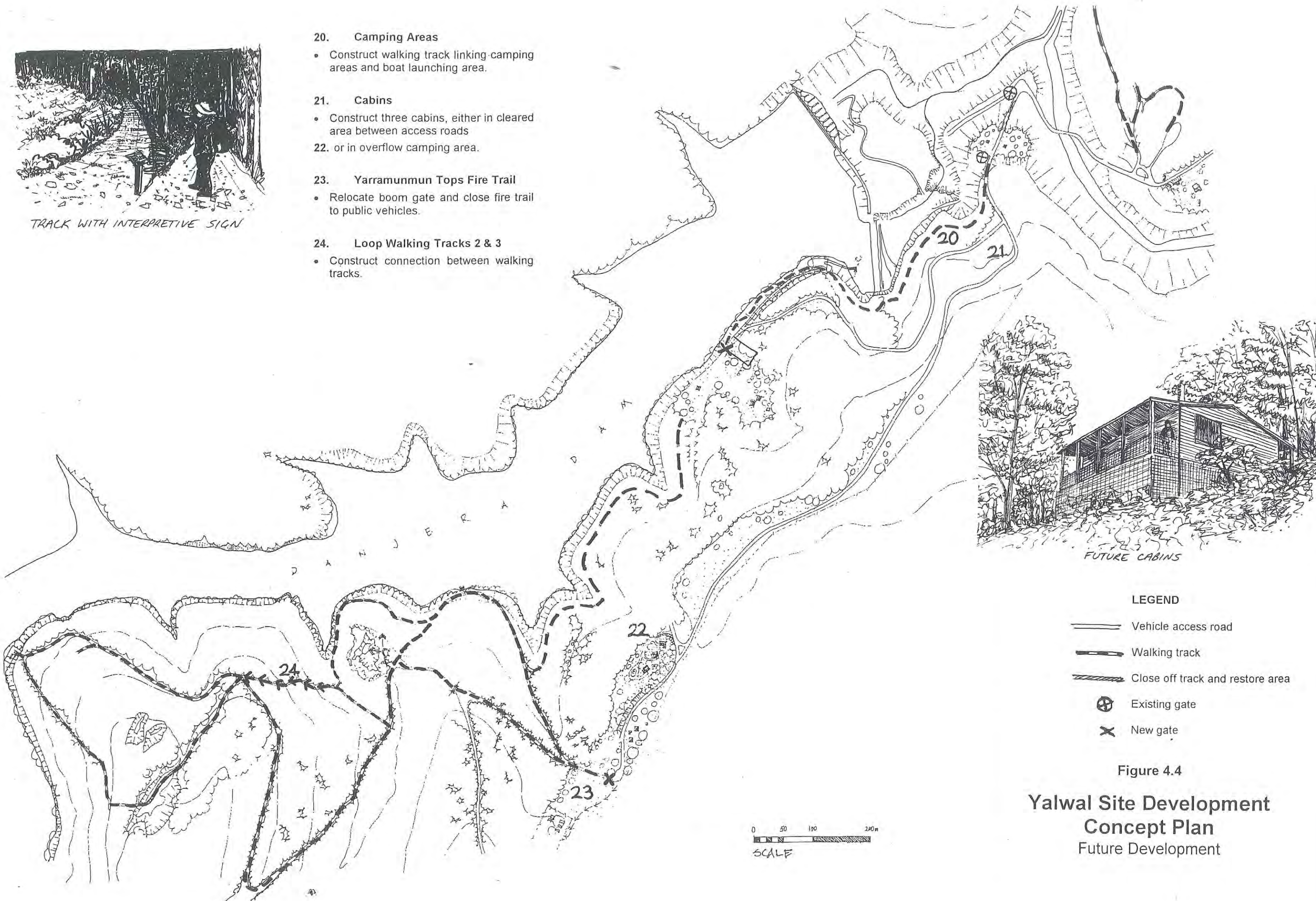
- Construct three cabins, either in cleared area between access roads
- 22. or in overflow camping area.

23. Yarramunmun Tops Fire Trail

- Relocate boom gate and close fire trail to public vehicles.

24. Loop Walking Tracks 2 & 3

- Construct connection between walking tracks.



LEGEND

- Vehicle access road
- - - Walking track
- ▨ Close off track and restore area
- ⊗ Existing gate
- X New gate

Figure 4.4

**Yalwal Site Development
Concept Plan**
Future Development

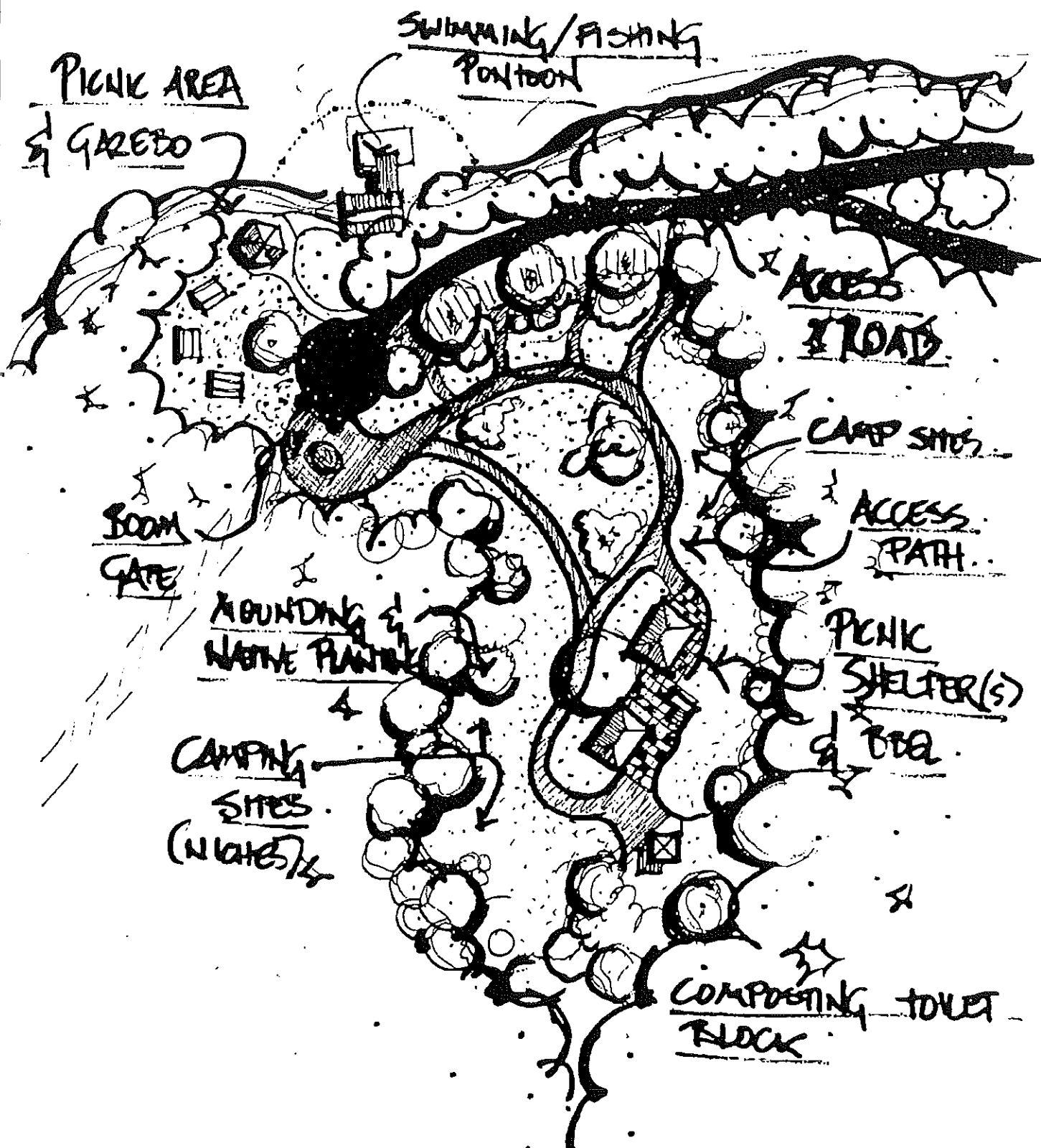


Figure 4.5

Main Picnic/Group Camping Area Concept Plan

5 Financial Evaluation

Further information can be found in **Appendix C, Financial Analysis**.

5.1 Costs

5.1.1 Capital Costs

The total cost of the development is approximately \$1.4 M. The estimated costs for each stage (including an allowance for survey, investigation and design, and contingencies) are as follows:

Stage 1 - \$620,000

Stage 2 - \$194,000

Stage 3 - \$386,000

The indicative cost for future development is \$200,000. It should be noted that these estimates are for planning purposes only (ie accuracy +/- 20%). Refer to **Appendix C** for detailed cost breakdowns.

For the purposes of the financial analysis cash flows were modelled over a 20 year period with Stage 1 of the development occurring in Year 1, Stage 2 in Year 5 and Stage 3 in Year 10. Future development has not been included in the analysis as costs are indicative and there are several factors which will influence how, when, where and whether this development proceeds.

5.1.2 Recurrent Costs

Recurrent costs (or operational costs) include wages and salaries and site management and maintenance costs. Due to the ongoing anti-social behaviour and criminal activities at Yalwal, effective management and visitor safety requires an on-site presence to prevent activities such as:

- break and enter of the Council house and theft/malicious damage;
- break and enter of vehicles parked at Yalwal and theft of contents; and
- dumping and burning of motor vehicles.

As noted in **Section 3.9** adjoining property owners and members of stakeholder groups, who use the area on a regular basis, believe this to be 'critical to the success of the proposed improvements'. Accordingly, allowance has been made for a ranger permanently stationed at Yalwal. Council has expressed preference for a Council ranger to be employed due to their knowledge and experience in dealing with management issues at Yalwal.

The old gold mine workings at Yalwal are considered to be the key feature of Yalwal and potentially its main attraction. There is a wealth of information on the history of the area which could be used to interpret the physical remains at the site. Conversely, there is a dearth of publicly available information on traditional Aboriginal use of the area. The Shoalhaven Aboriginal community has a special interest in Yalwal, demonstrated by their involvement in the construction of the Two Rivers Walking Track (see **Section 1.3**) and a current land claim, together with the large stone artefact site recorded in the NPWS rest area (see **Section 1.4.5**). These factors provide the opportunity to promote an Aboriginal perspective of the area, which would add another dimension to a visit to Yalwal.

Accordingly, other staff requirements in the initial stages would be the employment of a part-time interpretation officer, together with a part-time Aboriginal ranger position (full-time equivalent salaries of \$40,000 per annum have been assumed for these

positions). As the ranger would regularly be in the field on patrols, it is envisaged that an entrance fee collector would be engaged on a commission basis.

After three years it is assumed that an interpretation plan and guided tours would have been developed. Tours and other activities could then be taken over by commercial or other interests (eg LALC) on a commission basis, during peak time.

Costs would also be incurred for utilities and services, operating supplies, garbage removal, vehicle costs, cleansing and litter removal etc. An allowance of \$66,000 per annum has been adopted, based on running costs for a similar park (see Section 3.2, Appendix C).

Costs associated with maintenance of access roads, walking tracks, reserve structures and park furniture etc have been based on a percentage of capital costs, with the percentages increasing as each stage is completed (to account for increased maintenance costs with age of infrastructure). Adopted maintenance costs are as follows:

- Years 2 to 5 \$18,471 per annum
- Years 6 to 10 \$28,352 per annum
- Years 11 to 20 \$45,858 per annum.

Other costs include promotion and marketing and administrative costs. An allowance of \$10,000 has been made for initial promotion and marketing, with an ongoing allowance of \$3,500 per annum. It is anticipated that this would include updating the existing Yalwal brochure and production of simple A4 brochures on walking tracks, plus printing costs. Administrative costs (eg preparation of licences, accounting costs etc) have been based on a percentage of anticipated revenue.

5.2 Revenue

5.2.1 Annual Visitation and Potential Increases in Visitation

There is no information available on annual visitation to Yalwal or Morton National Park (there is only data on visitation to the Fitzroy Falls Visitor Centre). Accordingly, estimates of annual visitation have been made by extrapolating traffic counts and with reference to other tourism data.

Seasonal visitation to Yalwal is estimated at 22% in winter, 26% in Spring, 27% in Summer and 25% in August, based on overall NSW visitation patterns (BTR 2000). Annual visitation for Yalwal is estimated to be about 4800 visits/visitor nights. This is based on scaling up Autumn visitation (as shown Table 5.1) and assuming each season comprises 12 'normal weeks' and one peak week (ie long weekends/school holidays), average car occupancy is three people and that 50% of visitors are campers who stay an extra night during peak weeks.

Table 5.1
Yalwal - Estimated Autumn Visitation

Autumn	time	no. weeks	no. cars	occu- pants	nights	total visits/visitor nights
day visits:	normal	12	8.5	3		306
	peak	1	25	3		75
campers:	normal	12	8.5	3	2	612
	peak	1	25	3	3	225
total						1218

To assist in guesstimates of the potential increase in visitation and visitation per visitor group, reference has been made to visitor surveys and other information contained in reports on Manly Warringah War Memorial Park, Sydney (Nelson Consulting 1988), Namadgi National Park, ACT (Nelson Consulting 2000, UTS and Nelson Consulting 1997) and the Blue Mountains (UTS 1997, Veal 1991). It is also assumed that promotion and marketing would be undertaken to attract target groups that increase weekday and off-peak visitation to Yalwal (see Table 2.2 for a description of these).

Averaged, annual increases in visitation for Manly Warringah War Memorial Park (also featuring a recreational dam), between 1986 and 1996 were about 2%, based on traffic count data. The predicted average, annual increases in various activities in the Blue Mountains National Parks between 1989-2001 Veal (1991) ranged from about 0.3% for camping and sports, to about 5.3% for sightseeing.

Estimates of group visitation as a percentage of total visitation are set out below.

- ACT Parks and Forests campgrounds, 1996/97 Christmas school holiday survey - about 5% of campers were with an organised group (note that this is based on a small sample size) (Nelson Consulting and UTS 1997)
- Manly Warringah War Memorial Park, Sunday 5 October 1997 survey - 1% of visitors were with an organised group (Nelson Consulting 1998)
- Blue Mountains walking tracks, January-March 1997 survey - 6% of walkers were with an organised group (UTS 1997).

In 1996 group bookings for Namadgi National Park's three campgrounds involved about 1.6% of visitors to the park. For ACT Forests about 1% to 2% of campers were with an organised group (UTS and Nelson Consulting 1997).

Table 5.2 provides an indicative breakdown of visitor groups, current visitation and visitation at Year 10 of the Concept Development Plan. It is anticipated that visitation would stabilise at this point, on completion of Stage 3 of the capital works.

Table 5.2
Yalwal - Indicative Breakdown of Visitor Groups

Type of Visitor	% of Total Visitors/annum	No. of Visitors/annum	No. of Visitors at Year 10
day visitors	45	2160	4304
excursions	5	240	1704
campers	40	1920	3060
group campers	5	240	1704
national park users	5	240	240
Total	100	4800	11,011

Participation in ranger guided walks in 1996 for all ACT parks was about 0.5%, for Namadgi National Park about 1% and for Tidbinbilla (which is a regional attraction with formal walks and exhibits) about 6.5% of all visitors (ACT Parks and Conservation Service 1997).

For the Blue Mountains during 1995/96, Discovery Program school bookings increased by 15%, the total number of participants increased by 10% and the number of participants in commercial canyoning increased by 4% (UTS 1997).

Based on the above information the following participation rates for tours/guided walks have been adopted for Yalwal:

- years 1-3, 8% of day visitors and 4% of campers

- years 4 onwards, 4% of day visitors and 2% of campers.

The drop off in participation after Year 3 is anticipated due to repeat visitation and further development of the old mine workings walking tracks, making them more suitable for self-guided walks.

5.2.2 Revenue Sources

Camping fees in NSW National Parks and State Recreation Areas and ACT parks and forests range from about \$5.00 to \$12.00 per site/night, depending on the level of facilities provided and the popularity of the area. Park entry fees range from about \$5.00 to \$7.50 per car (Lewis and Savage 1999, UTS and Nelson Consulting 1997).

The results of a survey of campers over the 1996/97 Christmas school holiday period in Namadgi National Park (when no camping fees were charged) indicated that most were willing to pay between \$3 to \$5 per person to camp at the formal campgrounds (UTS and Nelson Consulting 1997).

Suggested reserve entry and camping fees for Yalwal are shown in Table 5.3. These are shown as \$ per person for ease of calculation in the financial analysis. In reality fees may be imposed per car, or per site for camping.

Table 5.3
Yalwal Entry and Camping Fees

Visitor Type	\$ per person
day visitor	2.00
camper	5.00
group campers	4.00*
excursions	1.50*
national park visitors	2.00

note: *this is an average fee allowing for discounts for schools etc or groups contributing to the management/rehabilitation of Yalwal with the 'normal rate' for others

Fees for NPWS Discovery Program two hour, to half-day activities are generally as follows:

- children \$3.00 - \$5.00
- adults \$4.00 - \$10.00
- families \$10.00 - \$20.00

Table 5.4 sets out suggested fees for tours and other services at Yalwal.

Table 5.4
Yalwal Tour and Other Service Fees

Tours and Services	\$ per person
guided tours	5.00*
guided tour commission after Year 3	1.00
ranger guide for excursions	1.00
exclusive use of an area/special event booking fee**	1.00
secure parking (average, ie assumes vehicles left for two nights)	1.00

notes:

*this is an average fee allowing for discounts for children, schools etc with a higher fee for adults

**relates to booking/cordoning off of specific area of reserve for birthday/Christmas parties, corporate functions, commercial tours and sporting events.

Funding assistance for implementation of the Concept Development Plan may be available through various government programs. The Shoalhaven ACC has identified the following potential funding sources.

Contributions to development costs (including infrastructure) from Federal Government programs, ie

- Regional Assistance Program
- Regional Solutions Program
- Heritage programs.

Employment and wage subsidies schemes, ie

- Work for the Dole scheme
- Indigenous wage subsidies
- Traineeships/apprenticeships
- Green corps.

Funding assistance to install safety barriers etc in the mine workings area may also be available from the Department of Mineral Resources.

5.3 Financial Outcome

The financial evaluation for Yalwal was carried out in compliance with NSW Treasury (1997) guidelines. Cash flow analysis was used to model the financial costs and benefits associated with the implementation of the Concept Development Plan, over a 20 year period.

Financial performance was measured using Net Present Value of cash flows (NPV), Net Present Value per Dollar of Capital Invested (NPVI) and Benefit Cost Ratio (BCR). Internal Rate of Return (IRR) was not used as this does not compute if annual cash flows are always negative, as would be the case for Yalwal.

The financial outcomes are summarised in **Table 5.5**. The results of the financial evaluation indicate that development of Yalwal would require a net annual subsidy in the order of \$170,000 during the first two or three years. Once estimated visitation stabilised in Year 10, it is estimated that this shortfall would reduce to around \$135,000 per annum. Estimated revenue and operational costs for Years 1, 3 and 10 are shown in **Table 5.6**. Annual cash flows can be found in **Appendix C**.

Sensitivity tests (see **Appendix C**) show that the effects of fairly major changes to visitor numbers, recurrent costs and discount rates do not have a significant effect on the financial outcome.

Table 5.5
Financial Results

Financial Outcome	Stages 1, 2 & 3	Discount Rate per annum
Net Present Value of Cash Flows (NPV)	-\$2,195,000	8%
NPV per Dollar of Capital Invested (NPVI)	-2.53	8%
Benefit Cost Ratio (BCR)	0.11	8%

Table 5.6
Estimated Revenue and Operational Costs
Years 1, 3 and 10

Year	Revenue \$	Operational Costs \$
1	1,308	170,758
3	1,948	189,802
10	365	150,553

After Year 3, it has been assumed that tours operated by staff would be taken over by commercial operators on a commission basis. Accordingly, revenue decreases along with operational (recurrent) costs, a large component of which is salaries in Years 1-3.

Although the results shown in Table 5.5 are all below the conventional threshold for financial feasibility, there are other benefits in proceeding with the Concept Development Plan. These include protection of the Danjera Dam water supply, ensuring public safety and reducing environmental damage to the area. These benefits are difficult to quantify in dollar terms and hence have not been included in the financial analysis.

The level of subsidy of about \$32 per visitor initially, falling to about \$12 per visitor after Year 10, is considered reasonable. This is in view of the other benefits of the Concept Development Plan, and costs that would be incurred by Council and others if management issues were not addressed.

6 Recommendations – Development and Management

6.1 Site Capacity

On completion of Stage 3 of the capital works, the reserve capacity would be 50 camping sites (or approximately 150 campers) and 52 formalised parking bays for day visitors, or approximately 150 day visitors at any given time. Development beyond this on the Council reserve is not recommended because:

- vegetation would have to be cleared for additional camping/picnic sites;
- excessive visitor numbers would detract from the 'remote' nature of the area; and
- visitor activities could adversely impact on bushland, heritage values and/or the water supply values of Danjara Dam.

It is estimated that annual visitation would peak at 11,000 visits/annum, about double the current estimate of annual visitation. These estimates are based on many assumptions (see **Appendix C**) and so are indicative only, primarily because:

- no information is available on current annual visitation to Yalwal;
- future visitation levels will depend on the effectiveness of marketing and promotion to appropriate target groups (see **Section 6.6**); and
- local and regional competition for some of the markets to be targeted will impact on visitor numbers, eg Grady's Riverside Retreat and Coolendel both provide facilities for groups such as schools, scouts, fishing and canoe clubs.

6.2 Staffing

Due to the history of anti-social behaviour and criminal activities at Yalwal a permanent, full-time ranger, accommodated in the Council house is recommended together with:

- two temporary, **part-time**, three year positions to develop ways of increasing visitor understanding and appreciation of the values of Yalwal, while conserving and protecting these values; ie interpretive officer and Aboriginal ranger; and
- fee collector during peak times (to free up ranger time for patrols and other matters), paid on a commission basis.

A Council ranger is proposed for the full-time position, due to Council officers' knowledge and experience in dealing with management issues at Yalwal.

6.3 Fees

The following, per person, entry and camping fees are recommended:

- | | |
|-----------------|----------|
| • day visitor | \$2.00* |
| • camper | \$5.00 |
| • group campers | \$4.00** |
| • excursions | \$1.50** |

* this may be implemented as a per car entry fee of say \$5 or \$6 allowing a discount for children

** this is an average fee allowing discounts for schools etc or groups contributing to the management/rehabilitation of Yalwal.

The fees are based on those applicable to other public reserves/national parks and are modest compared to commercial establishments in the local area, eg Grady's Riverside Retreat and Coolendel.

Fees for tours and other services are also recommended, ie:

- guided tours \$5.00 (average per person)
- ranger guide for excursions \$1.00 per person
- exclusive use/special event booking \$1.00 per person

All fees should be periodically reviewed and there may be scope to increase fees to contribute more to operational costs, as site development works are completed and the area becomes more popular.

6.4 Booking System

A booking system is recommended. Campsites could be booked through the Nowra Tourist Information Centre, NPWS Visitor Centre at Fitzroy Falls, NPWS Nowra Office and/or Shoalhaven City Council. Restrictions on the length of stay for campers should be applied and a ballot system may be required at peak times, as the area becomes more popular. Bookings for guided tours, ranger tours, exclusive use and special events could also be made at one or more of these offices.

6.5 Interpretation

The old gold mine workings at Yalwal are considered to be the key feature of Yalwal (ie what sets it apart from other bushland reserves within the region) and its prime attraction. Not only do they provide a sense of history but a sense of adventure through the exploration of tracks, tunnels and open cuts.

Accordingly, the main theme for interpretation is Yalwal's gold mining history, covering the following topics:

- Gold mining techniques (as the scale and nature of the surviving mine workings and processing plants illustrate past gold mining techniques and the complexity of mining operations at Yalwal)
- Yalwal Village (as considerable written and photographic evidence is available and the Yalwal cemetery provides physical evidence of the harshness of life in a remote mining settlement)
- the Fletcher Family (as the family has long been associated with the area and interpretation is more effective if linked to family histories, a picnic or camping area could also be named after the family to maintain this link).

As Yalwal becomes more popular other key values of the area (as described in **Section 1.4**), should be interpreted ie geology, ecology, water catchment, Aboriginal sites and cultural heritage and, as suggested by members of the Yalwal Advisory Committee, the building of Danjera Dam and stocking with Australian Bass.

An interpretation plan should be prepared for the reserve and initially the following information/interpretive material:

- updating of existing brochure *Protecting Yalwal and Your Water Supply*;
- walking track brochure; and
- entrance booth display.

The plan would also cover signage at Chapmans Battery, Golden Crown Workings and the boat launching area jetty, along with the development of tours for the mine workings area.

Further opportunities for interpretation, tours and events are outlined in Sections 3.5 and 3.6.

6.6 Marketing and Promotion

It is recommended that a logo (eg Chapmans Stamper) and marketing strategy be developed for Yalwal to highlight the heritage features of the area and range of recreational opportunities (Appendix A, Section 3.3.6 provides factors to consider).

Promotion could be achieved initially through the Nowra Visitor Centre and NPWS Fitzroy Falls Visitor Centre, expanding to other visitor centres and NPWS and tourism websites as site development proceeds. Visitor Centres should stock:

- pamphlet on camping and recreational opportunities and code of conduct (ie updated *Protecting Yalwal and Your Water Supply* brochure);
- walking track brochure; and
- have other publications for sale, eg *Yalwal Gold* (David Glasson, undated), *The Two Rivers Track* or sections relating to Yalwal (Evans et al, in prep).

The following target groups have been identified:

- 'Day Visitors' (families, individuals, small groups <8 people)
- 'Excursions' (large groups >8 people, comprising tourists, seniors, students, scouts, clubs and other organisations)
- 'Campers' (families, small groups <8, individuals)
- 'Group Campers' (large groups >8 people, comprising 'nature-based' tourists, scouts, students, clubs and other organisations)
- 'National Park Visitors' (individuals, groups, families comprising 'serious' bushwalkers and backpackers, students, service personnel, armed forces, scouts)

Primary target groups are Day Visitors, Excursions and Group Campers to increase weekday, off-season and off-peak visitation to Yalwal. Some visitor research should also be undertaken to provide a better understanding of visitor numbers, changes in attitude, visitor satisfaction and interest in 'wilderness cabin' accommodation.

6.7 Development Guidelines

6.7.1 Protection/Enhancement of Natural Environment

Bat Habitat

- visitor access to be limited to maintain some tunnels free from human disturbance
- mesh gates etc to be used to prevent visitor access (rather than solid structures) – these are to be designed to allow the movement of bats into and out of the tunnels

Re-vegetation and Landscaping

- new plantings for re-vegetation, restoration and landscaping to be local indigenous species

Buffer Zones

- camp sites and other potential pollutant sources to be located at least 40 m away from Danjera Dam and permanent creeks
- only development/facilities recognised in the Yalwal Management Plan/Concept Development Plan (and relating to water supply) to be permitted within 40 m of Danjera Dam and permanent creeks, eg park furniture, fishing/viewing platforms, heritage interpretation/conservation works

- no clearing of existing vegetation within 40 m of Danjera Dam and permanent creeks (except minor clearing for walking tracks and creek crossings)

Visitor Impacts

- visitor code of conduct/minimum impact code to be developed and displayed at entry points and in main picnic/group camping area (also to be available as a leaflet similar to *Protecting Yalwal and Your Water Supply*) – general information, permitted and prohibited activities to be outlined, eg:
 - camping only in designated areas
 - cutting firewood not permitted
 - campfires only in formal fireplaces
 - vehicle access only on designated tracks – driving is not permitted along creeklines
 - access to mine workings area only via formal tracks
 - swimming and boating confined to designated areas
 - powerboats not permitted except those with electric motors
 - fisheries regulations apply to waterways with possible special provisions for Danjera Dam as no natural recruitment occurs/to protect water quality (eg catch and release only or reduced bag limits, use of lures and flies only, no bait fish etc)
 - washing up at sinks provided or away from creeks and the dam
 - in remote and walk-in picnic areas 'take only photos, leave only footprints', ie all food packaging, containers etc to be taken out of area for disposal
 - recyclables to be placed in appropriate bins
 - removal of mine relics or Aboriginal artefacts not permitted
 - no discharge of firearms or prohibited weapons
 - what to do in case of an emergency

6.7.2 Heritage Conservation

A conservation plan for the mine workings to be prepared and as per guidelines set out in the Conservation Policy (McGowan and O'Keefe 1998):

- conservation of Yalwal to be carried out in accordance with the articles laid down in the 'Burra Charter'
- all existing structures and features of post-contact heritage significance to be maintained and conserved, eg Yalwal Cemetery, Chapmans Battery and tramways
- new buildings and structures to be constructed and sited in a manner sympathetic to the area and its heritage values
- Yalwal to be interpreted to demonstrate and promote its heritage significance (see Section 6.5)

6.7.3 Visitor Safety

It is recommended that an emergency response plan is prepared, which includes procedures in case of fire and flood. This should precede site development works and be in place before visitation levels increase.

Mine Hazards

- further search and mapping of mine hazards to be undertaken, together with preparation of a management plan.

- where required mine tunnels to be closed-off using mesh gates or similar so that entrances remain intact and views are possible into tunnels
- visitor access to be directed away from, or safe access provided past shafts and potential rock fall areas via formal tracks and boardwalks with handrails and international symbol warning signs, in preference to obtrusive barricades

Fire

- reserve to be closed during times of extreme fire hazard
- assembly points/safe refuges on eastern side of Danjera Dam to be publicised, as evacuation of Yalwal during a major bushfire is considered too dangerous

Flood

- depth marker to be installed at bridge and safe crossing depth to be publicised
- assembly point and procedures to be publicised in the event that Yalwal is cut-off by flooding of Yarramunmun Creek

Water Safety

- swimming and watercraft use to be physically separated
- designated swimming area to be cleared of potential hazards, eg submerged rocks and stumps
- no recreational powerboats (with the exception of electric powered motorcraft) to be permitted for safety reasons, potential pollution of water from oil/fuel spills, and due to the proximity of the dam to the Ettrema Wilderness Area
- signage to be provided at launching area and formal water access points warning of submerged trees, rocks and stumps

6.7.4 Built Elements

Cabins

- designs to be based on ecologically sustainable development principles, eg energy efficient, use of solar power, minimal water use – use of recycled construction materials to be considered
- cabins to be of a modest scale with horizontal forms preferred (ie long, low structures) to integrate with the landscape
- as per Conservation Policy (McGowan and O'Keefe 1998) 'traditional Yalwal' construction materials to be used, eg timber, with hipped corrugated roofs and verandahs to continue the rural theme of farm buildings on adjoining land (see **Photo 1.8** and sketch, **Figure 4.4**)
- cabins to be sited away from public areas and landscaped to provide a sense of remoteness
- landscaping with indigenous species to be undertaken to soften built forms and 'lawns' to be of native grasses

Other Structures

- generally, a basic level of facilities is to be maintained at Yalwal (eg no supply stores etc so that the 'remote' character is maintained – Nowra is only a short distance away for food etc)
- maintenance of composting toilets (see **Appendix D** for typical design) to be carried out, and service reports prepared, in accordance with DCP No.78 On-site Sewage Management.
- main picnic/group camping area facilities - where possible to comply with Disabled Access Code AS 1428

- information board, interpretive signs, gates, 'gateway' treatment, toilets, shelters, boardwalks, track markers etc to be complementary in design and be consistent in colour and theme (while complementing adjacent National Park signage)
- logo to be developed for signs and structures, eg a stamper or burrawangs

Appendix D includes examples of suitable structures.

Tracks and Signs

- vehicle access (including mountain bikes and motor bikes) only to be permitted on designated access roads and fire trails
- in the long-term shared vehicle/pedestrian tracks to be phased out
- surplus tracks to be closed-off and allowed to regenerate
- as per Conservation Policy (McGowan and O'Keefe 1998) tracks, access roads and carparks to be unsealed
- connected loop tracks to be developed to provide a choice of walking times
- new tracks to be sited to minimise impacts on native vegetation (where possible use existing cleared areas) and avoid cut and fill and steps – where possible tracks (or sections of track) should be on gentle grades and provide access points for less able-bodied visitors
- appropriate erosion and sediment controls to be provided on existing tracks and new tracks, eg cross-drains, sediment traps – rock headwalls to be constructed to prevent scouring and hide drainage pipes
- lightweight, prefabricated metal frames for boardwalks preferred for ease of transport
- floor of tunnels where visitor access is permitted to be improved using cement stabilised soil
- as far as possible, regulatory signs to be rationalised and make use of international symbols rather than text
- interpretive signs to be integrated in boardwalk and viewing platform handrails as appropriate and a consistent and complementary approach to signage and information to be developed for Council and NPWS controlled land
- track and boardwalk construction to be generally in accordance with NPWS *Walking Track Construction Guidelines*
- reference also to be made to the NSW Heritage Council *Guidelines for Heritage Trails*
- walking tracks to be maintained, managed, promoted and interpreted in accordance with the objectives of SCC's *Walking Tracks Strategy*

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Appendix A

Yalwal

Market Analysis

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1 Visitation

1.1 Visitors to the South Coast

Based on tourism regions, the South Coast is made up of the Shoalhaven, Eurobodalla and Bega Valley Local Government Areas (LGAs). It stretches from north of Berry to the NSW-Victorian border. The region is a major holiday destination with a range of activities including beaches, mountains and ten national parks (Tourism NSW 1999). Visitation to the Shoalhaven is higher than the other LGAs. For the financial year 1995/96 Shoalhaven received 44% of visitors, Eurobodalla 29% and Bega Valley 27% (Tourism NSW 1999).

During 1998/99, there were approximately 2,637,000 domestic overnight visitors (representing 10% of domestic visitors in NSW) and 2,138,000 domestic day visitors to the South Coast. The average length of stay for overnight visitors was 3.9 nights, which is amongst the highest in NSW (BTR 2000). The number of visitors to the region appears to have decreased since the estimated 2,928,000 in 1994/1995 (note that survey methods have changed, which may have influenced results). However, the average length of stay has increased from 3.3 nights in 1994/95, reflecting the family holiday destination nature of the region and the distance of the region from the major population centres (Tourism NSW 1999). Of the international visitors to NSW, 3% or 72,100 visited the South Coast in 1998/99. These tourists were mostly from the United Kingdom or other European countries (BTR 2000).

Table 1.1 shows the origin of visitors to the region.

Table 1.1
Origin of Overnight and Day Visitors to the South Coast 1998/99

Origin of Visitors	Overnight Visitors %	Day Visitors %
Sydney	46	36
Other New South Wales	24	56
ACT	15	7
Victoria	13	

source: BTR 2000 (National Visitor Survey (NVS)) year ended June 1999)

Most overnight visitors travelled to the South Coast for holidays and leisure (69%) or to visit friends and relatives (22%), with 7% of people visiting for business purposes. Nearly all visitors travelled by private vehicle (93%) (BTR 2000).

For the year ended June 1999, most overnight visitors visited the South Coast in January (18%) followed by April (10%) and February and May (9% each). The percentage of visitors for these peak summer and school holiday periods was 1 to 2% higher than the NSW State average, apart from the month of January when visitation was 6% higher than the State average. This illustrates the seasonality of visitation to the South Coast and predominance of summer visitation.

Obviously different areas within the South Coast Region attract visitors from different origins. Eurobodalla is popular with ACT residents, while the Sapphire Coast (particularly Merimbula) is popular with Melbourne and rural Victorian residents (NSW Tourism Commission 1990b). There are no recent breakdowns for visitor origin, however, Table 1.2 provides an indication of the origin of visitors to the Illawarra Region (which in 1988/89 included Shoalhaven) and the South Coast Region.

Table 1.2
Origin of Domestic Visitors to the Illawarra and South Coast 1988/89

Origin	Illawarra % (including Shoalhaven)	South Coast % (Eurobodalla and Bega Valley)
Sydney	64.0	29.0
NSW country	22.7	25.3
Melbourne	2.3	14.8
Victoria country	0.9	8.2
ACT	7.1	20.8
Queensland	2.1	
other interstate	1.0	2.0

source: NSW Tourism Commission 1990a and 1990b

Tables 1.3 and 1.4 show the age and sex of overnight visitors aged 15 and over and life cycle group of visitors, respectively.

Table 1.3
South Coast Overnight Visitors
Percentage of Visitors by Age Group and Gender 1998/99

Age Group	Male %	Female %	Total %
15-24 years	8	6	14
25-44 years	23	20	43
45-64 years	16	15	31
65+ years	6	6	12
Total	53	47	100

source: BTR 2000 (NVS year ended June 1999)

Table 1.4
South Coast Overnight Visitors – Lifecycle Group 1998/99

Lifecycle Group	South Coast Region	NSW
young single living at home	11	13
young single living alone or in shared accommodation	2	3
midlife single	8	10
young/midlife couple, no kids	12	12
parent with youngest child aged 5 or less	13	12
parent with youngest child aged 6-14	15	13
parent with youngest child aged 15+ and still at home	10	8
older working single	2	3
older non-working single	3	5
older working married person	9	10
older non-working married person	14	12

source: BTR 2000 (NVS year ended June 1999)

note: does not add up to 100% due to rounding

Overnight visitors who were employed full-time represented the largest percentage of visitors to the South Coast (55%), followed by those who were retired or on a pension (16%). Activities visitors participate in are shown in Table 1.5.

Table 1.5
South Coast Visitor Activities 1998/99

Main Leisure Activities	Overnight Visitors %	Day Visitors %
go to the beach (includes swimming, surfing, diving)	56	21
visit friends or relatives	29	17
go fishing	25	9
visit national parks, bushwalking, rainforest walks	23	9
pubs, clubs, discos etc	16	6
outdoor activities (other than fishing and other sports)	13	3
go on a day trip to another place	9	
participate in sports (other than fishing)	7	4
visit art/craft workshops/studios	5	
visit history/heritage buildings, sites or monuments	5	6
visit museums or art galleries	4	
visit wildlife parks/zoos	3	
visit botanical or other public gardens	2	
visit industrial tourism attractions (eg breweries, mines)	2	
attend organised sporting event		3

source: BTR 2000 (NVS year ended June 1999)

1.2 Shoalhaven Residents

The Australian Bureau of Statistics (ABS) data includes Shoalhaven in the Illawarra Region, with Eurobodalla and Bega classified as the south coast.

Between 1991 and 1996 Shoalhaven had the largest increase in population (8,490) outside the Sydney Region and the 8th highest growth rate in NSW. The average annual growth rate between 1971 and 1996 was 4.03%. The compound growth rate to the year 2016 is estimated to be 2.3%. Most of the population increase is through migration (Shoalhaven City Council (SCC) undated).

Approximately one half of the Shoalhaven population is located in planning area 1 (see **Figure 1.1**) which includes Yalwal and the major residential and service centre, Nowra-Bomaderry, and surrounding townships of Shoalhaven Heads, Berry, Greenwell Point and Kangaroo Valley (which is the fastest growing district in the planning area) (SCC undated).

Table 1.6 shows the age groups of Shoalhaven residents. A higher percentage of the Shoalhaven population is aged 12 years and under and 55 years and over than the State averages of 18.6% and 21.3% respectively. There are proportionally fewer people in the 13-24 years age group than the State average of 17.0%.

For the period 1991-1996 the highest compound growth rates were for the 75+ age group (6.2%), 40-54 years age group (4.8%), followed by the 65-74 years age group (3.7%).

Table 1.6
Shoalhaven Residents – Percentage of Population by Age Group 1996

Age Group	Residents %
0-4 years	7.5
5-12 years	13.0
13-17 years	7.0
18-24 years	6.3
25-39 years	19.2
40-54 years	18.5
55-64 years	10.7
65-74 years	11.4
75+ years	6.3
Total	99.9

source: SCC undated (based on 1996 census data (unadjusted))

note: does not add up to 100% due to rounding

Tables 1.7 and 1.8 show the highest qualification achieved by Shoalhaven residents and the number of school students in the area, respectively.

Table 1.7
Qualification (highest) – Shoalhaven 1996 (persons aged 15 years or more)

Qualification	Shoalhaven %	NSW %
higher degree	0.6	1.6
post graduate diploma	1.1	1.3
bachelor degree	3.9	8.0
undergraduate diploma	3.1	3.5
associate diploma	2.5	3.0
skilled vocational	14.2	10.9
basic vocational	3.1	3.2
inadequately described	1.3	1.1
not stated	11.9	11.7
not qualified	58.3	55.7
Total	100	100

Of those with a qualification the most common field was engineering (9.7%) higher than the State average of 8.6%, then administration 5.5% (less than the State average of 7.7%), followed by architecture and building 3.9% which is higher than the State average of 2.7%.

Table 1.8
School Students 1996

Type of School	Infants/Primary No. of students	Secondary No. of students
government	7228	4332
catholic	810	646
other non-government	367	318
Total	8405	5296

1.3 Yalwal Visitors

Table 1.9 shows the estimated peak visitation for Yalwal for 1999-2000.

Table 1.9
Peak Yalwal Visitation 1999-2000

			1999	2000		
	Easter*	Anzac Day long w'end	2 May (Sunday)	16 May (Sunday)	October long w'end	27-28 May (weekend)
day visitors			55-60	60		
campers:			nil			60
main area	45	32		15	>100	
other areas	10	11				
NPWS area	30			30		
vehicles:				10		27
4WDs			23	23		
sedans			1	9		
bikes (reg)	8	2		10		11
bikes (unreg)	12	3	2	9		2

* poor weather

source: SCC letter dated 28/5/2000

The average weekly two-way traffic movements for Yalwal Road, between 3 April 2000 and 14 May 2000, ranged from about 27 to 99 (the traffic counter did not function continuously during this period). The peak daily two-way traffic volumes for Easter Friday, Saturday, Sunday and Monday were 128, 206, 203 and 196 respectively (see **Appendix A** for traffic counts).

Since February 1999 (due to an increase in the number of patrols) it appears that the number of unregistered motor bikes has decreased. During the 1999 Easter holidays about 50% of visitors were at Yalwal for the express purpose of trail bike riding with the remainder pursuing passive recreational activities. There were six canoes observed using the dam on 16 May 1999.

Between about May 1999 and May 2000 the number of 4WD 'convoys' passing through the reserve as part of the Yalwal/Yarramunmun/Tianjara/Twelve Mile/Braidwood Road 'loop' had increased (Yalwal appears to be a 'morning tea' destination and toilet stop).

Most visitors are from Wollongong and Sydney southern and south-western suburbs and visitation tends to be higher between Autumn and Spring (SCC 28/5/2000).

Use of the Yalwal NPWS area has changed since closure of the Yalwal Creek Fire Trail in mid-2000, with more family groups using the area, rather than 4WDs and trail bike riders.

2 Accommodation

Table 2.1 shows accommodation used by visitors to the South Coast during 1998-99.

Table 2.1
Accommodation Type used by NSW South Coast Visitors 1998-1999

Accommodation Type	Percentage
hotel, resort, motel, motor inn	11
guest house/bed and breakfast establishment	3
self-catering cottage/apartment	19
caravan park or commercial camping ground	23
friends' or relatives' property	28
own property, eg holiday house	11
caravan or camping by roadside/private property	3
other combined, eg:	2
- backpacker/hostel	
- university/school dormitory/college	
- privately owned boat/yacht etc	
- slept in bus/coach/train/plane	
- other non-commercial	

source: BTR 2000 (NVS year ended June 1999)

Shoalhaven has a high percentage of unoccupied dwellings (28.7%) compared to 8.9% for NSW as a whole. The 1986 census (later census data did not give an explanation) identified the major reason dwellings were unoccupied as being that they were holiday homes. Most of these are located in the coastal towns and villages (SCC undated, 1996 census data).

Caravan park capacities and occupancy rates for 1995-96 are shown in Table 2.2 and 1997 visitor nights for hotels/motels, holiday flats/units/homes and caravan parks are shown in Tables 2.3, 2.4 and 2.5 respectively.

3 Attractions

The following information is taken from NSW Tourism strategies.

3.1 Illawarra Region Tourism Development Strategy

(includes Shoalhaven)

Hinterland rivers, dams and waterways are underutilised for tourism purposes. Some of these include the Shoalhaven, Wingecarribee and Wollondilly rivers, Lake Illawarra, Jervis Bay, St Georges Basin, Burrill and Durras Lakes, Lake Conjola, and Lake Tabourie.

For National Parks, State Recreation Areas, State Forests and Crown Reserves visitor facilities are orientated to passive day use recreation, although limited camping facilities are provided. Potential exists for the development of a range of tourist facilities, in or adjacent to some of these areas including tourist complexes of a specialist or retreat nature such as Coolendel, Greenpatch, Wombeyan Caves, Tugalong, the H Ranch and specialist tours, eg horse riding treks (NSW Tourism Commission 1990a).

Table 2.2
Caravan Park Capacity and Occupancy Rates 1995-1996

Shoalhaven LGA Caravan Parks

Quarter ended	establish-ments	on-site vans	Capacity other powered sites	unpowered sites	cabins, flats etc	total	sites occupied by long-term guests	other sites permanently reserved	Site 1st month	Nights 2nd month	Occupied 3rd month	tot. for qtr	Site 1st month	Occupancy 2nd month	Rates % 3rd month
Mar-95	71	455	7,471	1,890	334	10,150	655	5,452	235,622	196,713	207,288	639,623	74.9	66.8	65.9
Jun-95	72	437	7,467	1,946	384	10,198	645	5,480	208,863	198,844	191,718	597,425	68.3	62.3	62.7
Sep-95	73	457	7,474	1,930	364	10,225	653	5,459	199,989	200,011	197,254	597,254	63.1	63.1	64.3
Dec-95	73	485	7,531	1,823	369	10,208	650	5,550	213,423	204,558	233,903	651,884	67.4	66.8	73.9
Mar-96	73	474	7,591	1,747	373	10,185	656	5,576	249,743	182,808	219,369	661,920	79.1	67.9	69.8
Jun-96	73	465	7,596	1,650	383	10,094	679	5,440	204,629	188,868	193,100	596,397	67.9	63.8	64.1
Sep-96	71	450	7,552	1,611	370	9,983	670	5,523	202,959	202,448	203,370	608,777	65.6	65.4	67.9
Dec-96	72	444	7,556	1,619	393	10,012	664	5,509	209,769	203,163	223,859	636,764	67.6	67.6	72.1

Eurobodalla LGA Caravan Parks

Quarter ended	establish-ments	on-site vans	Capacity other powered sites	unpowered sites	cabins, flats etc	total	sites occupied by long-term guests	other sites permanently reserved	Site 1st month	Nights 2nd month	Occupied 3rd month	tot. for qtr	Site 1st month	Occupancy 2nd month	Rates % 3rd month
Mar-95	26	229	3,069	721	239	4,258	330	1,631	97,180	71,867	74,905	243,952	73.6	58.2	56.7
Jun-95	26	234	3,115	707	239	4,295	323	1,618	74,401	67,072	64,189	205,662	57.7	50.4	49.8
Sep-95	26	236	3,071	683	266	4,256	321	1,612	67,644	66,668	68,027	202,339	51.3	50.5	53.3
Dec-95	26	232	3,076	658	276	4,242	323	1,604	73,154	69,701	80,023	222,878	55.6	54.8	60.9
Mar-96	26	233	3,079	656	277	4,245	334	1,594	93,257	68,164	76,256	237,677	70.9	57.3	57.9
Jun-96	26	251	3,077	656	257	4,241	331	1,588	72,389	68,553	65,992	206,934	56.9	52.1	51.9
Sep-96	26	227	3,074	645	296	4,242	328	1,584	68,935	67,931	68,362	205,228	52.4	51.7	53.7
Dec-96	26	231	3,045	631	301	4,208	319	1,582	69,491	68,600	77,813	215,904	53.3	54.3	59.7

Bega Valley LGA Caravan Parks

Quarter ended	establish-ments	on-site vans	Capacity other powered sites	unpowered sites	cabins, flats etc	total	sites occupied by long-term guests	other sites permanently reserved	Site 1st month	Nights 2nd month	Occupied 3rd month	tot. for qtr	Site 1st month	Occupancy 2nd month	Rates % 3rd month
Mar-95	24	254	2,734	1,273	244	4,505	173	704	83,397	43,208	40,195	166,800	59.7	33.1	28.8
Jun-95	24	251	2,726	1,266	244	4,487	162	707	45,375	33,300	31,795	110,470	33.7	23.9	23.6
Sep-95	24	248	2,743	1,201	244	4,436	164	711	35,304	33,796	36,273	105,373	25.7	24.6	27.3
Dec-95	24	248	2,731	1,201	251	4,431	163	709	36,085	34,664	54,447	125,196	26.3	26.1	39.6
Mar-96	24	250	2,728	1,204	251	4,433	168	703	80,807	44,277	45,308	170,392	58.8	35.7	33
Jun-96	24	251	2,726	1,199	249	4,425	169	717	41,806	34,413	33,312	109,531	31.5	25.1	25.1
Sep-96	24	273	2,670	1,200	229	4,372	166	711	34,368	33,265	35,869	103,502	25.4	24.5	27.3
Dec-96	24	260	2,718	1,170	256	4,404	172	718	38,335	37,361	56,286	131,982	28.1	28.3	41.2

Table 2.3
1997 Visitor Nights – Hotels/Motels

(59 Motels, 980 Guest Rooms, 3083 Bed Spaces – as at December Quarter 1997)				
Month	Occupied Room Nights	Room Occupancy Rate %	Guest Nights	Takings (\$,000)
January	16,687	56.6	40,274	1,391
February	10,913	41.0	21,354	729
March	13,533	45.9	28,553	950
April	10,978	38.2	20,815	748
May	8,809	29.9	15,606	548
June	8,285	29.2	14,813	535
July	9,543	31.4	18,360	613
August	8,517	28.0	15,078	569
September	9,893	33.6	18,210	658
October	13,555	44.6	27,932	918
November	12,027	45.5	23,807	801
December	13,774	45.5	29,322	1,064
Total 1997	136,514	38.7 (average)	274,124	\$9,524,000
Group size	2.01 (average)			

source: SCC 1999

Table 2.4
1997 Visitor Nights – Holiday Flats, Units and Houses

(27 Establishments, 91 Single and 588 Multiple Bed Rooms, 3831 Bed Spaces - as at December Quarter 1997)				
Month	Unit Nights Occupied	Unit Occupancy Rate %	Unit Lettings	Takings (\$,000)
January	14,778	58.6	2,244	1,240
February	5,164	22.7	1,051	350
March	4,829	34.7	1,278	410
April	3,329	18.0	965	227
May	1,513	7.9	643	128
June	1,995	10.8	659	157
July	2,311	12.0	706	164
August	1,890	9.8	715	146
September	1,904	10.3	678	173
October	4,122	19.6	1,646	260
November	3,629	17.8	1,367	199
December	7,128	33.9	1,910	604
Total 1997	52,592	21.3 (average)	13,862	\$4,058,000
Group size	assume 3.56			

source: SCC 1999

Table 2.5
1997 Visitor Nights – Caravan Parks

(72 Caravan Parks, 10,012 Sites - as at December Quarter 1997)			
Month	Occupied Site Nights	Site Occupancy Rate %	Takings (\$,000)
January	249,743	79.1	2,780
February	192,808	67.9	1,456
March	219,369	69.8	1,749
April	204,629	67.9	1,554
May	198,668	63.8	1,189
June	193,100	64.1	1,198
July	202,959	65.6	1,153
August	202,448	65.4	1,161
September	203,370	67.9	1,220
October	209,769	67.6	1,574
November	203,136	67.6	1,414
December	223,859	72.1	2,041
Total 1997	2,503,858	68.2 (average)	\$18,489,000
Group size	assume national average – 3.56		

source: SCC 1999

3.2 South Coast Region NSW Tourism Development Strategy

(Eurobodalla and Bega Valley)

The Mogo town has developed its tourism product in relation to its goldmining history. Walking tracks guide visitors through old mine workings, tunnels and puddling ponds and the opportunity is provided to fossick for gold. Craft, arts, nursery, pottery and leadlight establishments augment the goldmining attractions. This feature is considered to be of regional significance (Old Mogo Town and Mogo Goldfields Park).

Mount Dromedary Flora Reserve includes rainforest walks and the opportunity to visit old gold mine workings and the outlook from the top of Mount Dromedary provides a spectacular vista.

Hinterland Rivers, dams and waterways are underutilised, these include the Clyde, Moruya, Tuross, Bega and Towamba rivers and Brogo and Cockranes dams (NSW Tourism Commission 1990b).

3.3 Attractions Development Strategy for Regional NSW

3.3.1 Description of NSW Attractions

Attractions fall into four categories: icons, major destination, minor destination and short stop attractions.

Major destination attractions need to have *broad market appeal, high impact, high levels of attendance relative to total visitation to the area, and the content and image to create the additional reasons for visitation or repeat visitation to a region.*

Major destination attractions, which offer significant program and content levels to maintain visitor interest for approximately half a day are few in number in regional

NSW. Examples include major amusement and recreation attractions, large nature-based facilities such as zoos and extensive heritage sites.

The icon and major attractions to some extent establish the image and generate visitation while the remaining attractions provide additional activities for the visitors once they have arrived.

Given the length of time committed to a major destination attraction, few if any other attractions could be visited in the same day. As a consequence, most regions can only sustain a limited number of major destination attractions.

Minor destination attractions can be virtually any type of attraction with sufficient content and interest to sustain a visit of around two hours. In general, visits to these attractions will be unplanned prior to arrival in the region. Travellers can visit several minor destination attractions in one day, depending on the distance between attractions.

Minor destination attractions *rely primarily on local marketing and depend on visitors being enticed to the region by the icon and major attractions.*

Short stop attractions are typically smaller in scale, limited in focus and located on, or close to, major transport corridors or tourist routes, ie target transit travellers.

Nature-based attractions are the largest category (27%) in regional NSW, followed by museums and historic sites (18%). Other important attraction categories are those that are wine related and galleries and crafts, at 10% each.

Nature-based attractions are predominantly natural features of interest, national parks and walking tracks. Many of these are not formally operated, they are simply places of interest which tourists can visit.

Historic sites and museums include traditional museums, historic sites and buildings, and heritage villages.

Mining related attractions are another example of the concentration of attraction types in selected tourism regions. While only comprising 3% of all attractions in regional NSW they are major components in The Living Outback (western NSW), Explorer Country (Central NSW) and Big Sky Country (northern inland NSW) (Tourism NSW 1999 - see Figure 3.1 for tourism regions in NSW).

3.3.2 South Coast Attractions

The South Coast Region has 132 identified attractions, 9% of the total number of attractions in regional NSW. Table 3.1 provides a breakdown of the type of attractions.

Table 3.1
South Coast Attraction Types

Attraction Type	Percentage in South Coast
nature based	34
museums and historic sites	20
galleries and crafts	16
agricultural	7
other cultural	7
other attractions	17

source: Tourism NSW 1999

note: does not add up to 100% due to rounding

3.3.3 The Changing Nature of Attractions

Museums and historic sites until recently did not view themselves as tourist attractions but rather repositories of information and artifacts.....In general, the orientation was toward conveying information, research and education, not entertainment....For the general public, museums and many historic sites were not seen as friendly or enjoyable places to visit.

The quality of programs offered at many regional attractions is low. Many attractions rely on static displays that do not engage or create interest in the visitor. Collections of items in glass cases with signs are no longer of interest to most travellers. They seek higher quality presentation, which allows them to experience the attraction, not just see it.....More personal interaction between the operator and the visitor can create greater interest in the attraction, engage the visitor and provide the 'experience' they are seeking.

As tourists are now more discerning and as a result of advances in information technology, amusement parks have become more educational and museums, cultural facilities and natural attractions more entertaining.....All attractions have become more interactive, with a higher level of guest participation and control over their experience. This concept of EIE, "Educational Interactive Entertainment" or conversely "Entertaining Interactive Education" will be the fundamental basis for the success of attractions in the future.

The trend to nature-based and environmental tourism may have implications for attractions in regional areas, which can increase their market potential by emphasising the environmental component of the facility....For attractions, the opportunity for guests to participate in what is perceived as a healthy activity can improve market potential.

The traditional one long holiday each year has been augmented by shorter, three to five day holidays. This provides opportunities for attractions on the outer rim of major metropolitan areas that may have been overlooked in the past as travellers headed to more distant destinations.

The growing problems of pollution, limited resources on a global scale, political turmoil and regional and local conflicts will probably increase the level of stress and concern. As a consequence, many visitor will be seeking escape from the daily stress at home and work. They will look for attractions that provide escape. Escape does not necessarily mean fantasy or amusement, it can be an escape into a different time or culture, into art, into history or into architecture. Whatever the choice, it is an alternative to the everyday environment they live in.

The ability to experience history rather than simply to look at old buildings has led to the development of 'living history' attractions that use either authentic or re-created historic environments to entertain and educate visitors. These attractions rely heavily on the use of interpreters, generally in period costume and in some cases playing specific historic roles. The objective is to bring history alive so that guests can 'step back in time' to see life as it was in the past.

The most successful facilities provide an authentic experience for the guest. These types of attractions are very popular in the United States. Examples in Australia include Sovereign Hill in Ballarat and, to a limited extent, Port Arthur Historic Site. If the experience is not perceived as authentic or is seen as a parody, the attraction generally will not perform as well nor create repeat visitation (Tourism NSW 1999).

3.3.4 Visitors to Attractions

Local residents are the primary market for regional attractions, while cultural and educational attractions attract a higher percentage of domestic visitors than the other

attraction types. Table 3.2 shows the breakdown of visitors for all attractions compared to natural and cultural/educational attractions.

Table 3.2
Origin of Attraction Visitors

Attraction Type	Local Visitors %	Domestic Visitors %	International Visitors %
nature related	57	33	10
cultural & educational attractions	46	45	9
all attractions	54	36	10

source: Tourism NSW 1999

Groups form an important source of demand for attractions, accounting for 23% of all attendance and 25% of attendance for cultural/educational attractions and 22% of natural attractions. The most important segments of the group market are domestic coaches (39%) and school groups (23%). Table 3.3 provides a breakdown of group type by natural and cultural/educational attraction type.

Table 3.3
Group Visitors to Attractions

Group Type	Attraction Type		
	nature related %	cultural/educational %	all attractions %
domestic coaches	36	52	39
school groups	19	29	23
special interest groups	18	8	16
international groups	12	5	10
other groups	16	6	12

source: Tourism NSW 1999 – Regional Attractions Survey 1998

3.3.5 Attraction Attendance, Pricing and Staffing

The total attendance of responding attractions was 6.6 million visitors. However, over half of the respondents reported annual attendances of less than 50,000. Two thirds of the reporting attractions achieve attendance levels of less than 1,000 per week on average. It is difficult to maintain a quality presentation and facility with these low levels of attendance. Operating hours for attractions surveyed varied greatly, with many smaller attractions only open for limited hours or by appointment.

Most attractions in regional NSW are low-yield and low-profit. About 44% of attractions surveyed reported less than \$250,000 annual revenue, and a further 22% reported revenue between \$250,000 and \$500,000 per year. Cultural and educational attractions had the highest proportion of reported revenue below \$250,000, at 52%. In total, about two thirds of all attractions reported revenue of less than \$500,000 per year. With gross revenue of less than \$500,000, about two thirds of attractions have great difficulty in maintaining profitability. The 44% of attractions with gross revenue of less than \$250,000 would be very restricted in the programs they can offer, the hours they can maintain and their ability to upgrade the attraction.

Prices for admission are, in many cases, low compared with the product offered. One third of attractions surveyed have no admission charge. Of those that do charge, the median admission price is seven dollars, with many only charging one or two dollars.

While there are some large operators, the majority are small and, in many cases, family-run attractions. Regional attractions utilise a high level of volunteers, with over one third of staff being volunteers. Attractions are, in many cases, hindered in their efficient operation due to a lack of adequately trained staff (Tourism NSW 1999).

Pricing variation for cultural/educational and nature related attractions are shown in Table 3.4.

Table 3.4
Attraction Pricing

Attraction Type	Highest Adult Price	Median Adult Price	Lowest Adult Price
cultural/educational	\$25.00	\$6.25	\$1.00
nature related	\$70.00	\$15.25	\$2.00

source: Tourism NSW 1999 – Regional Attractions Survey 1998

3.3.6 Attraction Planning

In many cases, the major centres and attractions within the regions are not strongly linked or identified with their region and associated brand. Within the range of existing attractions, there are only limited programs targeted to children. As a result, the attractions sector in the regions is generally not attractive to the family market. Many attractions also do not capitalise on opportunities for sale of merchandise or food and beverage. Few attractions offer evening programs.

There are several critical factors for success for any regional tourist attraction. These factors can be grouped into four areas.

Product:

- *a concept and design which generates interest and enthusiasm from the target markets;*
- *exciting, interesting and changing programs, displays and exhibits;*
- *easy access to the attraction - the distance people will travel is a function of the appeal of the attraction and its uniqueness;*
- *adequate content for the price charged - the guests must feel that they have received value for money and that the program, displays and exhibits were worth the entrance fee.*

Marketing:

- *a well conceived and targeted marketing program which is realistic in identifying market potential;*
- *the ability to attract the local resident market;*
- *the ability to generate repeat visitation due to variation in the programs, displays and exhibits;*
- *an effective distribution strategy to disseminate information about the attraction, including brochures, signs and advertising;*
- *signage which is effective in directing guests to the attraction;*
- *a program to research and gain knowledge about the target markets on an ongoing basis.*

Financing:

- *a level of investment which can be supported by the potential revenue from the target markets;*
- *conservative projections of market potential and achievable attendance;*
- *adequate financial reserves to sustain the attraction during seasonal downturns, periods of economic disruption and natural disasters.*

Operations:

- *management with the experience and skills required by the specific nature of the attraction and the requirements of the market;*
- *staff with a customer service orientation;*
- *staff training programs which instill the necessary skills and attitudes.*

Creating visitor itineraries is also important in promoting minor destination attractions, eg:

- themed loops, starting and ending in a major town or city, with a collection of attractions based on a unifying theme such as nature and environment, arts and crafts, gold and mining, caves, heritage sites etc.
- a series of spokes from a central hub location, with each spoke providing a part or full day of experiences with a return to the hub location in the evening (Tourism NSW 1999).

3.4 Tours

A summary of information on school excursions, commercial tours and Discovery Program activities for the South Coast follows.

- A survey of southern NSW organisations (Wollongong to Victorian border and to just west of the ACT) identified 63 environmental study sites in this area.
- Most of these sites demonstrate forest management, coastal/estuary management or are remnant rainforest, with Nerrigundah demonstrating old mine workings and an old gold mining town.
- There are two field study centres located in southern NSW – Bournda and Mt Kembla, with the Boyd Education Centre located on the Shoalhaven River (Rumbalara Field Studies Centre 1995).
- Another Important environmental education destination in the region is the Minnamurra Rainforest Centre.
- Primary schools tend to visit youth camps, field study centres and local parks.
- Although primary schools conduct more excursions they require considerable support through either programs or displays.
- Secondary schools tend to visit national parks and coast/wetland areas.
- Secondary teachers use excursions as an opportunity to show areas of contrast to the local area, or use sites capable of covering environmental issues at a local level.
- Almost half the excursions lasted a full day, with those lasting several days tending to be primary school excursions interstate or to youth camps.
- Factors influencing a teacher's choice of venue were cost, contrast to school environment, being close to school, having hands on activities, part of a wider study (eg streamwatch, or a catchment study), the programs available at the site, the venue being relevant to a particular study topic and the site's features (eg striking rainforest).

- Local parks and national parks were chosen because they were close and cheap, excursions to dams were also identified as relatively inexpensive.
- Dams were used to study water quality and youth camps were used for bushwalking and sport/recreation activities (eg canoeing, abseiling).
- Primary schools generally undertook more identification activities (eg catching water bugs) whereas high school students did more water studies and scientific research (eg measuring phosphorous levels and turbidity) (Howard 2000).
- There are approximately 30 schools in the Shoalhaven LGA; and two TAFE colleges (Nowra and Bomaderry) and a campus of the University of Wollongong at Nowra.
- There are 31 organisations currently licenced with NPWS to undertake group activities in parks within or close to the Shoalhaven area (eg Morton, Budderoo and Budawang national parks and Bundonia State Recreation Area).
- Of these, approximately 26 are commercial operators (10 South Coast/Southern Highlands-based, 9 Sydney-based) with the remainder being schools or non-profit organisations, engaging predominately in outdoor sports activities (two involve camping).
- Services/activities offered by commercial operators fall roughly into the following categories: 'adventure tours' focusing on outdoor sports (9 operators); sightseeing/less strenuous 'bush experiences' (9 operators); corporate training/personal development (3 operators); environmental education (1); bushwalking (1); cycling (1); motor bike tours (1); and 4WD tours (1).
- It appears that six of the operators offer camping; only one of the 'bush experience' tours offers a 'cultural' component (bush tucker) and wildlife component (spot lighting); and only one of the 'adventure tours' specifies an environmental studies component.
- In the Shoalhaven/Southern Highlands area there are approximately six NPWS 'Discovery' tours currently available. These operate during school holidays and are essentially single activity tours covering cycling, canoeing, rock platform walks, bushwalking, spotlighting and wildlife surveys (obviously with an education/conservation focus).

See **Appendix B** for further information on school excursions, Discovery Tours and commercial tours.

4 References and Bibliography

BTR (2000), *Tourism Trends in NSW - South Coast Regional Biannual Profile Year end June 1999*, prepared for Tourism New South Wales.

NSW Tourism Commission (1990a), *Illawarra Region NSW Tourism Development Strategy*.

NSW Tourism Commission (1990b), *South Coast Region NSW Tourism Development Strategy*.

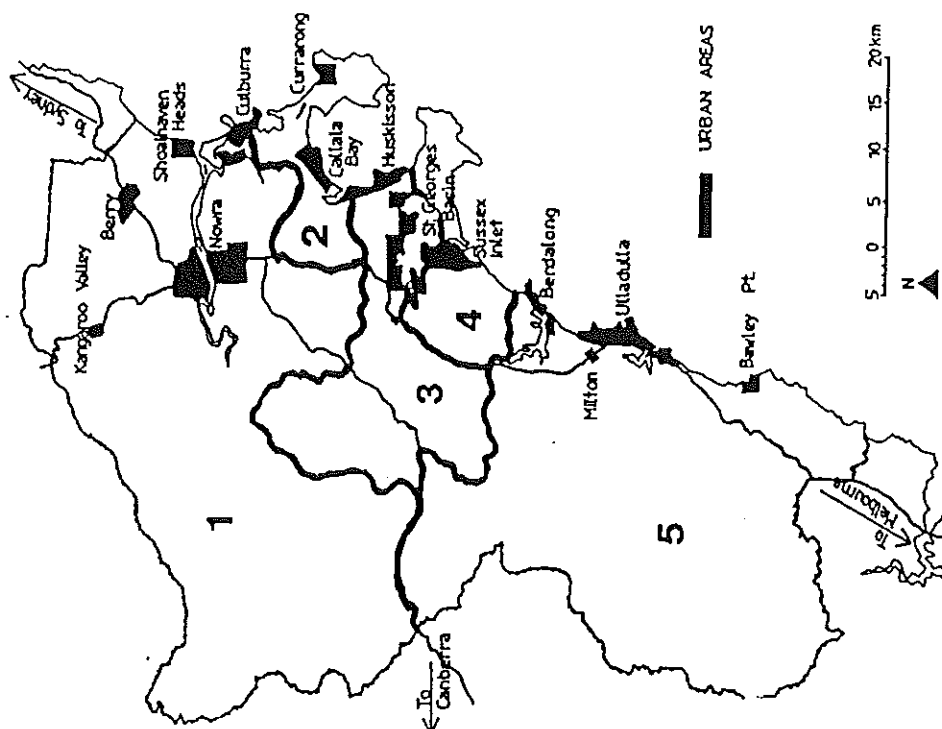
Shoalhaven City Council (SSC undated), *Population Profile 1996*, based on ABS statistics (unadjusted).

SCC (1999), *Tourism in the Shoalhaven – Profile and Statement of Economic Impact for 1997*.

Tourism New South Wales (1999), *Attractions Development Strategy for Regional New South Wales*.

Planning Districts - Shoalhaven

AREA 1: 2,050 square kilometres - 44%	
Berry Comerong Island Kangaroo Valley South Nowra Numbaa Terara	Bomaderry Greenwell Point Nowra Central West Nowra Pyree Cambewarra HMAS Albatross East Nowra North Nowra Shoalhaven Heads Worrigei
AREA 2: 140 square kilometres - 3%	
Callala Bay Culburra Orient Point	Callala Beach Curarorong Crookhaven Heads Myola
AREA 3: 560 square kilometres - 12%	
Basin View Huskisson Sanctuary Point Woollamia	Bream Beach Hyams Beach St. Georges Basin Wrights Beach Errowal Bay Old Errowal Bay Vincentia
AREA 4: 190 square kilometres - 4%	
Berrara Swan Haven	Cudmirrah Sussex Inlet
AREA 5: 1,720 square kilometres - 37%	
Bawley Point Berringer Lake Cunjurong Point Fishermans Paradise Lake Conjola Mollymook Narrawallee	Bendalong Burrill Lake Dolphin Point Kings Point Lake Tabourie Mollymook Beach Termeil Depot Beach Conjola Park Durras North Kioloa Manyana Milton Ulladulla



Planning Districts - Shoalhaven

Figure 1.1
source: SCC
(undated)

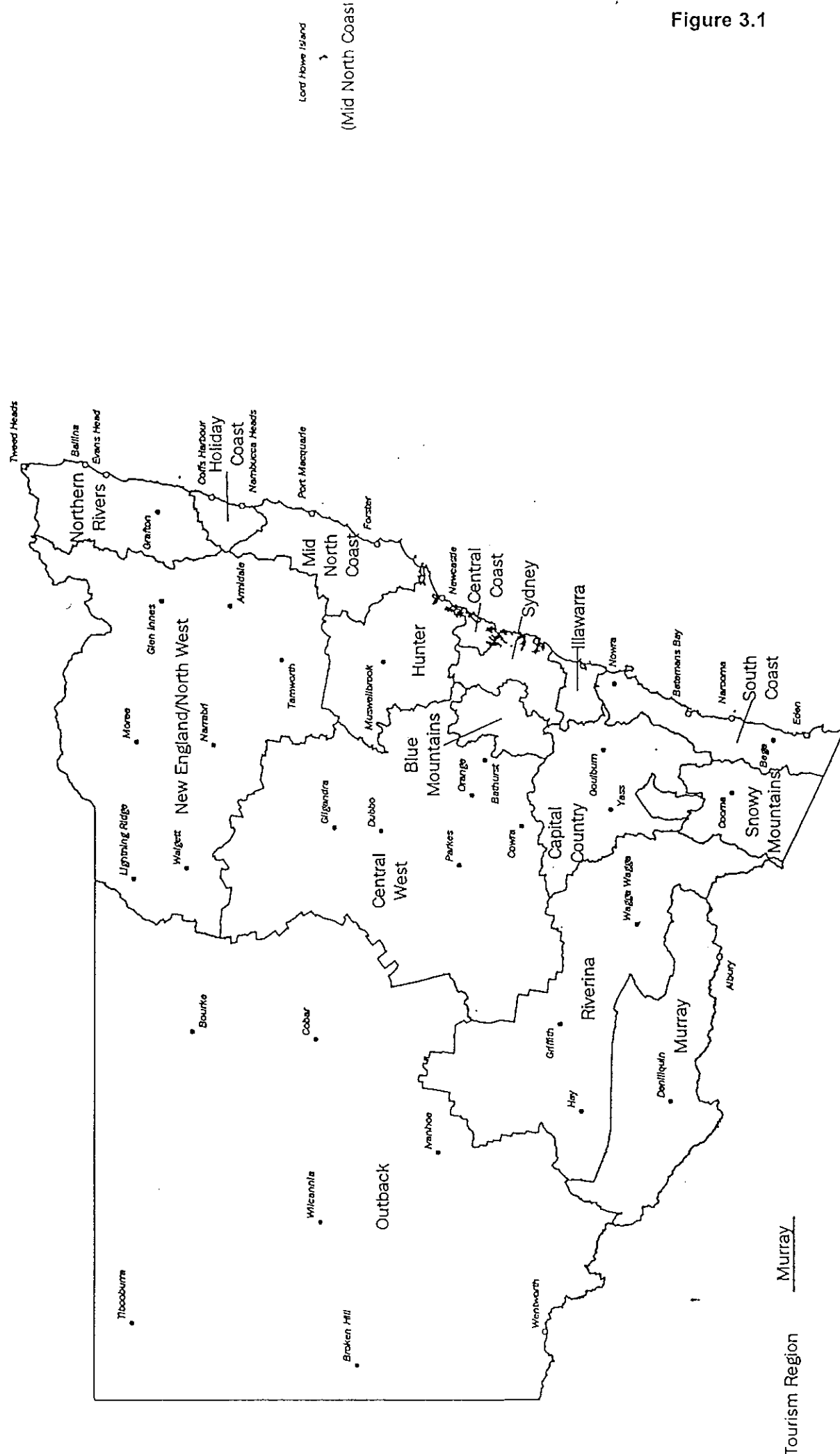


Figure 3.1

Appendix A

MetroCount Traffic Data Analyser 06/03/97 (c)Microcom
Traffic Volume Analysis

Site No. : 99081

Site Id. : YALWAL RD TOP OF HILL BEFORE YALWAL

Data dir. : WE

Direction shown : West/East combined

Time range : [16:04 Mon 03-04-2000] to [12:06 Fri 05-05-2000]

Filter : CS(1) CL(1 2 3 4 5 6 7 8 9 10 11 12) SP(15,160) HW(all)

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Hour period									
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0100-0200	*	0	0	0	0	0	0	0	0
0200-0300	*	0	0	0	0	0	0	0	0
0300-0400	*	0	0	0	0	0	0	0	0
0400-0500	*	0	0	0	0	0	0	0	0
0500-0600	*	0	0	0	0	0	0	0	0
0600-0700	*	0	0	0	0	0	1	0	0
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0800-0900	*	0	4	0	4	0	1	2	1
0900-1000	*	1	2	1	5	0	1	2	1
1000-1100	*	2	3	3<	0	1	1	2	1
1100-1200	*	4<	3	0	10<	5<	1	4<	3<
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2200-2300	0	0	0	0	0	1	0	0	0
2300-2400	0	0	0	0	0	0	0	0	0
TOTALS									
12Hr 7-19	2	21	30	10	45	37	36	26	29
16Hr 6-22	6	21	30	10	50	43	43	28	32
18Hr 6-24	6	21	30	10	50	44	43	28	32
24Hr 0-24	6	21	30	10	50	44	43	28	32
AM HR	*	11	7	10	11	11	7	11	11
PEAK	0	4	4	3	10	5	2	4	3
PM HR	20	14	15	15	15	14	13	15	15
PEAK	2	3	5	2	7	7	9	4	4

* - Not in logging period.

MetroCount Traffic Data Analyser 06/03/97 (c)Microcom
Traffic Volume Analysis

Site No. : 99081

Site Id. : YALWAL RD TOP OF HILL BEFORE YALWAL

Data dir. : WE

Direction shown : West/East combined

Time range : [16:04 Mon 03-04-2000] to [12:06 Fri 05-05-2000]

Filter : CS(1) CL(1 2 3 4 5 6 7 8 9 10 11 12) SP(15,160) HW(all)

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Hour period									
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TOTALS									
12Hr 7-19	26	18	32	37	36	56	54	29	37
16Hr 6-22	26	18	33	37	36	56	56	30	37
18Hr 6-24	26	18	33	37	36	56	57	30	37
24Hr 0-24	26	18	33	37	36	56	57	30	37
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PEAK	3	3	5	6	4	4	5	3	3
PM HR	15	13	16	18	18	14	16	15	15
PEAK	7	5	8	5	7	13	9	4	5

* - Not in logging period.

MetroCount Traffic Data Analyser 06/03/97 (c)Microcom
Traffic Volume Analysis

Site No. : 99081

Site Id. : YALWAL RD TOP OF HILL BEFORE YALWAL

Data dir. : WE

Direction shown : West/East combined

Time range : [16:04 Mon 03-04-2000] to [12:06 Fri 05-05-2000]

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PEAK	5	7	6	12	23	34	37	8	14

* - Not in logging period.

MetroCount Traffic Data Analyser 06/03/97 (c)Microcom
Traffic Volume Analysis

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2000-2100	1	0	0	0	0	0	0	0	0
2100-2200	0	2	0	0	0	0	0	0	0
2200-2300	4	1	0	0	0	2	0	1	1
2300-2400	3	0	0	0	0	0	0	0	0
TOTALS									
12Hr 7-19	181	83	47	36	28	24	35	75	62
16Hr 6-22	189	85	47	38	31	25	35	78	64
18Hr 6-24	196	86	47	38	31	27	35	79	65
24Hr 0-24	196	86	47	38	31	27	35	79	65
AM HR	11	11	10	9	10	10	11	11	11
PEAK	12	10	8	7	3	1	2	6	4
PM HR	14	13	16	16	15	14	14	14	14
PEAK	31	13	10	9	5	7	9	10	10

* - Not in logging period.

MetroCount Traffic Data Analyser 06/03/97 (c)Microcom
Traffic Volume Analysis

Site No. : 99081

Site Id. : YALWAL RD TOP OF HILL BEFORE YALWAL

Data dir. : WE

Direction shown : West/East combined

Time range : [16:04 Mon 03-04-2000] to [12:06 Fri 05-05-2000]

Filter : CS(1) CL(1 2 3 4 5 6 7 8 9 10 11 12) SP(15,160) HW(all)

Date	MON	TUE	WED	THU	FRI	SAT	SUN	AVERAGES	
	01/05/00	02/05	03/05	04/05	05/05	06/05	07/05	5-DAY	7-DAY
Hour period									
0000-0100	0	0	0	0	0	*	*	0	0
0100-0200	0	0	0	0	0	*	*	0	0
0200-0300	0	0	0	0	0	*	*	0	0
0300-0400	0	0	0	0	0	*	*	0	0
0400-0500	0	0	0	0	0	*	*	0	0
0500-0600	0	0	0	0	0	*	*	0	0
0600-0700	0	0	0	0	0	*	*	0	0
0700-0800	0	0	0	0	0	*	*	0	0
0800-0900	1	0	0	0	0	*	*	0	0
0900-1000	0	0	1	0	1	*	*	0	0
1000-1100	4<	1<	2	0	0	*	*	1	1
1100-1200	1	0	5<	1<	3<	*	*	2<	2<
1200-1300	0	0	0	0	*	*	*	0	0
1300-1400	1	0	0	0	*	*	*	0	0
1400-1500	4<	0	1<	1	*	*	*	1	1
1500-1600	2	4<	1	3<	*	*	*	2<	2<
1600-1700	0	1	1	2	*	*	*	1	1
1700-1800	3	1	0	0	*	*	*	1	1
1800-1900	0	0	0	0	*	*	*	0	0
1900-2000	0	0	0	0	*	*	*	0	0
2000-2100	0	1	0	0	*	*	*	0	0
2100-2200	0	1	0	0	*	*	*	0	0
2200-2300	0	0	0	0	*	*	*	0	0
2300-2400	0	0	0	0	*	*	*	0	0
TOTALS									
12Hr 7-19	16	7	11	7	4	0	0	10	10
16Hr 6-22	16	9	11	7	4	0	0	10	10
18Hr 6-24	16	9	11	7	4	0	0	10	10
24Hr 0-24	16	9	11	7	4	0	0	10	10
AM HR	10	10	11	11	11	*	*	11	11
PEAK	4	1	5	1	3	0	0	2	2
PM HR	14	15	14	15	*	*	*	15	15
PEAK	4	4	1	3	0	0	0	2	2

* - Not in logging period.

MetroCount Traffic Data Analyser 06/03/97 (c)Microcom
Traffic Volume Analysis

Site No. : 99081

Site Id. : YALWAL RD TOP OF HILL BEFORE YALWAL

Data dir. : WE

Direction shown : West/East combined

Time range : [10:59 Fri 05-05-2000] to [10:55 Mon 15-05-2000]

Filter : CS(1) CL(1 2 3 4 5 6 7 8 9 10 11 12) SP(15,160) HW(all)

Date	MON 01/05/00	TUE 02/05	WED 03/05	THU 04/05	FRI 05/05	SAT 06/05	SUN 07/05	AVERAGES	
								5-DAY	7-DAY
Hour period									
0000-0100	*	*	*	*	*	1	0	*	0
0100-0200	*	*	*	*	*	0	0	*	0
0200-0300	*	*	*	*	*	0	0	*	0
0300-0400	*	*	*	*	*	0	0	*	0
0400-0500	*	*	*	*	*	0	0	*	0
0500-0600	*	*	*	*	*	0	0	*	0
0600-0700	*	*	*	*	*	0	0	*	0
0700-0800	*	*	*	*	*	0	0	*	0
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1100-1200	*	*	*	*	2<	4<	11	2<	5
1200-1300	*	*	*	*	0	6	10	0	5
1300-1400	*	*	*	*	0	7<	4	0	3
1400-1500	*	*	*	*	0	3	8	0	3
1500-1600	*	*	*	*	0	4	9<	0	4<
1600-1700	*	*	*	*	5<	3	2	5<	3
1700-1800	*	*	*	*	0	1	4	0	1
1800-1900	*	*	*	*	0	0	3	0	1
1900-2000	*	*	*	*	0	0	0	0	0
2000-2100	*	*	*	*	2	0	0	2	0
2100-2200	*	*	*	*	0	0	0	0	0
2200-2300	*	*	*	*	0	0	0	0	0
2300-2400	*	*	*	*	0	0	0	0	0
TOTALS									
12Hr 7-19	0	0	0	0	7	35	73	7	43
16Hr 6-22	0	0	0	0	9	35	73	9	43
18Hr 6-24	0	0	0	0	9	35	73	9	43
24Hr 0-24	0	0	0	0	9	36	73	9	44
AM HR	*	*	*	*	11	11	10	11	10
PEAK	0	0	0	0	2	4	17	2	9
PM HR	*	*	*	*	16	13	15	16	15
PEAK	0	0	0	0	5	7	9	5	4

* - Not in logging period.

MetroCount Traffic Data Analyser 06/03/97 (c)Microcom
Traffic Volume Analysis

Site No. : 99081

Site Id. : YALWAL RD TOP OF HILL BEFORE YALWAL

Data dir. : WE

Direction shown : West/East combined

Time range : [10:59 Fri 05-05-2000] to [10:55 Mon 15-05-2000]

Filter : CS(1) CL(1 2 3 4 5 6 7 8 9 10 11 12) SP(15,160) HW(all)

	MON	TUE	WED	THU	FRI	SAT	SUN	AVERAGES	
Date	08/05/00	09/05	10/05	11/05	12/05	13/05	14/05	5-DAY	7-DAY
Hour period									
0000-0100	0	0	0	0	0	0	1	0	0
0100-0200	0	0	0	0	0	0	0	0	0
0200-0300	0	0	0	0	0	0	0	0	0
0300-0400	0	0	0	0	0	0	0	0	0
0400-0500	0	0	0	0	0	0	0	0	0
0500-0600	0	0	0	0	0	0	0	0	0
0600-0700	0	0	0	0	0	1	0	0	0
0700-0800	0	0	0	0	0	0	0	0	0
0800-0900	3<	5<	1	4<	4<	1	0	3<	2
0900-1000	3	1	0	2	1	16<	2	1	3<
1000-1100	1	2	3<	0	1	3	6	1	2
1100-1200	2	1	1	1	1	4	8<	1	2
1200-1300	0	3	2	0	4	5	6	1	2
1300-1400	0	4	1<	2	1	5	3	1	2
1400-1500	3<	5	0	0	1	7<	8<	1	3<
1500-1600	3	6<	0	4<	0	2	3	2<	2
1600-1700	0	1	0	0	2	1	8	0	1
1700-1800	0	0	1	1	3	4	4	1	1
1800-1900	0	0	0	3	4<	0	0	1	1
1900-2000	0	0	1	0	1	0	0	0	0
2000-2100	0	0	0	0	1	0	0	0	0
2100-2200	0	0	0	0	0	0	0	0	0
2200-2300	0	0	0	0	0	0	0	0	0
2300-2400	0	0	0	0	0	0	0	0	0
TOTALS									
12Hr 7-19	15	28	9	17	22	48	48	18	26
16Hr 6-22	15	28	10	17	24	49	48	18	27
18Hr 6-24	15	28	10	17	24	49	48	18	27
24Hr 0-24	15	28	10	17	24	49	49	18	27
AM HR	8	8	10	8	8	9	11	8	9
PEAK	3	5	3	4	4	16	8	3	3
PM HR	14	15	13	15	18	14	14	15	14
PEAK	3	6	1	4	4	7	8	2	3

* - Not in logging period.

MetroCount Traffic Data Analyser 06/03/97 (c)Microcom
Traffic Volume Analysis

Site No. : 99081

Site Id. : YALWAL RD TOP OF HILL BEFORE YALWAL

Data dir. : WE

Direction shown : West/East combined

Time range : [10:59 Fri 05-05-2000] to [10:55 Mon 15-05-2000]

Filter : CS(1) CL(1 2 3 4 5 6 7 8 9 10 11 12) SP(15,160) HW(all)

Date	MON 15/05/00	TUE 16/05	WED 17/05	THU 18/05	FRI 19/05	SAT 20/05	SUN 21/05	AVERAGES	
								5-DAY	7-DAY
Hour period									
0000-0100	0	*	*	*	*	*	*	0	0
0100-0200	0	*	*	*	*	*	*	0	0
0200-0300	0	*	*	*	*	*	*	0	0
0300-0400	0	*	*	*	*	*	*	0	0
0400-0500	0	*	*	*	*	*	*	0	0
0500-0600	0	*	*	*	*	*	*	0	0
0600-0700	0	*	*	*	*	*	*	0	0
0700-0800	0	*	*	*	*	*	*	0	0
0800-0900	3<	*	*	*	*	*	*	3<	3<
0900-1000	2	*	*	*	*	*	*	2	2
1000-1100	*	*	*	*	*	*	*	*	*
1100-1200	*	*	*	*	*	*	*	*	*
1200-1300	*	*	*	*	*	*	*	*	*
1300-1400	*	*	*	*	*	*	*	*	*
1400-1500	*	*	*	*	*	*	*	*	*
1500-1600	*	*	*	*	*	*	*	*	*
1600-1700	*	*	*	*	*	*	*	*	*
1700-1800	*	*	*	*	*	*	*	*	*
1800-1900	*	*	*	*	*	*	*	*	*
1900-2000	*	*	*	*	*	*	*	*	*
2000-2100	*	*	*	*	*	*	*	*	*
2100-2200	*	*	*	*	*	*	*	*	*
2200-2300	*	*	*	*	*	*	*	*	*
2300-2400	*	*	*	*	*	*	*	*	*
TOTALS									
12Hr 7-19	5	0	0	0	0	0	0	5	5
16Hr 6-22	5	0	0	0	0	0	0	5	5
18Hr 6-24	5	0	0	0	0	0	0	5	5
24Hr 0-24	5	0	0	0	0	0	0	5	5
AM HR	8	*	*	*	*	*	*	8	8
PEAK	3	0	0	0	0	0	0	3	3
PM HR	*	*	*	*	*	*	*	*	*
PEAK	0	0	0	0	0	0	0	0	0

* - Not in logging period.

Appendix B

Parks as Schools: what do teachers want from an excursion?

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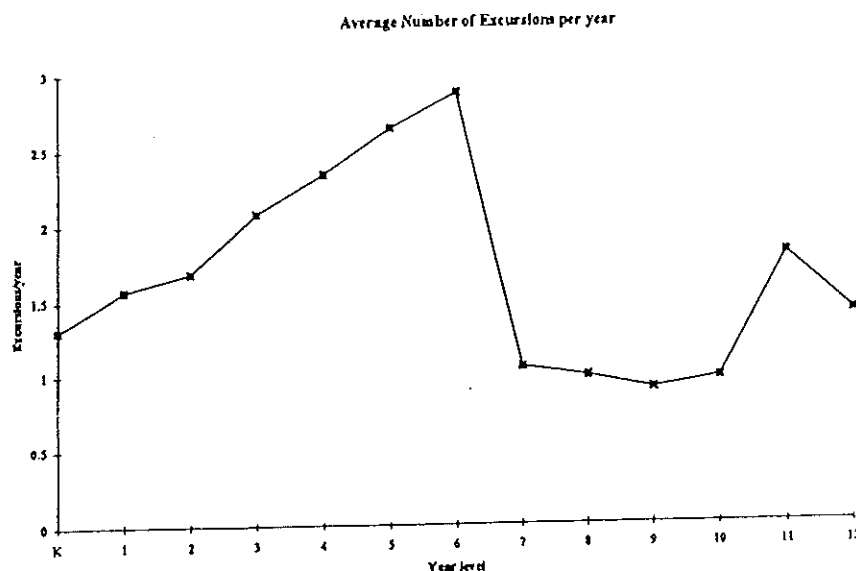
ABSTRACT:

Many parks and recreation agencies target the school sector. However few studies have attempted to find out what teachers want. This article reports findings of a survey of NSW schoolteachers on their choice of park, recreation and other venues. The survey found the number of excursions is highest in year 6 when almost 3 excursions per year are reported. The most popular sites are national parks, Field Study centres, and coast/wetlands areas, although local parks, museums, and primary production sites are also common. Primary and high school teachers showed significant differences in their choice of venues. Differences were also found in the various Key Learning Areas and whether schools were in country or city areas. The results show that offering a school program is no longer a simple case of creating worksheets and conducting a nature study. To be successful Park Managers need to carefully market their programs: teachers have specific needs and preferences. Moreover such programs may require considerable support in terms of activities, equipment and transport in order to offset resource constraints faced by schools.

INTRODUCTION

Many parks and recreation agencies target the school sector. A set curriculum (ie. guidelines provided for each subject), formalised administrative structure, easily accessible market, and a keen audience make a schools program an obvious choice as a target market. However the next step of how to target schools is often made with little background knowledge.

Figure 1: The number of excursion held each year by schools

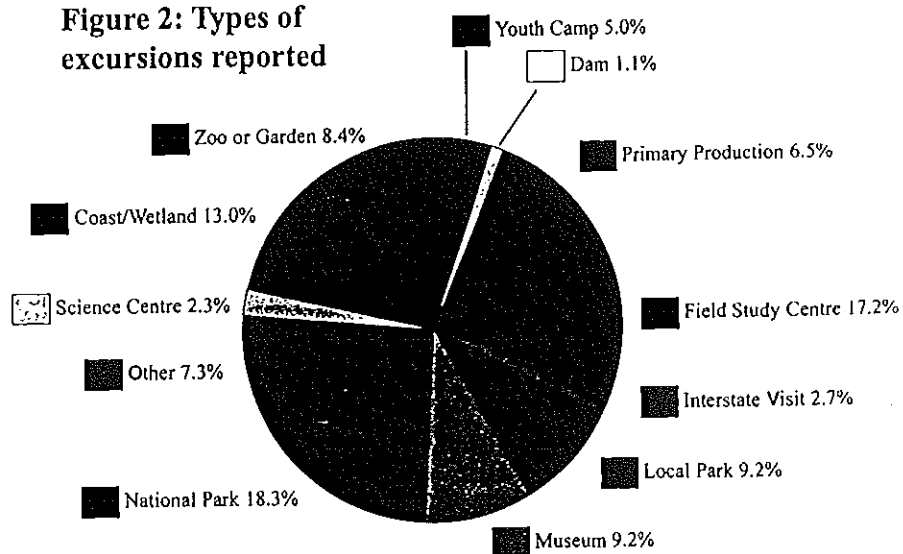


Like many other states, NSW has an Environmental Education Curriculum that makes environmental education mandatory in all schools. It provided guidelines for environmental education within the total school curriculum and one key component of this statement is education in the environment (NSW Dept of School Education 1989). That is,

the curriculum advocates the use of practical activities and first hand experiences for students.

Our knowledge of how environmental education is conducted by schools is poor. Most surveys were conducted a few years ago and were concerned on broader issues rather than specifics (NSW Dept of Education 1995,

Figure 2: Types of excursions reported



Skamp 1996). These studies generally show the status of environmental education in schools varies from state to state, school to school and teacher to teacher. There have been few attempts to see what specifically is being used and why. For example, there has been no attempt to determine why schools choose certain parks and reserves for their excursions. This article reports findings of a survey of NSW schoolteachers on their choice of park, recreation and other venues to meet the requirements of the Environmental Education Curriculum.

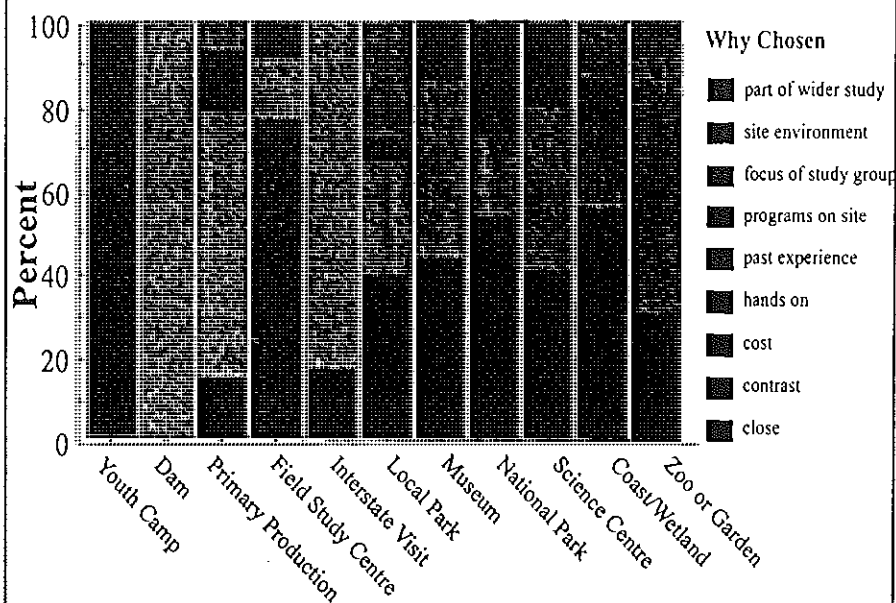
METHOD

The sample in this study was taken from the NSW Department of Education's registration of State Schools. In 1996 there were 1630 primary schools, 18 separate infants schools, 65 central schools, and 389 high schools educating over 760 000 students in NSW. A stratified random sample of 494 of these schools was selected for the survey, which was conducted in late 1998. Two hundred and ninety three responses were obtained.

A mail survey, including a letter briefly describing the study and asking for the teacher's help, was sent to a teacher in charge of a particular Key Learning Area within a randomly selected school. The curriculum is divided into seven Key Learning areas (KLAs): Science, Maths, English, Human Society and its Environment (HSIE), Creative and Practical Arts, and Health, Physical Education and Personal Development (HPEPD). The survey procedure followed that advocated by Dillman (1978). That is, to improve the rate of return, a follow up reminder and a follow up survey were sent after the initial mail out (Dillman 1978).

The questionnaire asked teachers to list the excursion sites used, why they chose the site, the cost, how it was used, and the year level that the excursion was conducted. Open responses on venues, why sites were chosen and how they used were grouped into broad categories for analysis. Data was analysed using the Statistical Package for Social Sciences.

Figure 4: Why venues are chosen



RESULTS

The survey found the number of excursions held by schools typically increases until year 6 when almost 3 excursions per year were reported (Figure 1). The number of excursions then decreases markedly for secondary schools with a second peak in year 11. This pattern was the same for city and country schools.

Eighty-four percent of all teachers stated they were involved in excursions with an environmental education purpose. The most common response was one excursion a year. Although one teacher reported ten per year, 75% of responses were less than four

excursions each year. Primary teachers reported more environmental education excursions that secondary teachers, as did city teachers compared to country teachers. Many of responses by teachers in secondary English and Maths KLAs reported they did no excursion for environmental education (Table 1).

One of the key aspects of the NSW environmental education initiative was the establishment of Field Study Centres across the state. The main purpose of these Centres is to provide learning experiences, train teachers, and provide advice. For a park agency, such Centres represent both competition and significant

Figure 5: Activities undertaken at each venue

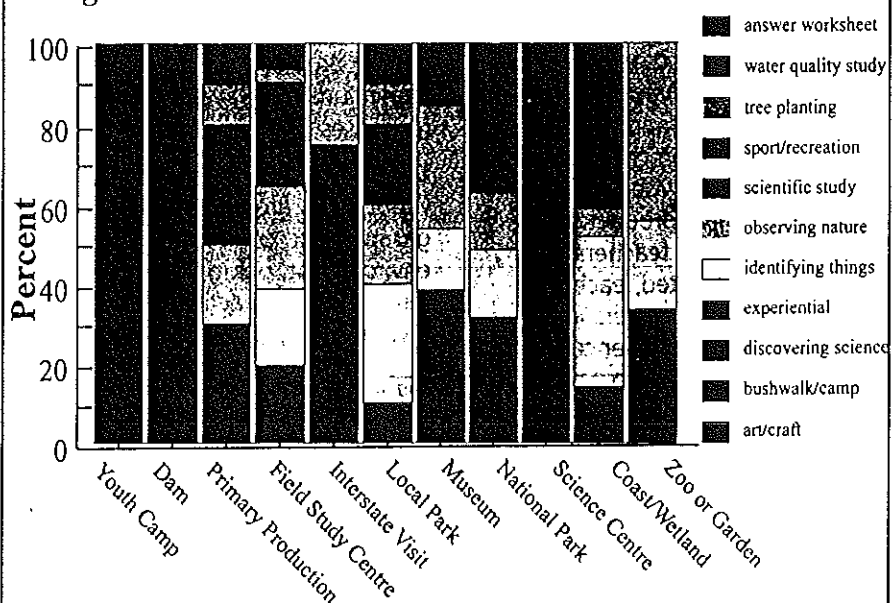




Table 1: Percentage of teachers stating they were involved in excursions with an environmental education purpose.						
Key Learning Area	Creative Arts	English	HPEPD	HSIE	Maths	Science
Primary teachers (n=138)	100%	92%	100%	97%	93%	97%
Secondary teachers (n=138)	90%	45%	88%	93%	30%	90%

opportunity for promotion and partnership. Similar levels of service levels were reported by city and country schools. However, this survey found Primary School teachers, particularly in the HSIE, Creative and Practical Arts, and HPEPD Key Learning Areas, stated they received the services of Field Study Centres more often than other teachers (Table 2).

Over one hundred different sites were listed. The sites listed by teachers were grouped into eleven main categories: Field Study Centres, National Parks, local parks, coast/wetlands areas (such as the beach), museums, primary production sites (such as farms or forestry areas), Science Centres, youth camps, dams, interstate, and gardens and zoos. The most popular sites were National Parks, Field Study centres, and coast/wetlands areas, although local parks, museums, and primary production sites were also commonly visited (Figure 2).

Primary and high school teachers showed significant differences in their choice of venues ($d.f=11, (2=30, p=0.04)$). Primary schools tended to visit Youth Camps, Field Study Centres, and local parks, while High Schools tended to visit National Parks and coast/wetlands area. Country teachers visited Zoos and National Parks and went interstate more than city teachers, while city teachers visited local parks and primary production areas more than country teachers did. As might be expected, each site tended to attract teachers in different Key Learning Areas: Science Centres

attracted science teachers, youth camps were commonly reported by HPEPD teachers, while national parks and coast/wetlands areas were commonly reported by HSIE teachers.

Almost half of the excursions reported lasted a full day, although some went for up to six days. Those lasting several days tended to be by primary schools and were only reported for those excursions going interstate or to youth camps. Those lasting only an hour or two tended to be to a local park.

The average cost of an excursion to the student was about \$30. The average was markedly less for city schools (\$23) compared to country schools (\$39). Youth camps and interstate excursions were the most expensive: costing on average over \$100. (Figure 3) The cheapest excursions were to local parks (<\$5), and to primary production areas (<\$7). These sites were much cheaper than the excursions to the more popular sites such as National Parks (<\$35) or coast/wetlands areas (\$20). Cost was stated by three-quarters of teachers as a key factor that prevented them conducting more excursions. Many teachers specifically referred to the cost of transport. Distance to the venue (20%) and finding time in an overcrowded curriculum (20%) were also common responses by teachers.

The basis of teachers choice of venues was grouped into eight broad groups: cost, contrast to school environment, being close to school, having hand on activities, part of a wider study (eg. streamwatch, or

a catchment study), the programs available on site, the venue being relevant to a particular study topic, the site's environment (eg striking rainforest, etc.). Each of these categories had key success factors in favour of their selection (Figure 4). For example, youth camps, Field Study Centres, and museums were chosen for the programs on site. Science centres had hands on activities. Local parks and National Parks were close and cheap. Primary teachers tended to choose particular sites because they were hands on, had programs on site, and were relevant to the study topic, whereas high school teachers tended to select sites that were close, provided a contrast and had a unique environment.

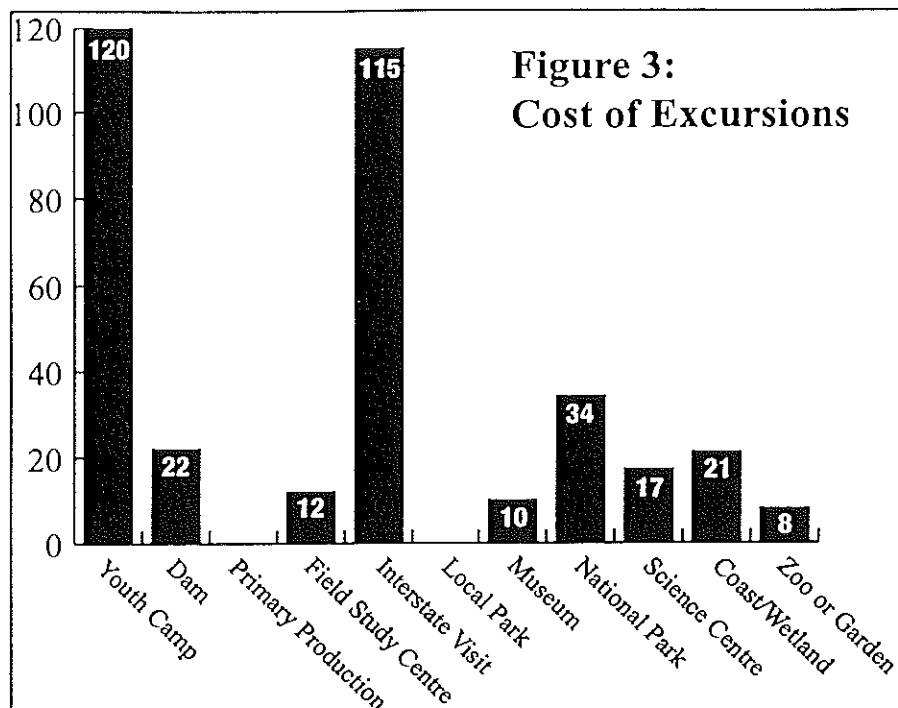
When looking at what teachers did at these venues, a similar pattern emerged to that of why sites were chosen (Figure 5). Youth camps were used for bushwalking and sport/recreation activities (eg. canoeing or abseiling). Dams were used to study water (eg. water turbidity). Interstate venues and Science Centres gave students an opportunity to discover science through hands on displays and activities. Primary schools generally undertook more identification activities (eg. catch water bugs) whereas high school students did more water studies and scientific research (eg. measure phosphorus levels and turbidity).

DISCUSSION

The survey shows that the school sector is a considerably sized market for Park Managers. Extrapolation of the results suggest that NSW government schools conduct over 28,000 excursions a year, and about 84% of these had some aspect of environmental education. Other studies which have asked about the number of excursions indirectly (eg. do they have lessons that investigate the environment) show a similar percentage (NSW Dept of Education 1995). The school sector can therefore be a significant target market for park and recreation agencies.

However, determining how to target

Table 2: Percentage of teachers who reported getting support from Field Study centres.					
Service provided:	Students Visit the Centre	Updates on programs	Provision of Resource Materials	Help with planning	Teacher training
Primary (n=138)	56%	40%	41%	34%	9%
Secondary (n=138)	35%	17%	10%	10%	4%



schools is not an easy matter and a critical task to be achieved. Teachers have many places to choose from. In a recent survey, over 500 different sites were listed (Rumbalara Field Study Centre 1995). In addition teachers are heavily constrained by cost and time. Clearly one option for Park Managers is not to target the school sector because of high competition and market constraints.

If the school sector is to be targeted, this survey can give some broad directions that might assist a park and recreation agency. Firstly, assisting a school with transport may significantly increase visitation to a site. Secondly, although primary schools conduct more excursions, they require considerable support, and Field Study Centres, youth camps and museums dominate the market. Finally, different types of venues appeal to teachers for different reasons. These will be key success factors that will need to be promoted and nurtured to make the site popular with schools.

Yet a more important issue arises from both research and experience. Park Managers often take one of two approaches about what sort of school studies to have within a park. The most common approach seems to be observing a few classes or using past experience. Another common approach is to examine relevant curriculum guides

and extrapolate the topics to the venue. The latter approach being largely restricted to the HSIE, Science and Technology KLAS, where environmental education is a common topic. This survey shows that the preferences of teachers differ according to Key Learning Areas, primary or secondary schools, and whether they are from city and country areas. Given such diversity, a partnership approach like that taken by Field Study Centres and museums, seems essential to cater successfully for the different preferences within the market.

This survey shows the nature of excursions has changed in the last twenty-five years. In a survey conducted in 1974, Linke (1980) found that most excursions for primary schools consisted of walking around a trail or local park and examining the plants and animals found. For secondary teachers time was spent talking about waste, undertaking broad regional geographic or scientific studies. None were comprehensive in covering environmental issues. Primary teachers are now more selective in choosing a site. They tend to prefer sites that offer considerable support through either programs or displays. Secondary teachers use excursions as an opportunity to show areas of contrast to the local area or are

capable of covering environmental issues at a local level. The latter are often linked to wider regional studies in other schools through programs such as Streamwatch, Ribbons of Blue, and Saltaction. etc.

To conclude, a fundamental aspect of visitor management is staying close to the customer in order to satisfy their wants and needs. The schools sector is a potential target market for a park agency. Offering school programs is no longer a simple case of creating worksheets and conducting a nature study. To be successful a program needs to be carefully marketed: teachers have specific needs and preferences. Moreover such programs may require considerable support in terms of activities, equipment and transport in order to offset resource constraints faced by schools.

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SOUTH COAST REGION

Six *National Parks Discovery* activities are available in the Shoalhaven area and the Southern Highlands area between 17.04.00 – 23.04.00. Details of these activities are provided below.

If you would like to make a booking or need more information please phone the Region office on (02) 423 2170 or Fitzroy Falls Visitor Centre on (02) 4887 7270.

WALK GRADES

EASY: suitable for all ages, but take care with children.

MEDIUM: some steps or steep areas, suitable for people who walk occasionally.

HARD: steep sections, for people who walk regularly. Visitors with heart or breathing problems should not attempt these walks.

WEB SITE NUMBER

SCR1

NAME OF ACTIVITY:	Rock Platform Walk
GENERAL DESCRIPTION:	Learn about Jervis Bay's shoreline creatures and how they survive on a rock platform. How many shells can you identify? Be prepared to get your feet wet! Observe seabirds diving for fish and maybe see dolphins cruising by.
NPWS PARK OR RESERVE:	Jervis Bay National Park
GENERAL LOCATION:	Greenfield Beach
DATE:	Monday, 17 April 2000
TIME:	12 noon
DURATION:	2 hours
GRADE:	Easy
DISTANCE COVERED:	2 km
COST:	Adult \$4, child \$2, family \$10.
BOOKINGS:	Not required
MEETING POINT:	Meet the Ranger at the picnic area.
ALL PARTICIPANTS SHOULD:	Wear sensible shoes, lots of sunscreen and a hat.

WEB SITE NUMBER**SCR2**

NAME OF ACTIVITY: Bike Ride Bundanoon
GENERAL DESCRIPTION: A Ranger-guided tour on wheels of the spectacular sights of this part of Morton National Park. Easier than walking, more fun than a car, using tracks not always accessible to the public. Along the way make a wish at the wishing well, discover wildlife secrets, catch your breath at famous lookouts. If needed you can hire a bike, a tandem, baby seats and helmets from the Bundanoon Bike Shop (4883 6043 – bookings advised).
NPWS PARK OR RESERVE: Morton National Park
GENERAL LOCATION: Gambell's Rest, Bundanoon
DATE: Tuesday, 18 April 2000
TIME: 10.00 am
DURATION: 4 hours
GRADE: Easy
DISTANCE COVERED: 10 km
COST: Adult \$4, child \$3, family \$15.
BOOKINGS: (02) 4887 7270
MEETING POINT: Meet the Ranger Station, Gambell's Rest.
ALL PARTICIPANTS SHOULD: Bring water and some lunch.

WEB SITE NUMBER**SCR3**

NAME OF ACTIVITY: Canoeing with Water Dragons
GENERAL DESCRIPTION: Join the Rangers and Kangaroo Valley Canoe Safari staff for an exciting trip down the Kangaroo River. Explore Morton National Park from the river as you journey down to Bendeela. Minimum age is 12 years and participants must be able to swim.
NPWS PARK OR RESERVE: Morton National Park
GENERAL LOCATION: Kangaroo River
DATE: Wednesday, 19 April 2000
TIME: 10.00 am
DURATION: 3 hours
GRADE: Easy – suitable for beginners.
DISTANCE COVERED: 10 km
COST: \$30 per person includes canoe hire, safety gear, instruction and return transport.
BOOKINGS: Limited number – bookings and deposit (\$10) essential. Phone: (02) 4887 7270
MEETING POINT: Hampton Bridge, Kangaroo Valley.
ALL PARTICIPANTS SHOULD: Bring a hat, sunscreen and lunch.

WEB SITE NUMBER**SCR4**

NAME OF ACTIVITY: Fisherman's Rock Walk
GENERAL DESCRIPTION: Come with the Rangers through the bush on a voyage beyond history to contemplate the dreaming time. Sit at a waterfall and enjoy the views and tranquillity of this delightful walk.
NPWS PARK OR RESERVE: Cudmirrah National Park
GENERAL LOCATION: Fisherman's Rock, Berrara Creek
DATE: Wednesday, 19 April 2000
TIME: 10.00 am
DURATION: 3 hours
GRADE: Easy
DISTANCE COVERED: 2 km
COST: Adult \$4. child \$2, family \$10.
BOOKINGS: Not required.
MEETING POINT: Meet the Ranger at Fisherman's Rock.
ALL PARTICIPANTS SHOULD: Bring lunch and swimmers.

WEB SITE NUMBER**SCR5**

NAME OF ACTIVITY: Spotlight Walk
GENERAL DESCRIPTION: Listen to the sounds of dusk, notice the change from day to dark. Experience the bush at night time. Look and listen for gliders and spiders, bats and possums. Help the Ranger set mammal traps.
NPWS PARK OR RESERVE: Jervis Bay National Park
GENERAL LOCATION: Greenfield Beach
DATE: Saturday, 22 April 2000
TIME: 6.00 pm
DURATION: 2 hours
GRADE: Easy
DISTANCE COVERED: Not applicable
COST: Adult \$4. child \$2, family \$10.
BOOKINGS: Not required
MEETING POINT: Meet the Ranger at the picnic area.
ALL PARTICIPANTS SHOULD: Bring a mug for billy tea after the walk.

WEB SITE NUMBER**SCR6**

NAME OF ACTIVITY: Birds Mammals and Breakfast
GENERAL DESCRIPTION: Observe and release animals which have been caught in the traps overnight. Are they mammal or marsupial, or both? Have a sausage sizzle and count all the different variety of birds we see while eating breakfast.
NPWS PARK OR RESERVE: Jervis Bay National Park
GENERAL LOCATION: Greenfield Beach
DATE: Sunday, 23 April 2000
TIME: 7.30 am
DURATION: 2 hours
DISTANCE COVERED: Not applicable.
COST: Adult \$4. child \$2, family \$10.
BOOKINGS: Not required.
MEETING POINT: Meet the Ranger at the picnic area.
ALL PARTICIPANTS SHOULD: Bring a mug.

**NPWS Commercial Tour Licenses and Consents
Nowra District**

Company	Parks	Activities
Achievement Concepts/ Abundant Life Learning	Morton & Budawang	abseiling, climbing, bushwalking, navigation, rope constructions, simulated search and rescue scenarios
Outdoor Education Group NSW Division	Morton	abseiling, rock climbing, caving, orienteering, rafting, canoeing, bushwalking
Great Australian Walks	Morton, Budawang, Murramarang, Jervis Bay	guided bushwalks
Barry's Bush Tucker Tours	Morton, Budderoo, Seven Mile Beach, Murramarang, Jervis Bay	bushwalks, spotlight walks, campfires, bushtucker meals
Corporate Outdoor Training	Morton	bushwalking, camping, canoeing, abseiling
IWS Corporate Training	Morton	abseiling, rock climbing, high rope courses, still water canoeing, navigation courses
Outdoor Insights Pty Ltd	Morton, Bungonia	abseiling, bushwalking, caving, rock climbing
Outland Expeditions Pty Ltd	Bungonia, Morton	adventure tours, abseiling, canyoning, caving, canoeing
Solar Springs Health Retreat	Morton	bushwalking, cycling, abseiling
Southbound Adventures	Bungonia, Morton	bushwalking, environmental studies, abseiling, rock climbing, canoeing, caving
Outward Bound	Bungonia, Morton	non-commercial caving, bushwalking, camping, high ropes, abseiling, canoeing
Able	Morton, Budawang, Bungonia	caving, abseiling, bushwalking, canoeing, camping, climbing
Triple Care Farm	Budawangs area of Morton, Murramarang, Budderoo, Bungonia	bushwalking, abseiling, caving, canoeing, camping, swimming
ABD and Corporate Australiana Tours	Fitzroy Falls, Minnamurra	vehicle based tours
Boomerang Bicycling Tours	Southern Highlands – Morton, Budderoo	vehicle supported cycling tours
Wild Escapes	Morton	vehicle based sightseeing, short bushwalks
Santa Sabina College	Morton, Bungonia	abseiling, rock climbing, caving, canoeing, bushwalking, mountain bike riding
Scots College	Morton, Bungonia	mountain bike riding, rogaining, bushwalking, camping, caving
Bush Limousines	Budderoo, Morton, Murramarang	guided vehicle tours, bushwalking, 4WD tours
Spiro's Torture Tours	Morton, Deua, Wadbilliga, Bemboka	guided motor cycle tours
South Coast Scenic Tours	Murramarang, Budderoo	bus tours (20 seater), short bushwalks to lookouts etc,
The Edge Adventure Sports	Bungonia	abseiling, canyoning, caving, bushwalking
Lands Edge Coastal Interpretation	7 Mile Beach, Budderoo (Minnamurra)	educational, environmental interpretation
Adventure Challenge	Bungonia	caving, canyoning, abseiling, bushwalking
Wildskill	Morton	bushwalking, camping, canoeing, abseiling
Beaky's 4WD Tours	Morton (Grady's Thompson's Corner Area)	bushwalking, canoeing, camping off park at Grady's
Paddy Pallin Adventure	Morton, Jervis Bay	bushwalking, camping, abseiling, mountain biking
Birds Australia	Barren Grounds, Budderoo	bushwalks and nature study (bird watching)
Leisure Coast Tours	Morton, Budderoo (Fitzroy Falls, Carrington Falls, Minnamurra)	scenic tours (mini bus) sightseeing, short walks
Nature Forest Tours	Morton (Fitzroy Falls), Budderoo (Minnamurra), 7 Mile, Jervis Bay	scenic tours (mini bus) sightseeing, short walks
Aussie Off Road Experiences	Morton, Deua	4WD tours and tag a long 4WD tours

Appendix B

NELSON CONSULTING

YALWAL TOURIST DEVELOPMENT SITE SERVICING CONCEPT DEVELOPMENT PLAN

Issue No. 2 NOVEMBER 2000

Document Amendment and Approval Record

Issue	Description of Amendment	Prepared by [date]	Verified by [date]	Approved by [date]
1	Draft	PLM 3/10/00		
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1 INTRODUCTION

Yalwal is a historic gold mining area located approximately 30 kilometres west of Nowra. The mine workings are located within the catchment of Danjera Dam, which was built in the 1960's as the reserve water supply for the northern Shoalhaven.

On completion of the dam, an informal camping area was provided that has subsequently become a popular off-road vehicle and trail bike location. Uncontrolled camping, erosion of roads and damage to historic mines has led to a rapid deterioration of the area.

The authorities responsible for managing Yalwal and its surrounding areas include Shoalhaven City Council, National Parks and Wildlife Service and the Department of Land and Water Conservation. A Management Plan has been developed to regulate and manage activities in the area. The objectives of the Plan are to:

- ☐ protect Shoalhaven's water supply;
- ☐ protect the natural and cultural environments from inappropriate activities;
- ☐ identify recreational and viable tourist opportunities within the area; and
- ☐ provide sustainable and economically sound outcomes.

The intent of this report is to develop a servicing strategy for Yalwal and it forms part of the Concept Development Plan for the area. It builds on previous investigations and specifically identifies options for servicing the site in a sustainable and economically responsible manner.

2 PROPOSED DEVELOPMENT

2.1 LOCATION

Yalwal is located approximately 30 kilometres west of Nowra, within the catchment of Danjera Dam and on the Boundary of Morton National Park and the Ettrema Wilderness Area as shown in **Figure 2.1**. Access to the area from Nowra is via Yalwal Road, which is sealed to Bamarang Reservoir. The remaining 17 kilometre section to Danjera Dam is unsealed.

2.2 EXISTING SERVICES

2.2.1 Water

Yalwal is not serviced by town water. Water is pumped directly from Danjera Dam to supply two storage tanks (*1,000 and 500 litres respectively*) that service the toilet block at the picnic area. A pump-house is located to the south west of the picnic area and transfers water via a 32 mm polyethylene pipeline to the storage tanks. Water gravitates from the tanks through a 25 mm polyethylene pipe to the toilet block.

2.2.2 Wastewater

The existing wastewater system consists of a toilet block, septic tank and adsorption trench. Sanitary plumbing fixtures include two water closets in the women's toilet and one water closet and urinal in the men's toilet.

Wastewater is directed to a septic tank, located adjacent to the toilet block and effluent is discharged to an absorption trench.

2.2.3 Power and Telecommunications

The Management Plan states that limited services are available at Yalwal. Mains power is not available and the nearest connection to the supply grid is approximately 13 kilometres to the east.

A telephone mast is provided to service private property, however mobile telephone coverage is not available at the picnic area and throughout the mine workings.

2.2.4 Waste Management

The picnic area is serviced weekly by Council staff. This involves collection of garbage, cleaning of toilets, inspection of the water tanks and provision of firewood.

2.3 ENVIRONMENTAL CONTEXT

Yalwal, due to its close proximity to the Morton National Park, Ettrema Wilderness Area and Danjera Dam as well as its gold mining past and Aboriginal archaeology, is a place of environmental and historic significance.

Danjera Dam was constructed by Shoalhaven City Council to augment its northern water supply during times of low flow in the Shoalhaven River. The Management Plan acknowledges that future growth in the Shoalhaven and the designation of environmental flows will ensure that the dam has a greater role as a water source.

At present, the areas surrounding the dam are eroded due to the inappropriate use of off-road vehicles and trail bikes, which in turn may lead to siltation of the reservoir. Camping also has the potential to pollute waters impounded by Danjera Dam. There is a need to protect the water supply from siltation and pollution as a result of these uncontrolled activities. Under NSW legislation, impounded waters used for public water supply are provided a high level of protection. No wastes, of any description, may be discharged to such waters.

2.4 PRECINCT REDEVELOPMENT

In summary, the proposed works that form the basis of the Concept Development Plan comprise:

Stage 1:

- ☐ upgrade the existing Council house for use as a Ranger's residence;
- ☐ establish camping facilities on NPWS land north of Yarramunmun Creek;
- ☐ formalise existing camping areas at the start of the loop road on the western side of Yarramunmun Creek;
- ☐ restrict access to picnic area by installing a gate on loop road;
- ☐ widen lower loop road for two-way traffic and close off north of picnic area;
- ☐ widen upper loop road for two-way traffic and close off at Yarramunmun Top Fire Trail;
- ☐ construct a car park at picnic area;
- ☐ provide tables and barbecues within picnic area adjacent to the dam;
- ☐ construct a covered area (*including tables, barbecue and sink/washing up area*) for group camping in the vicinity of the existing toilet block;
- ☐ replace the existing toilet block for group camping; and
- ☐ repair and maintain walking track No.1.

Stage 2:

- ☐ construct information booth / 'gateway' entrance;
- ☐ formalise car park near cemetery, install picnic tables and basic toilet facilities on eastern side of access road;
- ☐ construct a viewing platform at northern end of boat launching area;
- ☐ formalise car park at boat launching area;
- ☐ provide shelter at picnic area adjacent to dam;

- ☐ install a pontoon and delineate swimming area; and
- ☐ formalise walking track No.2.

Stage 3:

- ☐ delineate overflow car parking area near main picnic / group camping area;
- ☐ construct walking track from dam picnic area to track No.1; and
- ☐ formalise walking track No.3.

Future Development:

- ☐ construct walking track from boat launching area to picnic area;
- ☐ construct three cabins in cleared area north of dam picnic area or in overflow camping area, adjacent to cemetery car park;
- ☐ connect walking track Nos. 2 and 3 (*ie. Sawpit Creek crossing to Pioneer Open Cut*); and
- ☐ provide compound at Council house; and
- ☐ construct walking track linking camping areas.

3 LOAD PROJECTIONS

3.1 VISITOR NUMBERS USER GROUPS

Data on visitor numbers has been adapted from information presented in the Yalwal Conceptual Development Plan Progress Report, August 2000. Visitation rates are summarised in Table 3-1.

Table 3-1 Visitor Numbers

	1999					2000
	Easter	Anzac Long Weekend	2 May (Sunday)	16 May (Sunday)	Oct. Long Weekend	27 – 28 May (Weekend)
Day Visitors			55 – 60	60		
Campers						60
main area	45	32		15	> 100	
other areas	10	11				
NPWS	30			30		

The proposed development addresses the needs of a range of user groups. Estimated user numbers are presented in Table 3-2.

Table 3-2 Yalwal User Numbers

Area	Number of Users
Rangers residence	1 – 2
NPWS camp site (10 sites)	30
Yarramunmun Creek camp sites	
Eastern side of access road (10 sites)	30
Western side of access road (10 sites)	30
Picnic area	
Camp site	40
Day visitors	60

3.2 WATER DEMAND

The level of supply is not an issue at Yalwal given its proximity to Danjera Dam. However, in keeping with the Management Plan objective for sustainable and cost effective development, water demand estimates have been based on a minimum level of supply, assuming water conservation measures are implemented.

Supply levels have been adopted largely from the Australian Water Resources Council (AWRC) Guidelines for Low Cost Water Supplies for Small Communities and are presented in Table 3-3.

Table 3-3 Water Demand

Source	Water Use	Comment
Toilet	10 L/flush	
Hand Basin	1 L/use	
Hose Tap	720 L/hour	From the Australian National Plumbing and Drainage Code (AS3500) which states a flow rate of 0.20 L/s for a DN15 hose tap.

The water demand estimates presented in Table 3-3 make allowance for toilet flushing. However, in order to minimise water use, the installation of composting toilets is considered as an alternative to flush toilets in Section 5.

3.3 PROJECTED WASTEWATER LOADS

Wastewater loads are based on user numbers presented in Table 3-2. In estimating the wastewater load, it is assumed that campers would use the toilet facilities twice per day and day visitors once only. Wastewater loads, based on the installation of flush toilets at the site, are summarised in Table 3-4. The provision of composting toilets would eliminate this black water source from the site.

Table 3-4 Wastewater Loads

Area	Wastewater Volume (L/d)*
NPWS camp site	600
Yarramunmun Creek camp sites	
Eastern side of access road	600
Western side of access road	600
Picnic area	
Camp site	800
Day visitors	600

* Assumes all camp sites occupied

Wastewater generated from the Ranger's residence will be derived from both blackwater (*toilet and kitchen water*) and greywater (*typically shower water*) sources. Sewage flow rates from households are usually within the range of 150 to 250 litres per person per day (AWRC, 1989). Given that the residence would be provided with a basic level of water supply (*ie. rainwater tanks*) a sewage flow allowance of 150 litres per day has been adopted.

4 WATER SUPPLY

4.1 GENERAL

Development of Yalwal is based on sustainable, low-impact activities with only basic amenities proposed at camp sites and picnic areas. In terms of water supply the following infrastructure is planned for stage 1 of the development:

- ☐ provision of a water service for the Ranger's residence;
- ☐ install hose tap at NPWS camping area;
- ☐ provide two hose taps within the Yarramunmun Creek camp sites;
- ☐ install sink/washing up facilities at group camping area; and
- ☐ provide water for basic toilet facilities at cemetery car park.

The existing water storage tanks, supplied directly from Danjera Dam, would be utilised for the picnic and group camping areas. A new pumped system would be provided to supply the Ranger's residence, NPWS campsite and Yarramunmun Creek campsites with water from the dam. Rainwater tanks would be used to supply water to other toilet locations throughout the area.

4.2 LEVEL OF SUPPLY

Rainwater tanks are generally sized in accordance with the following parameters outlined in the Handbook for Affordable Water Supply and Sewerage for Small Communities (*ARMCANZ, 1999*):

- ☐ average annual rainfall;
- ☐ distribution of rainfall throughout the year;
- ☐ variation of rainfall from year to year;
- ☐ available roof area;
- ☐ level of security required; and
- ☐ level of supply required.

The AWRC recommends a minimum supply level of about 300 l/d for a three-person household. This has been adopted as the design yield for the rainwater tanks.

A supply rate of 0.20 l/s, as specified in the Australian National Plumbing and Drainage Code, is the design basis for hose taps located in camping areas.

4.3 RAINWATER TANKS

The option of installing rainwater tanks at the Ranger's residence to meet the supply levels presented in **Section 4.2** has been investigated. The storage volume is estimated from design charts included in the Handbook for Affordable Water Supply and Sewerage for Small Communities (*ARMCANZ, 1999*) and is based on the following assumptions:

- ☐ supply level 300 l/d;
- ☐ an average annual rainfall of 1153 mm;
- ☐ roof area of less than 100 m²; and
- ☐ 90 percent security of supply.

The small roof area of the Council house precludes the use of rainwater tanks to provide a secure water supply to the residence. An alternative water supply, pumped from Danjera Dam, is considered in **Section 4.4**.

There is also a requirement to provide water to hand basins at various toilet locations throughout the area. Water supply to these locations is dependent on whether waterborne or waterless facilities are installed. Should waterless systems be provided, then rainwater tanks could be used for this purpose. Wastewater management options are considered in **Section 5**.

4.4 PUMPED SUPPLY

A pump house currently transfers water from Danjera Dam to two storage tanks that supply the picnic area toilet block. Given the security of supply from the dam, it is proposed to use the existing water tanks to supply the group camping area. Water would gravitate from the storage tanks to a number of supply points, including the washing up area and upgraded toilet block. It is proposed to retain the existing pumps and storage tanks with this arrangement.

The proximity of the Yarramunmun Creek camp sites to the dam suggest that it is feasible to provide a pumped water supply similar to that installed for the group camping area. This supply could also be extended to supply water storage tanks at the Ranger's residence and NPWS campsite. A pump house would be constructed to transfer water directly from the dam to the sites. Two pipeline routes have been considered, the first is along the existing access road and the second follows the 85 metre contour to minimise pipe length. Approximately 900 m of 32 mm diameter polyethylene pipe and a pumping capacity of 0.5 l/s at 45 m head is required to service these areas. Care is needed to locate the pump house and water off-take so as to maintain the integrity of the supply. The location of the off-take must guarantee supply during draw down of the dam and be isolated in order to prevent contamination from nearby swimming and boat launching areas.

5 WATSEWATER MANAGEMENT

5.1 GENERAL

The isolation of Yalwal from a reticulated sewerage system necessitates on-site management of wastewater. All on-site wastewater treatment systems within the City of Shoalhaven must be designed in accordance with Council's Development Control Plan (DCP) No. 78. The DCP specifies minimum site requirements for the on-site disposal of effluent and details information that must be provided with applications for Council approval.

On-site facilities can be classified into two categories, namely waterborne and waterless systems, which are discussed in the following sections. The discussion includes a brief description of the alternatives and lists benefits and disbenefits for each option.

5.2 WATERBORNE SYSTEMS

Waterborne wastewater treatment systems are almost exclusively used in areas where a secure reticulated water supply is provided and include systems such as septic tanks and aerated wastewater treatment systems.

5.2.1 Septic Tanks

The most common wastewater treatment device for on-site wastewater treatment is the septic tank. Septic tanks are designed to Australian Standard AS1547 to provide for the settlement of solids and flotation of oils and greases. The solids are digested within the tank under anaerobic conditions (*ie, the absence of oxygen*), with gases produced by the breakdown of the solids vented to the atmosphere through a vent pipe above the roofline.

Advantages

- ☐ they are relatively inexpensive to install and do not require any electrical or mechanical components;
- ☐ they can handle sudden fluctuations in hydraulic loads; and
- ☐ minimal routine maintenance is required.

Disadvantages

- ☐ only partial treatment of wastewater is achieved;
- ☐ they can produce odours if routine maintenance is not performed or if the tank is overloaded as well as during desludging; and
- ☐ desludging is required on a regular basis, generally every 3 to 4 years.

Septic tanks only provide preliminary treatment of wastewater and the effluent is not disinfected. They are therefore dependent on the efficient operation of a disposal system to return effluent to the environment in a suitable manner.

5.2.2 AWTS

The alternative to a septic tank system is an aerated wastewater treatment system (*AWTS*). The principal treatment processes in an AWTS include:

- ☐ settling of suspended solids and flotation of scum in a primary chamber;
- ☐ oxidation and degradation of organic matter through aerobic biological digestion;
- ☐ secondary sedimentation of solids; and
- ☐ disinfection for pathogen removal by chlorination or UV irradiation.

An AWTS configuration generally consists of a primary sedimentation tank, an aeration chamber and a clarifier. Effluent then enters a holding tank for disinfection and final disposal.

To maintain the biological activity in the aeration chambers, air is supplied by small compressor and distributed to the aeration compartment by diffusers. Sludge is also removed regularly and returned to the primary sedimentation tank for anaerobic digestion.

Advantages

- ☐ high effluent quality;
- ☐ treated and disinfected wastewater can be re-used for surface irrigation; and
- ☐ large system volume means better equalisation of flow and lower sensitivity to shock loadings.

Disadvantages

- ☐ high installation cost;
- ☐ effluent quality needs to be monitored;
- ☐ relatively high energy requirement;
- ☐ routine maintenance required;
- ☐ poor performance under fluctuating loads;
- ☐ mechanical or electrical failure inactivates AWTS; and
- ☐ no nutrient (*nitrogen and phosphorus*) removal.

Effluent from the AWTS would be of a higher quality than the existing septic tank. Release of effluent to the environment would be via an on-site disposal system (*refer Section 5.4*).

5.2.3 Wet Composting System

Wet composting systems are designed to treat organic garbage in addition to wastewater. One such system accredited by the NSW Health Department is the Biolytic Filter manufactured by Downmus Resource Recovery.

In summary the treatment process comprises a tank that incorporates two specific treatment zones separated by a filter membrane. All wastewater and solid organic wastes (*eg. paper, food scraps etc*) are directed to an organic waste pile in which the composting process is aided by the addition of worms. Wastewater passes through a filter membrane below the organic waste pile into a trickle media zone where it undergoes further biological treatment. Treated effluent is collected and may be disposed of on-site via absorption or evapotranspiration trenches.

Advantages

- ☐ provides biological treatment of wastewater and solids;
- ☐ eliminates need for desludging septic tanks (*organic material broken down to stable worm casts*);
- ☐ the system is compatible with both flush and non-flush toilets; and
- ☐ low energy use.

Disadvantages

- ☐ high maintenance (*commitment to composting principles*);
- ☐ without additional treatment effluent is suitable for sub-surface disposal only; and
- ☐ no nutrient (*nitrogen and phosphorus*) removal.

5.3 WATERLESS SYSTEMS

Waterless systems include pans, pit latrines, pour-flush toilets, aquaprivies and composting toilets. For the purposes of this report only composting toilets are considered.

The Department of Health is responsible for setting the standards for the design and construction of composting toilets. The Department registers designs that meet their standards. Only systems approved by the Department may be installed.

The Enviro Loo composting toilet system by Enviro Option has been considered here. It is a waterless dehydration evaporation system, which relies on mesophilic and thermophilic biological degradation for the treatment of waste material. The main operating forces include separation of solid and liquid, evaporation, airflow and heat. These factors, together with prolonged retention period, are critical to ensure high biological activity and efficient conversion of waste to humus material.

Air circulation within the system is driven by wind power and radiation heat. Urine is disposed of by evaporation and the solid waste is stabilised by a process of dehydration due to forced ventilation.

The Enviro Loo is a single chamber waterless composting toilet constructed from rotomoulded black polyethylene. It consists of rectangular top and bottom tank outer sections, a drying tray fitted in the bottom section and a flap to drive the solid waste down the drying tray that is operated by an external stainless steel rod. The composted end products are collected periodically every 18-24 months into a collection bag.

Advantages

- ☐ conserves water;
- ☐ no chemicals needed;
- ☐ minimal operating costs; and
- ☐ recycles nutrients.

Disadvantages

- ☐ relatively high capital costs;
- ☐ periodic handling and disposal of composted materials required;
- ☐ temperature sensitive;
- ☐ need to maintain adequate C:N ratio; and
- ☐ requires a persistent commitment to composting principles.

5.4 EFFLUENT MANAGEMENT

5.4.1 On-Site Disposal Systems

On-site disposal systems rely on the treated wastewater being absorbed into the ground, although the systems can be enhanced by the growth of plants that take up wastewater as part of their metabolism.

The success of absorption systems is greatly dependent on the soil types in the area. The soil at Yalwal is medium dense to dense and generally consists of clays and poorly sorted sand and gravels underlain by rock. The presence of rock limits drainage, causes problems with effluent distribution, and interferes with trench and pipe installations.

An alternative to the absorption trench is the evapotranspiration bed. Evapotranspiration areas or trenches have a shallow depth and large surface area so that effluent rises into the root zone of the surface vegetation.

5.4.2 Pumpout System

Where site conditions are such that on-site effluent disposal is not practicable, and no centralised system is available, then a pumpout system is required. Effluent from septic tanks is collected in a well for pump out on a regular basis, generally weekly or fortnightly. Tankers pump effluent from the well and deliver it to a treatment plant.

These systems are generally not cost effective due to high on-going pump-out costs but are applicable in environmentally sensitive areas that are accessible by road. Their major advantage is low maintenance when compared to other on-site systems.

5.5 HYDROLOGICAL ASSESSMENT

Coffey Geosciences were commissioned to carry out a hydrological assessment of the site to assist in the assessment of effluent management options. A copy of the report is provided in **Appendix A**.

The scope of the assessment included:

- ☐ review of background information to provide initial assessment of local geology, groundwater levels, flow direction and soil/rock permeability;
- ☐ drilling of boreholes to assess sub-surface conditions and infiltration testing to assess vertical permeability; and
- ☐ assessment and recommendations for effluent disposal.

Throughout the study it was acknowledged that the primary objective of the Yalwal Management Plan is to ensure that the Danjera water supply is safeguarded against pollution, siltation and other threats to its integrity. The findings of the assessment may be summarised as follows:

- ☐ three boreholes were drilled on the site identified for group camping;
- ☐ the central area of the site is underlain by approximately 0.4 m to 0.5 m of clayey gravel fill, which in turn is underlain by poorly sorted gravel or gravely clayey sand. Auger refusal was between 0.6 m and 1.2 m depth;
- ☐ at the southern edge of the site the drilling showed approximately 1.2 m of sandy gravely clay underlain by about 1 m of sandy clayey gravel / gravely clay. This is underlain by weathered sandstone to borehole termination at 5 m;
- ☐ groundwater was not encountered, indicating the depth to groundwater was greater than 5 m at the time of the fieldwork. Groundwater is expected to flow toward Danjera Dam; and
- ☐ field infiltration tests suggest that vertical infiltration through the upper soil profile would generally be moderate.

The group camping area is located in a steep sided gully sloping toward Danjera Dam. The borehole investigation determined that the soil was medium dense to dense and generally consists of clays and poorly sorted sands and gravels. The results of the infiltration tests indicated low to moderate vertical soil permeability that is expected to reduce with depth within the weathered rock

profile. The investigation concluded that effluent disposal directly into the soil is not recommended.

Further assessment was made of the following effluent disposal options:

- ☐ surface irrigation of effluent in surrounding bushland (*subject to an appropriate level of treatment*);
- ☐ discharge into soakage pits or trenches (*current practice*); and
- ☐ injection into groundwater bores.

The options for effluent disposal were found to be limited due to the physical constraints of the site and the proximity to Danjera Dam. Groundwater was not encountered at 5 m depth and vertical permeability of the surface soil was moderate, suggesting that horizontal permeability may be a significant drainage pathway in the sub surface soil. The proximity of the dam presents a risk of contamination from effluent that would migrate horizontally toward it. Therefore effluent disposal pits or groundwater injection bores are not recommended. The potential for surface runoff to contaminate the water supply also precludes the option of surface irrigation of effluent at the group camping site.

5.6 CONCLUSIONS

Field investigations indicate that the site characteristics at Yalwal are not suitable for on-site disposal of effluent. Should these practices continue, or be further developed, then there is a risk of contamination of the water supply.

Two options have been identified that do not require on-site disposal of effluent, namely pump-out systems and waterless systems. The existing toilet block servicing the picnic area is provided with a secure water supply and could be readily upgraded to a pump-out system. Provision of a 9,000 litre septic tank would require pump out each month based on peak visitor numbers. While it is unlikely that this pump out frequency would be realised due to the use of water saving devices (*eg. low flush toilets*) and seasonal demand, there is still a need to provide access for a pump out tanker. The current access road is not suitable for such a vehicle and in keeping with the philosophy of encouraging 'low impact' activities at the site, it is unlikely to be upgraded for tanker access.

With regard to the use of waterless systems, the failure of commercial composting toilets has reinforced the scepticism of authorities about composting (*Gunn, 2000*). Failure is generally a result of excessive moisture in the compost heap, which results in high operator demands. Recent composting toilet designs (*eg. Enviro Loo*) claim to have overcome these problems by separating solid and liquid wastes.

On the basis that a cost-effective pump out service could not be provided at Yalwal without a major upgrade of the access road, it is recommended that composting toilets be installed to service the areas adjacent to Danjera Dam. Servicing of the composting units would form part of the duties of Council staff who currently maintain the area. The provision of composting toilets will also minimise water demand at these sites.

Wastewater from the Ranger's residence will include both blackwater and greywater. It is proposed to maintain the existing septic tank and absorption trench system to treat these wastes for the following reasons:

- ☐ only a relatively small volume of wastewater would be produced;
- ☐ septic tanks provide cost effective treatment for both blackwater and greywater;
- ☐ minimal routine maintenance is required; and
- ☐ the location of the residence is remote from Danjera Dam and downstream of the spillway, thus minimising potential contamination of the water supply.

6 POWER, TELECOMMUNICATIONS AND WASTE MANAGEMENT

6.1 POWER

Mains power is not available at Yalwal, therefore alternative energy sources need to be identified to supply the Ranger's residence. Conventional low voltage, solar powered lighting would be used for the toilet facilities.

There is a range of renewable energy source technologies that are currently available to provide 240-volt power for the residence. This would allow conventional lights and appliances to be used. Options include:

- ☐ solar system with no back up;
- ☐ solar hybrid system with LPG generator back up; and
- ☐ automated solar, wind and generator system.

Photovoltaic requirements can only be determined during detailed design, once a power load profile is established.

6.2 TELECOMMUNICATIONS

Stage 1 of the development would require basic communications facilities to be provided at the Ranger's residence. These would include a NPWS VHF radio, UHF CB radio and possibly a police radio.

Future stages may involve utilising an existing telephone mast, currently servicing private property, to extend mobile phone coverage to Yalwal.

6.3 SOLID WASTE

Solid waste management must ensure the integrity of the water supply, therefore it is considered that the most appropriate method of waste management is to remove pollutant sources from the site. The area should continue to be serviced by a regular Council maintenance crew, whose responsibilities would include:

- ☐ removal of rubbish;
- ☐ servicing toilet facilities; and
- ☐ maintaining water supply.

The frequency of rubbish removal would be subject to seasonal demand. Daily collections may be required during peak times.

7 HAZARD ASSESSMENT

7.1 GENERAL

Det Norske Veritas (*DNV*) were commissioned to identify hazards at the site and recommend control measures. The report is summarised in the following sections, with a full copy provided in **Appendix B**. The study represents a preliminary assessment and is a precursor to the development and implementation of a detailed safety management plan for the area.

7.2 HAZARDS

The DNV report identified both natural and man made hazards that are not unique to Yalwal and are managed at other sites, including the Hill End mine sites. These hazards are presented in Table 7-1.

Table 7-1 Identified Hazards

	Hazard	Main Contacts
Natural Hazards	Steep embankments	Falling down Rock falls
	Deep water	Drowning
	Large trees	Falling branches
	Wildlife	Bites
	Temperature	Exposure Fire
	Submerged debris	Damage to watercraft, injury to swimmers
Man-made Hazards	Mine tunnels	Falling rock and related incidents
	Mine shafts	Falling into and related incidents
	Mine equipment	Contact and related incidents
	Walking Tracks	Related incidents
	Roadways	Related incidents
	Camping areas	Related incidents

The assessment states that recommendations related to the natural hazards are to primarily provide appropriate administrative controls, however man-made hazards require both physical and administrative controls. It is also stressed that mines require controls that satisfy the Chief Inspector of Mines from the Department of Mineral Resources.

In addition to the hazards presented in the DNV assessment, there may also be a perceived hazard associated with the use of cyanide at the site during the turn of the century. For the extraction of gold, a cyanide solution is added to crushed ore in order to dissolve the gold. The gold is then precipitated from the solution (*Mineral Resources 1997*). Cyanide contained in liquid residue from processing readily breaks down in sunlight and air. Given that major mining operations ceased in the area during World War I, it is not expected that any cyanide residuals would remain within Danjera Dam or its surrounds.

7.3 FINDINGS AND RECOMMENDATIONS

It is recommended that general mine and tunnel access be restricted with some specific exceptions arranged through the Chief Inspector of Mines. Every known shaft should be sealed and a documented effort made to search for other shafts not mapped. Where mines and tunnels are visible and / or easily accessible from walking tracks, the entrances should be sealed with locked gates, supported by appropriate signage. Mines and tunnels that are out of the way, and hard to locate, should initially have simple barriers and signs erected to discourage access. Where there are indications of a route (*natural or otherwise*) that leads immediately above tunnel entrances, these should be barricaded to deter exploration and prevent rock falls.

Specific hazards and control measures for the area are summarised in Table 7-2.

Table 7-2 Specific Hazards and Controls

Site	Observations / Hazards	Controls
Danjera Dam	Drowning – varying depth, water levels and submerged logs Pollution - risk to water supply Damage to watercraft – submerged logs	Provide appropriate communications to visitors Develop management system (clear swimming areas of submerged debris) Audit / inspect functioning of management system
Golden Crown Tunnels	Loose and falling rock	Seal tunnels
Albion Tunnel	No sign of frequent rock falls, clear of loose rock overhangs at entrance	Tunnel could be considered for entry approval via Chief Inspector of Mines
Pioneer Tunnel	Entrance free of loose overhead rocks and is relatively flat, horizontal and openly ventilated. No evidence of recent rock falls Drop chute significantly deteriorated by metal corrosion and timber decay. Chute backed up by loose rocks	Limited access restricted to near the point of the drop chute. Barriers and signs erected at this point Seal shafts and drop chute
Homeward Bound Tunnel	Entrance free from loose rocks and no evidence of loose rock overhead or recent rock falls Tunnel is flat, short and freely ventilated	Tunnel could be considered for entry approval via Chief Inspector of Mines

Site	Observations / Hazards	Controls
Pioneer Quarry 3	Exit area from Homeward Bound Tunnel shows signs of occasional rock falls Other tunnels / mines open into this area Area opposite Homeward Bound Tunnel shows obvious signs of rockfalls. Rocks are precariously perched on slope above	Provide appropriate signs warning of rock falls at tunnel exit and quarry faces Install barriers and signs to restrict access to the top of quarry faces Seal other tunnels / mines opening into the Quarry Barricade and provided signs preventing access to area opposite tunnel exit
Golden Crown Mine	Approach to mine tricky with risk of falling and / or causing rock falls	Seal mine Visible track barricade and the dangers signposted

The report concludes that Yalwal has had a long history of uncontrolled public access to the mine workings area and that it was not likely to be feasible to prevent access whilst controls are being put in place. Recommendations include:

1. Finalise the walking track route. The proposed route, with the exception of passing through the Homewood Bound tunnel is probably no more hazardous than other reasonable possibilities. All routes will expose the public to mines, tunnels and shafts. With the support of the Chief Inspector of Mines regarding the Homewood Bound thoroughfare, the proposed route is a reasonable option;
2. Risk based decision making should be applied in prioritising and initiating engineering controls in conjunction with the Department of Mineral Resources and with regard to satisfying the Mines Inspection Act for sealing mines;
3. Development and implementation of a Management Plan for the area. The plan should include a comprehensive Emergency Procedures Plan as part thereof; and
4. Other hazards, largely natural, should be mainly administratively controlled, with the addition of simple barriers to prevent accidental incursion to areas at risk.

8 REFERENCES

(ARMCANZ, 1999) Agriculture and Resource Management Council of Australia and New Zealand, *Handbook Affordable Water Supply and Sewerage for Small Communities*, Water Services Association of Australia, 1999.

(AWRC, 1989) Department of Primary Industries and Energy, *Guidelines for Low Cost Water Supplies for Small Communities*, Australian Water Resources Council Water Management Series No. 17, Australian Government Publishing Service, Canberra, 1989.

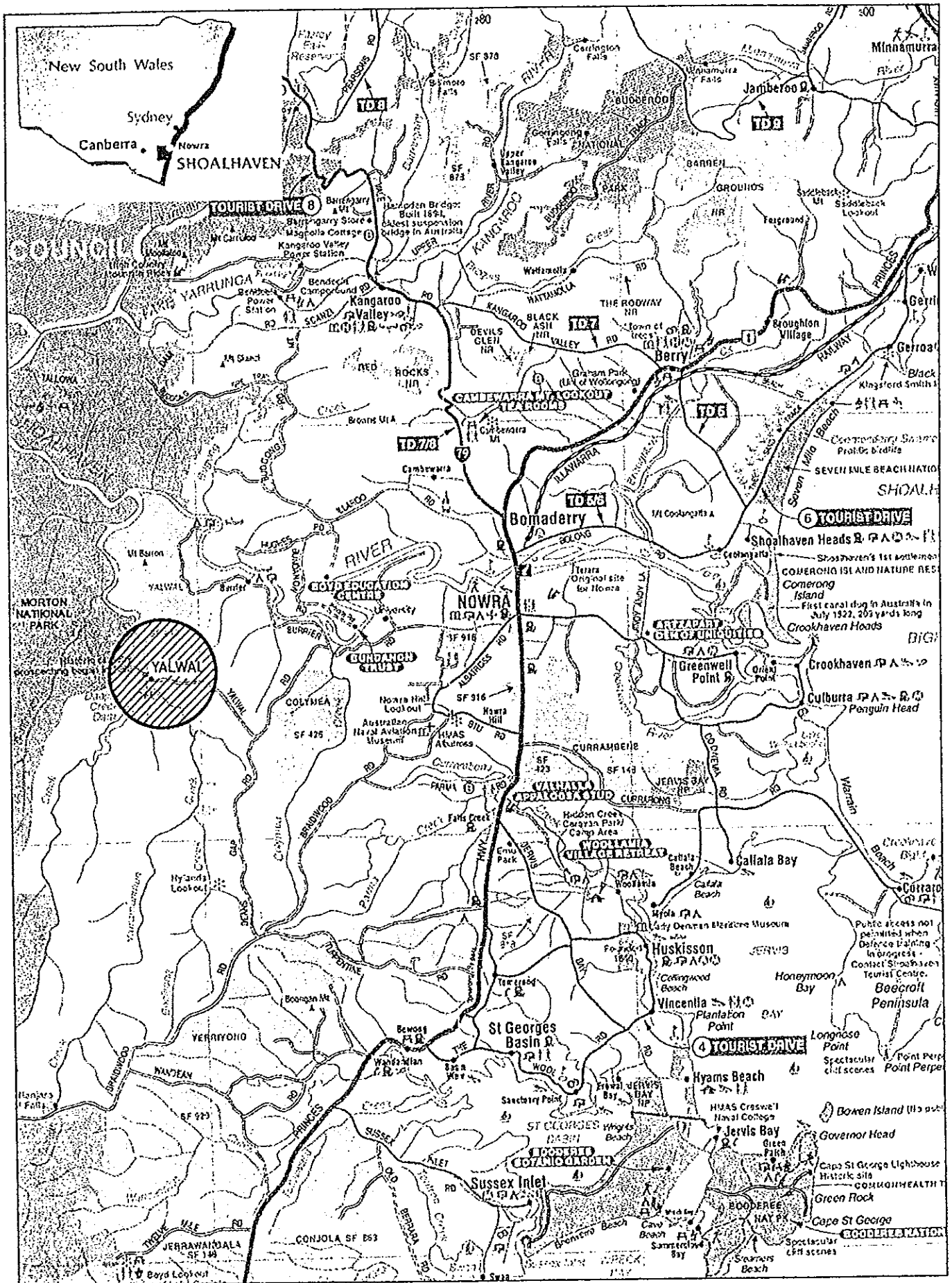
(Gunn, 2000) Review Notes *Best Practice Human Waste Management Workshop, Proceedings and Papers March 2000*, Australian Alps Liaison Committee, June 2000.

(Mineral Resources, 1997) NSW Department of Mineral Resources, *MINFACT No. 63 Gold Mining and Cyanide*, August 1997.

Yalwal Management Plan, Shoalhaven Water, December 1999.

FIGURES

FIGURE 2.1



SOURCE : CARTOSCOPE, 2000

STUDY LOCATION

APPENDIX A ASSESSMENT OF EFFLUENT DISPOSAL

PATTERSON BRITTON & PARTNERS PTY LTD
ASSESSMENT OF EFFLUENT DISPOSAL - YALWAL TOURIST
FACILITY
YALWAL, NSW

E12315/1-AB
25 July 2000


Coffey

RECEIVED		
21 AUG 2000		
Patterson Britton & Partners Pty. Ltd.		
JOB No.		
JOB NAME		
CIRCULATE	ACTION	DATE
ACTIONS COMPLETE		

E12315/1-AB DSD:

25 JULY 2000

PATTERSON BRITTON & PARTNERS PTY LTD
Level 2, 104 Mount Street
NORTH SYDNEY NSW 2060

Attention: Mr Paul Macinante

Dear Sir,

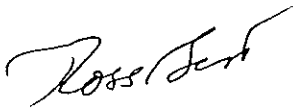
RE: ASSESSMENT OF EFFLUENT DISPOSAL - YALWAL TOURIST FACILITY

We are pleased to provide our report on the assessment of effluent disposal at the above site.

Thank you for your commission for this work and we look forward to the opportunity of being of assistance again in the future. If you require further information or clarification regarding any aspect of this report, please do not hesitate to contact Mr Damien Davidson or the undersigned.

For and on behalf of

COFFEY GEOSCIENCES PTY LTD



ROSS BEST

SENIOR PRINCIPAL

Distribution: Original held by Coffey Geosciences Pty Ltd
1 copy to Coffey Geosciences Pty Ltd
3 copies to Patterson Britton & Associates Pty Ltd

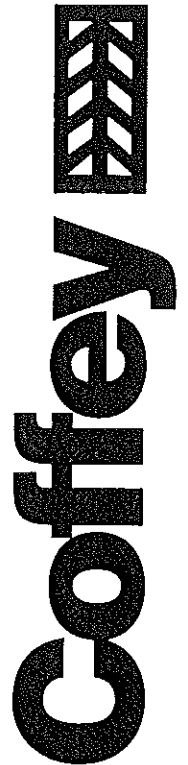


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A	Borehole Logs
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1. INTRODUCTION

1.1 General

Coffey Geosciences Pty Ltd (Coffey) were commissioned by Mr Paul Macinante of Patterson Britton & Partners Pty Ltd to carry out a hydrogeological assessment of effluent disposal at the Yalwal Tourist Facility.

A locality plan showing the site location is presented in Figure 1. The site consists of a camping ground in Yalwal near the Morton National Park and Danjera Dam. The work was carried out generally in accordance with our proposal E12315/1-AA dated 17 February, 2000.

2. SCOPE OF WORK

The following scope of work included:

- Review of background information to provide an initial assessment of the local geology, groundwater levels, flow direction and soil/rock permeability;
- Field investigation including: drilling borehole to assess sub-surface conditions, and infiltration testing to assess the vertical permeability;
- Identification and assessment of effluent disposal options; and
- Preparation of a report presenting the results of field studies, hydrogeological conditions, assessment of groundwater impacts and recommendations for effluent disposal.

The work undertaken and results are discussed in detail in the following sections.

3. SITE BACKGROUND INFORMATION

3.1 Site Location and Landuse

The site is currently used as a camping ground (see Figure 2). It is situated in an area surrounded by the Morton National Park to the north and southwest. Danjera Dam which drains from Danjera Creek adjoins the site to the west. The site itself is covered by sparse vegetation, including small trees and grass. Surface soil over the majority of the site is orange brown sandy clay and gravel. In the east of the site are toilet blocks and water tanks. A pump is used to pump water from Danjera dam to the water tanks. The area of investigation is adjacent to the toilet block.

3.2 Topography and Drainage

The topography of the majority of the site is comprised of valley floor. Surrounding the site are moderate to steeply sloping hills covered with natural vegetation. The site forms a small gully sloping gently to the west, toward Danjera Dam. Surface drainage would be in the general direction of Danjera Dam.

3.3 Local Geology and Hydrogeology

Reference to the 1:250,000 Wollongong geological map indicates that the majority of the site is underlain by complex volcanics. Permean sandstones and siltstones of the Megalong Conglomerate are found on the ridge tops. These consist of Nowra Sandstone (quartz sandstone), Wandrawandian Siltstone (siltstone / silty sandstone) and Conjola formation (conglomerate, sandstone and silty sandstone). The Permean sandstones

have eroded in the valleys to expose strata of the Lower Carboniferous (consisting of granite, diorite, quartzite, porphyry), Upper Devonian (quartzite, sandstone, siltstone, shale) and Ordovician (slate, quartzite, phyllite).

Based on local topography, groundwater is expected to be located at a depth of about 2m to 5m in the lower lying areas of the site, but may be greater than 10m deep on the higher slopes. Regionally the groundwater is expected to follow the topography and flow towards Danjera Creek and Danjera Dam.

3.4 Climate

As indicated on the Yalwal 1:25000 topographic map, the area receives an annual average rainfall of 1153mm. The highest average rainfall is received in February (150mm) followed by October (130mm) then March (125mm). The average temperature range is between about 5°C and 25°C.

4. FIELDWORK

4.1 Site Observations

Field investigations were carried out on the 14 April, 2000. Site observations during the fieldwork indicated the site was cleared of trees and sparsely vegetated with grass. The site adjoins Danjera Dam to the west. The ground was covered with red coarse gravel and sloped to the west at about 5°. The site rose steeply to the north, south and east. Shallow drainage ditches, draining to the Danjera Dam, were observed to the north and south of the site.

4.2 Boreholes

Three boreholes (BH1 to BH3) were drilled on the eastern portion of the site to identify sub-surface condition. The approximate locations of the boreholes are presented in Figure 2. One borehole was planned to be drilled but shallow auger refusal on rock (which was suspected to be a floating boulder) occurred at BH1 and BH2. All boreholes were drilled using a 100mm auger on a GEMCO210B drill rig. Boreholes BH1 and BH2 were extended to auger refusal and borehole BH3 was extended to a depth of 5m. Borehole logs are presented in Appendix A.

As no groundwater was encountered during the borehole drilling, a piezometer was not installed.

4.3 Infiltration Testing

Infiltration tests were performed at two locations to assess the vertical permeability. At each location (IN1 and IN2 – See Figure 2) boreholes were extended to about 200mm to get below the topsoil. The boreholes were prepared by pouring in water and leaving this to soak for approximately one hour. The infiltration test was carried out by pouring 100mm of water into each hole and measuring the rate of water level fall over time. These results were used to calculate the vertical permeability. Figures 3 and 4 show plots for the vertical permeability calculations.

5. RESULTS AND DISCUSSION

5.1 Borehole Investigation

The three boreholes drilled on the site (see Appendix A for borehole logs) indicated the central area of the site at locations BH1 and BH2 was underlain by approximately 0.4m to 0.5m of clayey gravel fill (or slopewash).

This was underlain by poorly sorted gravelly sand at BH1 and gravelly clayey sand at BH2. Auger refusal on rock occurred at both BH1 and BH2.

Borehole BH3 was drilled at the edge of the southern slope of the site (see Figure 2). The drilling showed approximately 1.2m of sandy gravelly clay at the surface. The clay was of medium high plasticity and sand/gravel was poorly sorted. This was underlain by about 1m of sandy clayey gravel / gravelly clay with medium plasticity clay and fine to coarse sand. SPT blow counts at the top of this layer suggest the soil is medium dense. This was underlain by weathered sandstone between 2.1m and borehole termination at 5m. The sandstone was fine to coarse grained with 2-5mm ironstone bands and some gravel. The drilling difficulty and number of SPT blows throughout the soil profile in BH3 suggests the soils are medium dense to dense.

Groundwater was not encountered during the auger drilling of BH3 indicating the depth to groundwater was greater than 5m in the eastern portion of the site at the time of the fieldwork. Groundwater flow is expected to flow toward Danjara Dam.

5.2 Infiltration testing

The results of the field infiltration tests were assessed using the method described in Drainage Principles and Applications Vol111, Surveys and Investigations Pub16, International Institute for Land Reclamation and Improvement, 1974. Infiltration results analysis for locations IN1 / IN2 are shown in Figures 3 and 4.

The calculated vertical permeabilities were 0.65m/day for IN1 and 0.51m/day for IN2. This suggests that vertical infiltration through the upper soil profile would generally be moderate.

5.3 Summary of results

The Yalwal Tourist Facility camping ground is located in a steep sided gully sloping toward and adjoining Danjara Dam to the west. Based on the borehole investigation the soil is medium dense to dense and generally consists of clays and poorly sorted sands and gravels. The results of infiltration testing show low to moderate vertical soil permeabilities at locations IN1 and IN2. Permeability is expected to reduce with depth within the weathered rock profile.

On the basis of the field investigation, effluent disposal directly into the soil would not be recommended due to the moderate to low permeability of the soil and proximity of the site to Danjara Dam.

6. EFFLUENT DISPOSAL OPTIONS

Effluent disposal can be achieved in the following ways:

- Surface irrigation in surrounding bushland (treatment would be required);
- Discharge into soakage pits or trenches; or
- Injection into groundwater bores.

Options of effluent disposal are limited due to physical constraints. It may be possible to dispose of effluent off-site by way of a pump-out system or alternatively waterless on-site systems such as composting toilets may be considered.

As outlined in Australian Standard AS1547-1994, the evaluation of the site for an effluent disposal should take into account factors such as:

- Depth and permeability of the soil;

- The planned operating life of the system;
- The areas available for primary and alternative effluent disposal systems;
- The risk of contaminating adjacent properties, water supplies, swimming pools by seepage and runoff from the site;
- Groundwater level changes; and
- The effects of seepage or runoff into the effluent disposal area.

The main limitation to effluent disposal in the camping area is the proximity of the site to a water supply (Danjera Dam).

Groundwater was not encountered at 5m depth (the maximum depth of investigation) and the vertical permeability of the surface soil was moderate. This suggests the horizontal permeability may be a significant drainage pathway in the sub surface soil. The proximity of the site to Danjera dam presents a risk of contamination from the effluent which would migrate horizontally toward the dam. Effluent disposal pits or injection into groundwater bores is not recommended without assessment of potential impacts on the quality of Danjera Dam.

Surface irrigation of the surrounding bushland with effluent would not be effective as suggested by the surrounding topography and drainage lines. Runoff from the surface soil may present a risk of contaminating the water supply.

7. CONCLUSIONS AND RECOMMENDATIONS

The hydrogeological assessment conducted by Coffey on 14 April 2000 has shown the following:

- The soil is medium dense and generally consists of clays and poorly sorted sands and gravels;
- Low to moderate vertical soil permeabilities at locations IN1 and IN2;
- general flow direction for surface and groundwater (as suggested by topography) toward Danjera Dam; and
- groundwater at a depth of greater than 5m in the east of the site.

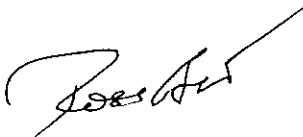
On the basis of the site investigations, the effluent disposal options were assessed. The site characteristics and settings suggest disposal of effluent in trenches/pits, groundwater bores or through surface irrigation would not be suitable and may risk of contaminating the water supply.

8. LIMITATIONS

The findings contained in this report are the result of discrete/specific methodologies used in accordance with normal practices and standards. To the best of our knowledge, they represent a reasonable interpretation of the general condition of the site. Under no circumstances, however, can it be considered that these findings represent the actual state of the site at all points. This report represents a hydrogeological assessment of part of the site with limited sampling points.

For and on behalf of

COFFEY GEOSCIENCES PTY LTD

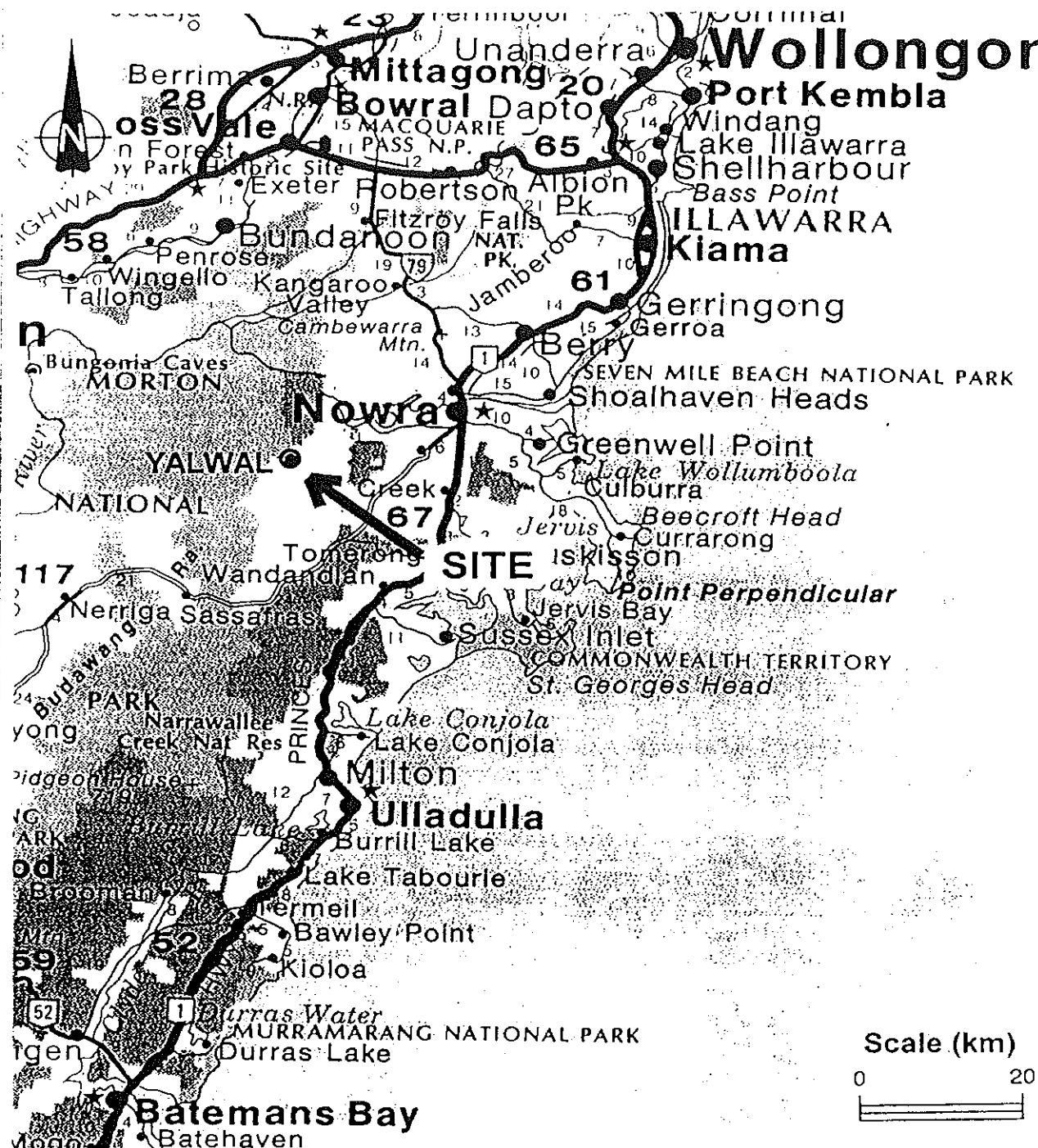


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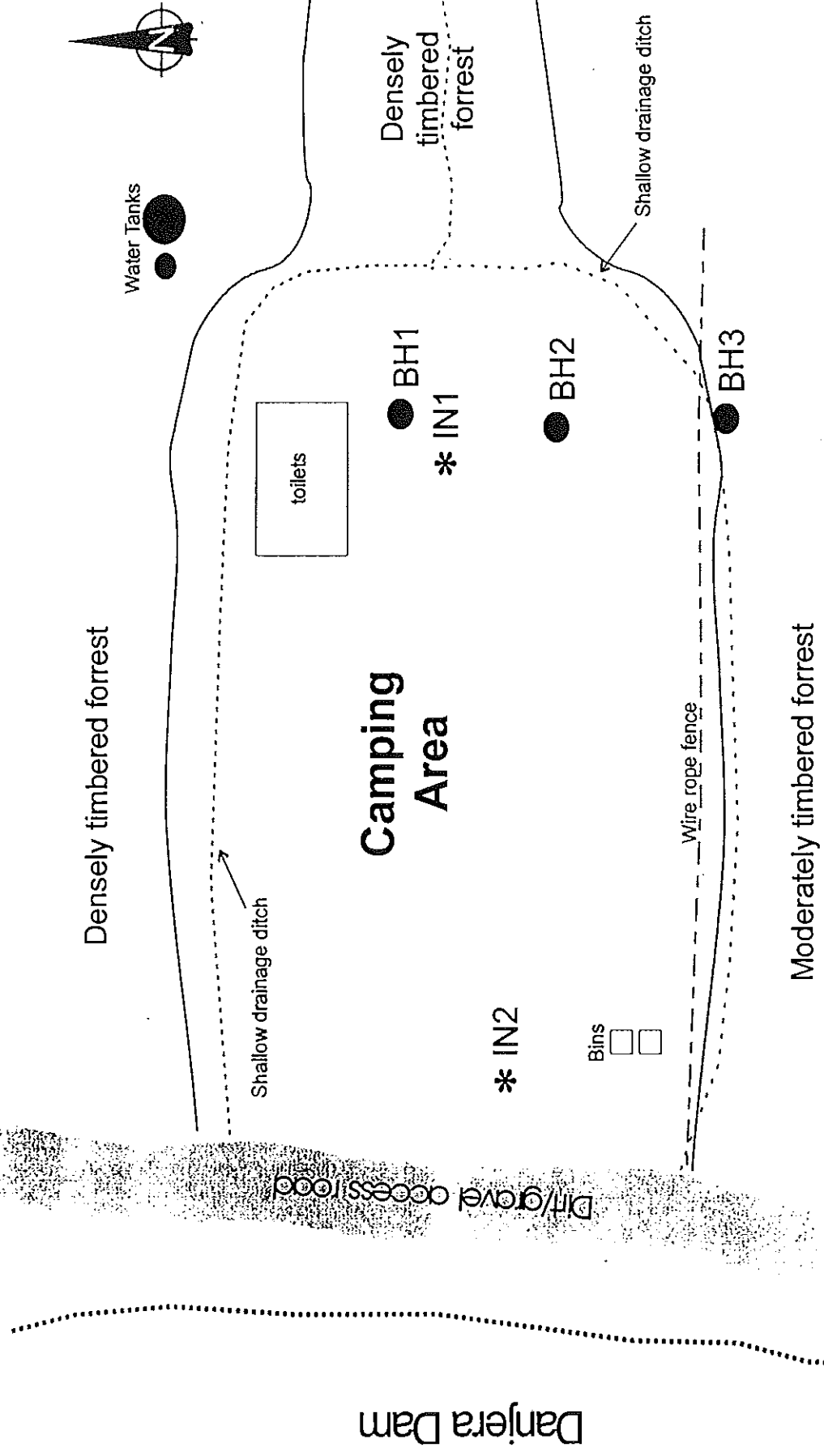
SITE LOCATION PLAN

Coffey



Coffey Geosciences Pty Ltd ACH 056 335 516		Geotechnical Resources Environmental Technical Project Management	
Drawn	DSD	PATTERSON BRITTON & PARTNERS PTY LTD ASSESSMENT OF EFFLUENT DISPOSAL YALWAL TOURIST FACILITY SITE LOCATION PLAN	FIGURE 1
Approved	<i>RJF</i>		
Date	25-Jul-00		Job no: E12315/1-AB
Scale	as shown		

SKETCH OF SITE SHOWING LOCATIONS OF BOREHOLES AND INFILTRATION TESTS



Coffey

Legend

- BH1 Approximate borehole location
- * IN1 Approximate infiltration test location

Drawn	DSD
Approved	<i>[Signature]</i>
Date	25-Jul-00
Scale	NTS

Coffey Geosciences Pty Ltd ACN 058 335 516

Geotechnical | Resources | Environmental | Technical | Project Management

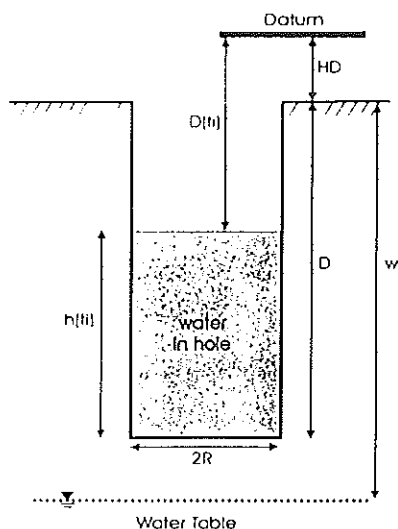
PATTERSON BRITTON & PARTNERS PTY LTD
ASSESSMENT OF EFFLUENT DISPOSAL
YALWAL TOURIST FACILITY

Drawing no:
FIGURE 2

SKETCH OF SITE

Job no: E12315/1-AB

Hydraulic Conductivity - Inverse Auger Hole Method

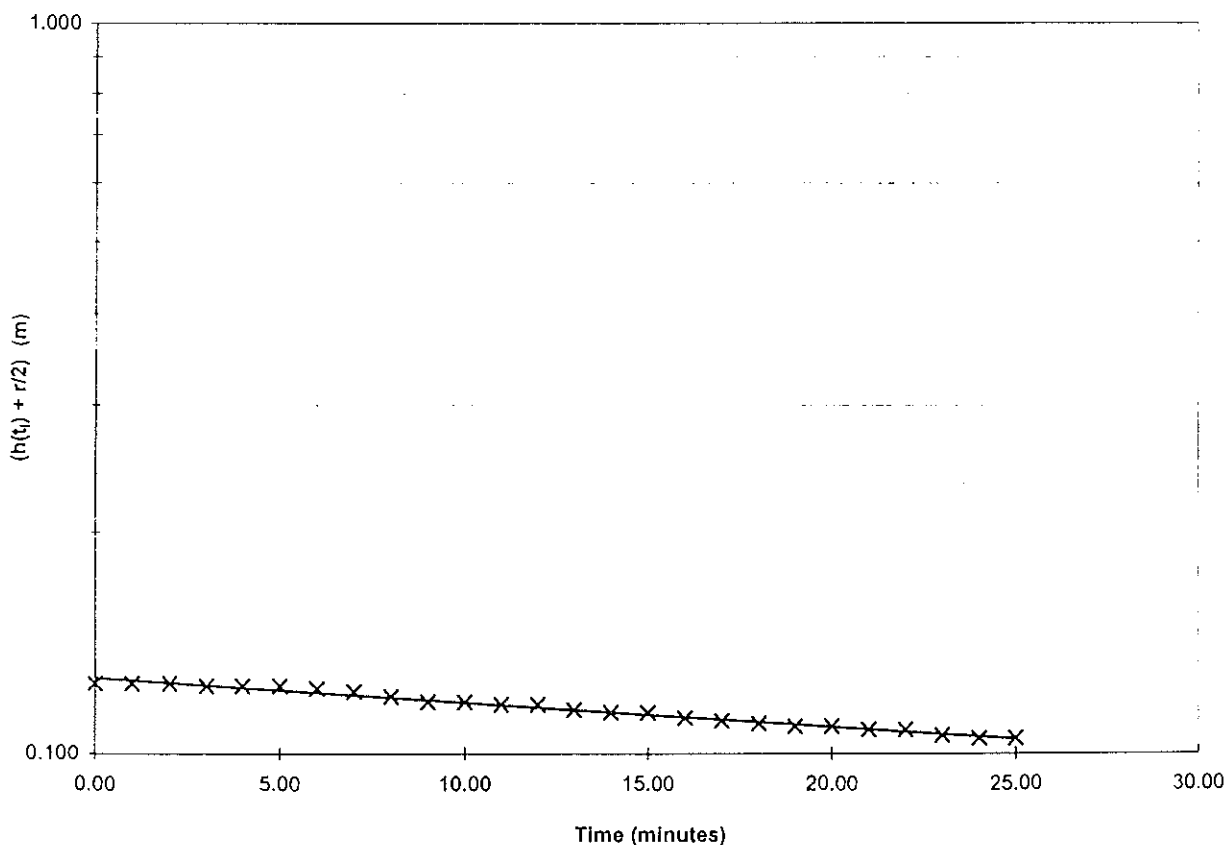


Borehole - IN1
Date Tested - 14 April 2000

Raw Data	Units	Value
Hole Radius (R)	m	0.05
Depth of Hole (D)	m	0.20
Height of Datum (HD)	m	0.00
Depth to groundwater (w)	m	unknown
Hydraulic Conductivity	m/day	0.645

Reference: Drainage Principles and Applications Vol111, Surveys Investigations Pub16, Internat. Institute for Land Reclamation and Improvement, 1974 Wageningen, Netherlands

Plot of $(h(t_i) + r/2)$ versus time



Coffey Geosciences Pty Ltd

ACN 056 335 516

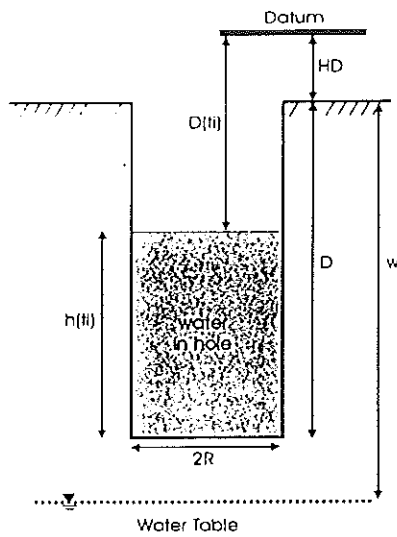
Geotechnical | Resources | Environmental | Technical | Project Management

Drawn: DSD
Approved: [Signature]
Date: 25-Jul-00
Scale:

PATTERSON BRITTON & PARTNERS PTY LTD
YALWAL TOURIST FACILITY
ASSESSMENT OF EFFLUENT DISPOSAL
HYDRAULIC CONDUCTIVITY TEST - BORE IN1

Drawing no: FIGURE 3
Job no: E12315/1-AB

Hydraulic Conductivity - Inverse Auger Hole Method

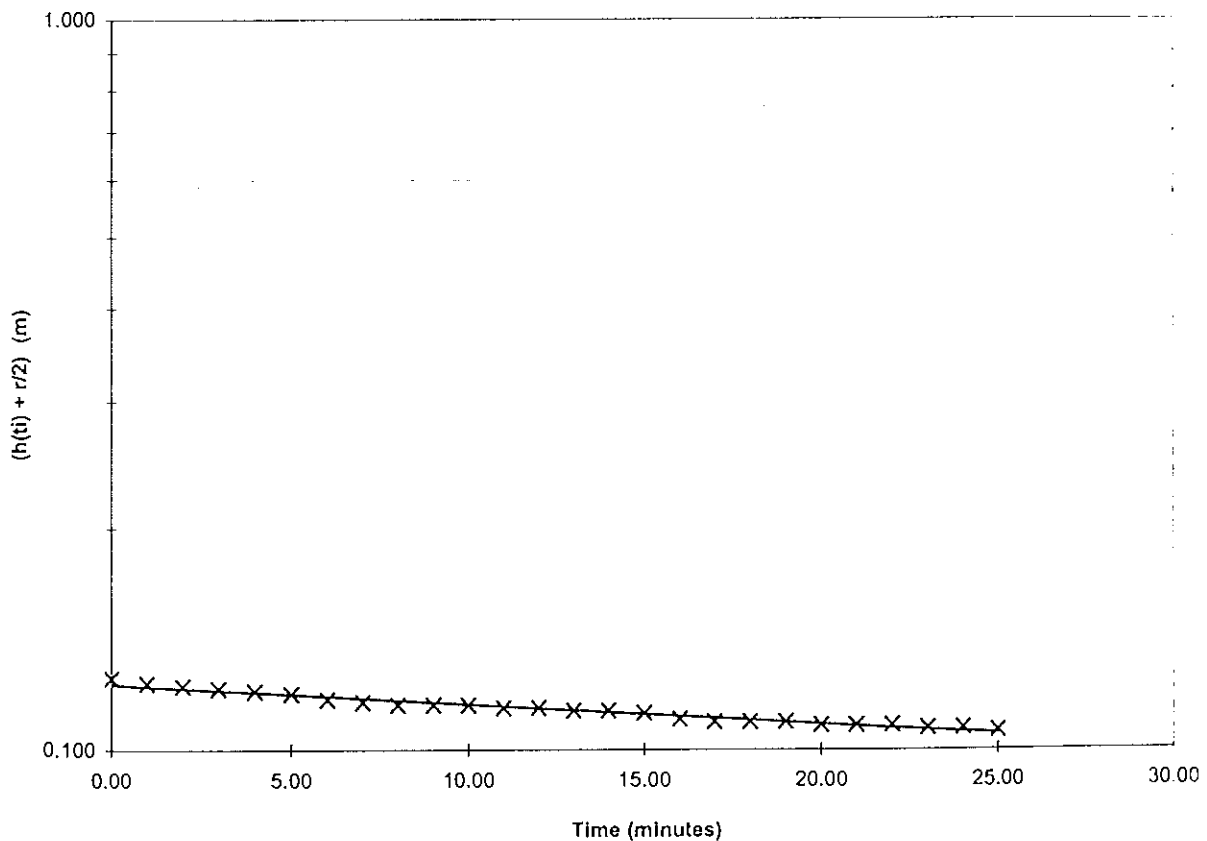


Borehole - IN2
Date Tested - 14 April 2000

Raw Data	Units	Value
Hole Radius (R)	m	0.05
Depth of Hole (D)	m	0.20
Height of Datum (HD)	m	0.00
Depth to groundwater (w)	m	unknown
Hydraulic Conductivity	m/day	0.511

Reference: Drainage Principles and Applications Vol111, Surveys Investigations Pub16, Internal. Institute for Land Reclamation and Improvement, 1974 Wageningen, Netherlands

Plot of $(h(t_i) + r/2)$ versus time



Coffey Geosciences Pty Ltd

ACN 056 335 516

Geotechnical | Resources | Environmental | Technical | Project Management

Drawn	DSD
Approved	<i>[Signature]</i>
Date	25-Jul-00
Scale	

PATTERSON BRITTON & PARTNERS PTY LTD
YALWAL TOURIST FACILITY
ASSESSMENT OF EFFLUENT DISPOSAL
HYDRAULIC CONDUCTIVITY TEST - BORE IN2

Drawing no:
FIGURE 4
Job no: E12315/1-AB

E12315/1-AB
25 July 2000

APPENDIX A

BOREHOLE LOGS

Coffey 

Borehole No. **BH1**

Sheet 1 of 1

Office Job No.: **E12315/1**Date started: **13.4.2000**Date completed: **13.4.2000**Logged by: **AT**Checked by: **Engineering Log - Borehole**Client: **PATTERSON BRITTON AND PARTNERS**Principal: **SHOALHAVEN CITY COUNCIL**Project: **YALWAL EFFLUENT DISPOSAL**Borehole Location: **DANJERA DAM, YALWAL****Coffey**

drilling information				material substance									
method	penetration	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material	moisture condition	consistency/density index	hand penetrometer	structure and additional observations
1	2	3							soil type: plasticity or particle characteristics, colour, secondary and minor components.			100 200 300 400 500	
ADV		N						SC	FILL: Clayey GRAVEL, fine to coarse grained, brown, dark red, gravel size >50mm	O/M			FILL? / SLOPEWASH?
						1		SC	Gravelly SAND, fine to coarse sand, fine gravel, drilling very hard excavating powdery with 20mm gravel, some silt	D			
				SPT 8,13 N=13					Borehole BH1 terminated at 1.2m				V-Bit refusal on "floating" rock
						2							
						3							
						4							
						5							
						6							
						7							
						8							

method	support	notes, samples, tests	classification symbols and soil description based on unified classification system	consistency/density index
AS auger screwing*	T timbering	U ₁₀ undisturbed sample		VS very soft
AD auger drilling*	C casing	50mm diameter		S soft
RR roller/turcone	penetration	disturbed sample		F firm
W washbore	1 2 3 4	standard penetration test (SPT)		St stiff
CT cable tool		SPT - sample recovered		VSt very stiff
HA hand auger		SPT with solid cone		H hard
DT distube		Nc vane shear (kPa)		Fb friable
B blank bit		V pressure meter		VL very loose
V V bit		P bulk sample		L loose
T TC bit		R refusal		MD medium dense
*bit shown by suffix e.g. ADT				D dense
				VD very dense

BOREHOLE E12315-1.GPJ COFFEY GDT 26.04.00

Revision A

Borehole No. **BH2****Engineering Log - Borehole**

Sheet 1 of 1

Office Job No.: **E12315/1**Client: **PATTERSON BRITTON AND PARTNERS**Date started: **13.4.2000**Principal: **SHOALHAVEN CITY COUNCIL**Date completed: **13.4.2000**Project: **YALWAL EFFLUENT DISPOSAL**Logged by: **AT**Borehole Location: **DANJERA DAM, YALWAL**Checked by: *AT***coffey**

drill model and mounting: **GEMCO 210B** slope: **-90°** R.L. Surface: **NOT MEASURED** m
 hole diameter: **100mm** bearing: **-** datum: **AHD**

drilling information					material substance											
method	penetration			support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	hand penetro- meter kPa	structure and additional observations	
	1	2	3													
ADV				N						GC	FILL: Gravelly CLAY, medium plasticity, brown, dark red, fine to coarse grained gravel, fine to coarse grained sand	M	H		FILL? / SLOPEWASH?	
										SC	Clayey SAND, low to medium plasticity, fine to coarse grained gravel. Drilling very hard, excavating powdery on refusal, with no large gravel chips, some trace of low plasticity silt	D	H		V-Bit refusal on 'floating' rock	
								1			Borehole BH2 terminated at 0.6m					
								2								
								3								
								4								
								5								
								6								
								7								
								8								
method					support			notes, samples, tests				classification symbols and soil description based on unified classification system			consistency/density index	
AS auger screwing*					T timbering			U _u undisturbed sample				moisture D dry M moist W wet Wp plastic limit Wl liquid limit			VS very soft	
AD auger drilling*					C casing			60mm diameter							S soft	
RR roller/ricone					penetration			disturbed sample							F firm	
V washbore					1 2 3 4			standard penetration test (SPT)							SI stiff	
CT cable tool								SPT - sample recovered							VSt very stiff	
HA hand auger					no resistance ranging to refusal			SPT with solid cone							H hard	
DT diatube					water			vane shear (kPa)							Fb friable	
blank bit								pressure meter							VL very loose	
V bit					10/1/08 water level on date shown			bulk sample							L loose	
TC bit								refusal							MD medium dense	
bit shown by suffix e.g. ADT															D dense	
															VD very dense	

BOREHOLE E12315-1.GPJ COFFEY.GDT 28.04.00

Revision A

Borehole No. **BH3**Sheet 1 of 1
Office Job No.: **E12315/1****Engineering Log - Borehole**Client: **PATTERSON BRITTON AND PARTNERS**Date started: **13.4.2000**Principal: **SHOALHAVEN CITY COUNCIL**Date completed: **13.4.2000**Project: **YALWAL EFFLUENT DISPOSAL**Logged by: **AT**Borehole Location: **DANJERA DAM, YALWAL**Checked by: *AT***Coffey**

drill model and mounting: GEMCO 210B				slope: -90°		R.L. Surface: NOT MEASURED m						
hole diameter: 100mm				bearing: -		datum: AHD						
drilling information				material substance								
method	penetration	support	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material	moisture condition	consistency/density index	hand penetrometer	structure and additional observations
1	2	3						soil type: plasticity or particle characteristics, colour, secondary and minor components.			100 200 300 400 kPa	
ADV		N					CI-CH	Sandy Gravelly CLAY, medium to high plasticity, gravel, fine to coarse grained, dark red, dark brown	D	VSt		RESIDUAL
			SPT 6,9,10 N=19		1							
			SPT 10 N=8		2			Sandy Clayey GRAVEL/Gravelly CLAY, medium plasticity, fine to coarse grained, light brown-orange, becoming more structured, trace of silt	D	VSt		Possible reflect rock structure Drilling harder, excavating rock chips
					3			EW SANDSTONE, fine to coarse grained with 2-5mm ironstained bands	D	H		Extremely Weathered Sandstone Rock
					4			becoming fine grained, drilling as gravelly clayey sand, fine to medium grained, light brown	D			becoming very hard to drill
			SPT 20 N=8		5							
					6			Borehole BH3 terminated at 5m				Very slow progress on V-Bit
					7							
					8							

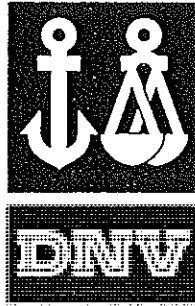
method	support	notes, samples, tests	classification symbols and soil description based on unified classification system	consistency/density index
AS auger screwing*	T timbering N nil	U ₂₀ undisturbed sample		VS very soft
AD auger drilling*	C casing	60mm diameter		S soft
RR roller/tricone	penetration 1 2 3 4	disturbed sample		F firm
W washbore		standard penetration test (SPT)		St stiff
CT cable tool		SPT - sample recovered		VSt very stiff
HA hand auger		SPT with solid cone		H hard
DT diabute		vane shear (kPa)		Fb friable
B blank bit		pressure meter		VL very loose
V V bit		bulk sample		L loose
T TC bit		refusal		MD medium dense
*bit shown by suffix e.g. ADT				D dense
				VD very dense

water	moisture
100/100 water level on date shown	D dry
water inflow	M moist
water outflow	W wet
	Wp plastic limit
	WL liquid limit

BOREHOLE E12315-1.GPJ COFFEY.GDT 28.04.00

Revision A

APPENDIX B HAZARD ASSESSMENT



IDENTIFICATION OF HAZARDS & CONTROL MEASURES

For the proposed Yalwal Tourist Facility

Prepared for

Patterson Britton & Partners Pty Ltd

Prepared by Karl Herold

Revision 0

Det Norske Veritas
(DNV Project Number 0131)

RECEIVED		
06 OCT 2000		
Patterson Britton & Partners Pty. Ltd.		
JOB No.		
JOB NAME		
CIRCULATE	ACTION	DATE
ACTIONS COMPLETE		

Overview

Patterson Britton & Partners have been engaged by Shoalhaven City Council as consulting engineers for the proposed Yalwal Tourist Facility on the land generally near the Danjera Dam water storage area. DNV has been engaged by Patterson Britton & Partners Pty Ltd to provide Hazard Identification services in relation to Yalwal & Environs Management Plan.

The three agencies with management responsibilities of the lands are Shoalhaven City Council (SCC), Department of Land & Water Conservation (DLWC), and NSW National Parks and Wildlife Service (NPWS). The lands are currently not closely managed, and it is reported (and evident) that significant degradation of the area has occurred due to the unmanaged use of the land.

The lands have many natural and man-made hazards. They are rich with mining history, having many old mine shafts, quarry faces, and some old equipment left from the mining era. These primarily representing the man-made hazards, yet at the same time representing prime attractions.

The major perceived benefit of managing the land-use in a formal sense is the prevention of further degradation, and thereby also providing an associated protection of the water supply. The risk of managing the land-use in a more formal sense is that it will be more attractive to a larger number of people, including families with children, who will then be exposed to the natural and man-made hazards. This then requires appropriate risk mitigation, and provides greater exposure to litigation.

The cost of appropriate mitigation, including establishing appropriate physical controls and management systems, will partly determine the viability of the project.

The Tasks

1. Site assessment. A one-day site assessment would be undertaken where existing natural and man-made hazards would be identified and suitable photographs taken.
2. 1 day to write a report of findings and recommended control measures.
3. 1 day travel and co-ordination of information.

The Hazards

The hazards are a combination of natural and man-made hazards, and are not unique to Yalwal. These hazards exist on other lands accessible to the public and are managed by organisations such as the NPWS. Examples include the Bungonia Recreation area and the Hill End mine sites. In general, the hazards identified include:

	Hazard	Main Contacts
Natural Hazards	Steep embankments	Falling down Rock Falls
	Deep water	Drowning
	Large trees	Falling braches
	Wildlife	Bites
	Temperatures	Exposure Fire
	Dead trees, stumps & submerged logs in upper area of dam	Damage to watercraft Injury to swimmers
Man-made Hazards	Mine tunnels	Falling rock & related incidents
	Mine shafts	Falling into & related incidents
	Mine equipment	Contact and related incidents
	Walking tracks	Related incidents
	Roadways	Related incidents
	Camping areas	Related incidents

Generally the recommendations related to the natural hazards are to primarily provide appropriate administrative controls. The Man-made hazards however require a combination of physical (engineering) and administrative controls. Mines require controls that satisfy the Chief Inspector of Mines from the Dept. of Minerals and Resources.

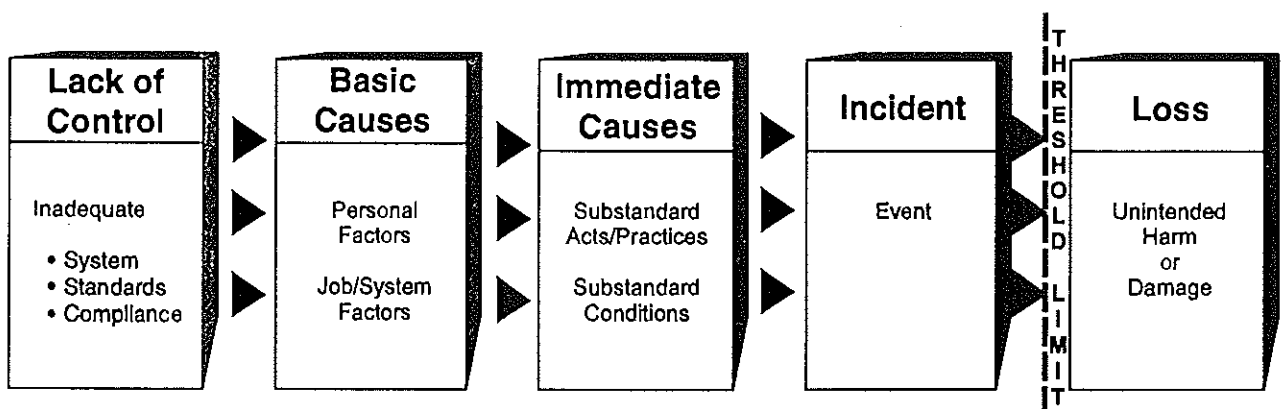
Controls

The concept that all hazards must be eliminated is not practical or realistic. The very nature of the attractions at a place such as Yalwal involve hazards. The generally accepted approach is to identify the hazards, assess the risk, and implement controls that reduce the risk to As Low As Reasonably Practicable (ALARP). The subjectiveness of words such as "Reasonably" is generally dealt with using the concept of Best Practice.

The work involved in managing these controls is ongoing by nature and suggests the implementation of an appropriate management plan. This is a key recommendation of the report.

DNV widely advocate the use of a number of key management models in the development of appropriate management systems. Principles from these have been used in the generation of this report. The models used include:

1. **IEDIM model** to establish the goals of loss control management.
 - I.....Identify the loss exposures.
 - E.....Evaluate the risk.
 - D.....Develop a plan.
 - I.....Implement the plan.
 - M.....Monitor the plan.



2. Loss Causation Model. (figure 1)

The Loss Causation Model in particular spreads the risk control focus from just dealing with the Immediate Causes (such as substandard conditions), to include Basic Causes and Systemic controls. This is a widely accepted approach, and in the case of Yalwal would reasonably allow the physical conditions to be altered in only minor ways, albeit in conjunction with management plans. Minimal alteration of the physical conditions ensures maintaining the attractions as well as limiting the capital expenditure required to reasonably safely provide access to the public.

Specific Findings and Recommendations

The exact route of the proposed walking track has not yet been determined, although a route of interest was followed on the day of the inspection.

In general, this route appropriately led past the more attractive features of Yalwal. Including:

1. Danjera Dam
2. Golden Crown Tunnels
3. Albion Tunnel
4. Tramway
5. Caledonian workings
6. Ison/Sandeman/Underwood Cuts
7. Pioneer Tunnel
8. Homeward Bound Tunnel
9. Pioneer Quarry No3
10. Golden Crown Mine

General Mine and Tunnel Access

Under the Mines Inspection Act, responsibility for safety rests with the property owners, and it is generally required to seal abandoned man-made tunnels and shafts for safety purposes in accordance with general guidelines for sealing, or provide a locked gate access by approval only. These guidelines are available from the Department of Mineral Resources. There are also provisions to allow for entries such as for tourist purposes. The Chief Inspector of Mines provides the permits allowing these entries.

It is recommended that access to mines/tunnels should generally be restricted with some specific exceptions arranged through the Chief Inspector of Mines. This limited access will require that specific control measures, including management systems, be in place first. The management systems for example would include a schedule of physical inspections (and the related procedures), as well as a systems audit program. With respect to this, it is suggested that three tunnels (indicated below) may be made generally available for internal exploration by the public. The activities inside those mines/tunnels should be restricted to satisfy the Chief Inspector of Mines for safety reasons.

The Dept. of Mineral Resources has limited funds available to provide sealing of abandoned mines, and there is considerable demand to access these funds, it may be possible to more quickly obtain a joint funding approval.

It is commonly believed there are more tunnels and shafts than currently known. Therefore it will be hard to mitigate all risks. The shafts are a particular concern because they are unmarked and appear suddenly. It would be easy for someone to fall into them and be killed, and to compound the situation, they may not be found for a long time. The current landowners will be held responsible (irrespective of whether the tourist proposal goes ahead or not).

Every known shaft should be fully sealed, and a documented effort made to search for other possible shafts not mapped. Where the mines/tunnels are visible and/or easily accessible from the proposed pathway, the entrances should be sealed with locked gates, and supported by appropriate signs.

Mines and tunnels that are out of the way, and hard to locate, should initially have at the least, simple barriers and signs. Fully sealing and locking off of all mines/tunnels may take a long time and be dependent on future funds (refer to limited funds available from the Dept. of Mineral Resources). More importantly, once a pathway route through the site has been agreed on, the decision on where to start the sealing process needs to be based on risk. In the interim period, simple barriers should be installed in conjunction with appropriate danger signs indicating entry by permit only. Signposted information of historical interest may also be appropriate, and may provide enough information to discourage uninvited further investigation. Access should be allowed as close as possible to the entrance of the tunnels without risk from rock falls.

Where there are indications of a route (natural or otherwise) to immediately above the tunnel entrances, these should be simply barricaded as indicated already, to discourage such exploration, and prevent further rock falls.

1. Danjera Dam

This dam has various depths, and varying water levels throughout the year. It is also part of the Shoalhaven water catchment area. The related risks are primarily drowning and pollution. Recommendations for mitigation are to:

- Provide appropriate communications to visitors. This should be done at the point of access to the site, as well as at points where the public pathways near the dam waters.
- Develop management systems to control visitor access and ensure the appropriate communication process occurs at point/s of access.
- Develop an audit/inspection process to ensure the proper functioning of the management systems. The audit/inspection processes will be part of the management systems.

2. Golden Crown Tunnels.



These are visible from the proposed walking track, and will undoubtedly attract the interest of visitors. These tunnels show evidence, at the entrance, of loose and fallen rock. As such, sealing is recommended, and entry denied to the general public, in line with the restrictions indicated earlier in this report.

3. Albion Tunnel



This Tunnel did not show signs of recent rock falls and was quite clear of loose rocky overhangs at the entrance. This is a tunnel where some limited internal access may be provided in line with the general restrictions to activities in mines and tunnels. Therefore this tunnel could be considered for entry approval via the Chief Inspector of Mines.

7. Pioneer Tunnel



This is another tunnel where limited access could be allowed under the conditions specified earlier in this report. It shows evidence of constant access over a long time.

The tunnel was built in the 1890's and has evidence of the original tramway on the tunnel floor. It is easily visible and accessible, and will be attractive to visitors.

The entrance is free of loose overhead rocks and is relatively flat, horizontal, and openly ventilated. During the inspection, the tunnel was penetrated over 100metres, up to past the first Drop Chute. The tunnel to this point showed no signs of loose overhead rock, and there was no evidence of recent rock falls. The Drop Chute however was significantly deteriorated by metal corrosion and timber decay, and was backed up by loose rocks. It would not be advised to allow the general public access around the Drop Chute. Therefore the limited access should be restricted from near the point of this Drop Chute. Barriers and signs should be erected at this point. The shafts/Drop Chutes will also need to be sealed in accordance to previous comments about shafts.

8. Homeward Bound Tunnel



This is another tunnel where limited access could be allowed under the conditions specified earlier in this report.

The access to this tunnel is clearly visible, and it has been proposed that the main walking pathway around Yalwal include going through this tunnel into the Homeward Bound and Pioneer Quarry areas.

The entrance to the tunnel from the Danjera Dam side was free from loose rocks. The tunnel itself shows no evidence of loose rock overhead, and there was no evidence of recent rock falls. The tunnel seems to have been accessed by the public over a long time. It is flat, short, and freely ventilated from both ends.

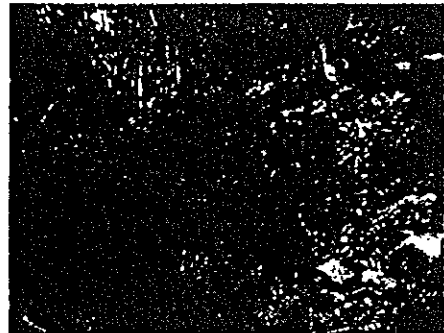
9. Pioneer Quarry 3

The exit from the tunnel into the Homeward Bound Quarry area (Pioneer Quarry 3) is spectacular and will likely continue to be attractive to the general public. This exit area shows signs of occasional rocks falling from the overhead quarry face over time. This is also evident around the general quarry face areas. It is recommended that appropriate signs be placed warning visitors of the danger of rocks falling near the quarry faces. It is unlikely to be accepted as reasonable or practicable to restrict/prevent access by the public to this area, especially by long time local enthusiasts; therefore total exclusion is unlikely to be easy, or economically feasible. Simple barriers and appropriate signs should restrict any access to the top of the quarry faces.

The Pioneer Quarry has however got several other tunnels/mines opening into it. The attractiveness of this site results in a propensity for the public to spend more time here and to explore the immediate area. It is recommended that these tunnels/mines be amongst the first to be appropriately sealed/locked.



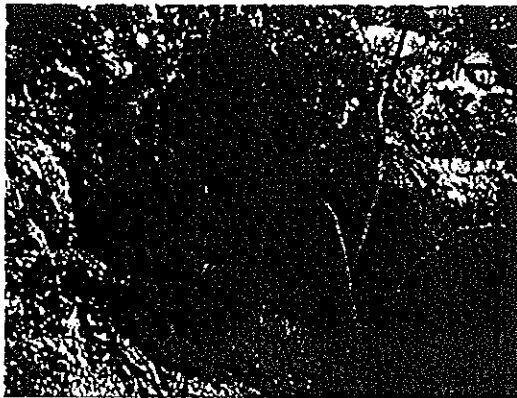
One area opposite the Homeward Bound tunnel exit in the Pioneer Quarry has some other mine entrances with obvious signs of rock falls around them. Rocks are precariously perched on the slope above. This area should be simply barricaded and warning signs erected to prevent accidental incursion. This is in addition to the sealing/locking of the mine.



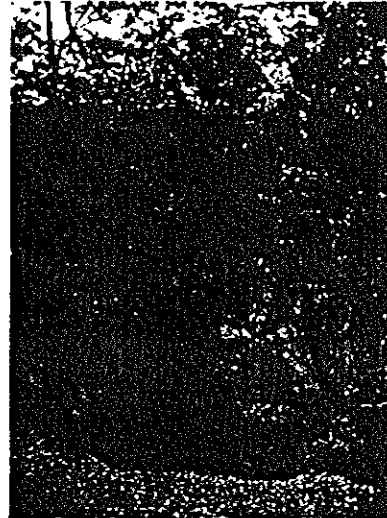
10. Golden Crown Mine

This mine is not visible from the proposed walking track, however the access to it is clearly visible by a sidetrack and will tempt exploration. The mine should be sealed/locked. The area approaching the entrance to the mine is tricky to reach, and there is a risk of falling 20+ metres and/or causing rock falls onto others at the mine entrance area below. The visible track should as a minimum be simply barricaded and the dangers signposted.

mine entrance



Overhead access to mine entrance area



The Track

Developing a track as a standard route through the Yalwal area will result in guiding visitors through/past both natural and man-made hazards. This provides considerable exposure to the organisations owning/managing this land, and it will be necessary to put a formal management plan in place.

The process for implementing a management plan follows the IEDIM principle.

This will require formally identifying the hazards (which need not be an onerous task). It normally involves experienced employees documenting the hazards during an on-site workshop (once the route has been determined).

Once the hazards are documented, each is simply evaluated using a common 3 dimensional risk assessment model (see appendix 1). The purpose of this assessment is to prioritise the work required to manage the hazard, and thereby to control the risk by reducing it to a reasonable level. This process will ensure that the High Potential risks are given priority. In effect, it facilitates a Risk Based decision making process.

The next step is to develop a Management Plan. This plan should consider both the hierarchy of controls (see appendix 2), as well as the Best Practice in this industry. (ie National Parks and Tourist Mines).

The next steps are Implementing the plan and Monitoring the plan. There should be a formal process in place for both. Monitoring will ultimately require internal inspections and auditing, as well as some external auditing of the management systems. Inspection systems on the pathways may include the identified hazards such as overhanging tree branches, and ultimately the regular removal of any in obvious danger of dropping onto the pathway.

It is suggested that the work above is part of normal management work in any organisation. Therefore does not require a lot of expensive external input. However, specific technical aspects where there is not sufficient internal experience will require some external guidance. It is highly likely that the NPWS, DLWC, and SCC, who will jointly manage this project, already have the expertise required to do the majority of this work.

Of particular concern are the man-made tunnels and shafts. However the cost of satisfactorily mitigating the associated risks in accordance with the Mines Inspection Act may be able to be shared with the Dept. of Mineral Resources.

Given the unusual circumstances involving Yalwal, with the long history of uncontrolled public access to the area, including the mines/tunnels, it would not likely be feasible to prevent all access whilst controls are being put in place. It is recommended that the following occur:

1. The planned route be decided. The proposed route is attractive, and with the exception of passing through the Homeward Bound tunnel, is probably no more hazardous than other reasonable possibilities. All routes will expose the public to the mines/tunnels/shafts. With the support of the Chief Inspector of Mines regarding the Homeward Bound thoroughfare, the proposed route will be a reasonable option.
2. Risk Based decision making should be applied in prioritising and initiating the engineering controls (in conjunction with the Dept. of Minerals and Energy), with regard to satisfying the Mines Inspection Act for sealing/locking mines/tunnels.
3. Development and Implementation of a Management Plan for the tourist area. The NPWS has similar plans for it's parks, and would be a good source of internal expertise (A staff Safety Manual was provided, but examples of local plans, which were relevant, were unable to be obtained). This plan should include a comprehensive Emergency Procedures plan as part thereof.
4. Other hazards, largely natural, should be mainly administratively controlled (see appendix 2), with the addition of some simple barriers that prevent accidental incursion to areas at risk. This is in line with best practice noticeable in many parks areas.



Risk Assessment Model

(this is a typical example)

It is suggested that organisations develop an appropriate risk assessment model based on their definitions of the three scales relating to **severity**, **frequency** of exposure and **probability** of loss. Although some subjective judgment is still required by the team members using this model, the fact that each factor is given due consideration results in a more consistent and logical classification according to criticality. The following paragraphs describe a practical evaluation system that is both easy to understand and simple to use. Definitions should be changed to suit the organisation. Each scale is considered in turn, evaluations are added, and the resulting score is used for prioritisation.

Severity is derived from the losses being incurred or the loss most likely to be incurred as a result of an incident related to the hazard.

A scale of from zero to six, such as the following, is suggested (monetary amounts are up to the organisation):

- 0 - No injury or illness or quality, production, environmental loss of less than \$1,000.
- 2 - Minor injury or illness without lost time; non-disruptive property damage; quality, production, environmental or other loss of \$1,000 to \$10,000.
- 4 - A lost time injury or illness without permanent disability; disruptive property damage; quality, production, environmental or other loss of more than \$10,000 but not exceeding \$50,000.
- 6 - Permanent disability; loss of life or body part; extensive loss of structure, equipment, material; quality, production, environmental or other losses exceeding \$50,000.

These descriptions and evaluations of severity, as well as the number of points on the scale, can be varied to suit different requirements.

Frequency of exposure can be assessed from *Figure 1*, using a scale of one to three.

Number of persons exposed	Exposure Frequency		
	Less than daily	Few times per day	Many times per day
Few	1	1	2
Moderate	1	2	3
Many	2	3	3

Figure 1. Frequency Value Factors



The **probability** or likelihood of loss occurring whenever a particular exposure occurs is influenced by the following factors:

- (a) Hazardousness (i.e., how inherently dangerous is the exposure?)
- (b) Complexity of the task.
- (c) The chance that there will be loss.

These factors are not evaluated separately but they should all be borne in mind. The key question is, *How likely is it that things will go wrong as a result of the exposure?* From this consideration, an estimate of the likelihood should be quantified. A scale of from -1 to +1 is used as follows:

- 1 = Low probability of loss
- 0 = Moderate probability of loss
- +1 = High probability of loss

The points allotted to each of the three factors are then added to indicate a scale of criticality ranging from 0 to 10 (see *Figure 2*). It is, in effect, an order of priority. Management may decide that all tasks allotted less than, say, 3 points will be disregarded from a loss control point of view and not be listed as critical tasks. On the other hand, tasks allotted 8 or more points will be regarded as the *most critical tasks*, requiring immediate attention.

Factor	Min.	Max.
Severity	0	6
Frequency	1	3
Probability	-1	1
Total	0	10

Figure 2. Quantifying Criticality



Hierarchy of Controls

1. Elimination. Not often an economically reasonable option, and often not possible in the given circumstances. However, this should always be considered first with an open mind.
2. Design/Engineering Controls. These are used to reduce the risk to what may be considered reasonable, with a view to best practice. Typical approaches involve guards and barriers.
3. Administrative Controls. This usually about developing procedures/instructions for exposed people to follow. It is therefore about communication/education, and may include information in the form of leaflets, signs, written records.
4. Personal Protective Equipment. The obvious example in the case of a mine/tunnel is a hardhat to protect the head.

Practical application usually involves several of the above. An example for Yalwal may be:

Engineering Controls such as locked gates on tunnels. Combined with the Administrative Controls of an entry permit system, and the use of Personal Protective Equipment (hardhats, amongst others).

Appendix C

Yalwal

Financial Analysis

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1 Costs

A summary of annual costs associated with the implementation of the Yalwal Concept Development Plan is provided in **Table A** in the **Appendix**. An explanation of how capital, recurrent and other costs were derived is provided in **Sections 1.1 to 1.3**.

1.1 Capital Costs

Capital costs for each stage of the development are shown in **Tables 1.1 to 1.3**. Indicative costs for future development are shown in **Table 1.4**. Numbers in the first column relate to the site development concept plans, **Figures 4.1 to 4.4** in the main report. The total cost of the development works is approximately \$1.4 M.

Table 1.1
Capital Costs – Stage 1

No.	Description	Quantity	Unit	Rate \$	Amount \$
1	Council house upgrade				
	finishes				
	- wall	100	m ²	26.50	2,650
	- floor	100	m ²	20.25	2,025
	- ceiling	100	m ²	35.75	3,575
	fittings	100	m ²	66.00	6,600
	services				
	- plumbing	100	m ²	95.00	9,500
	- electrical	100	m ²	30.75	3,075
	external services	100	m ²	4.50	450
	remote area solar power system	2500	per watt	19.00	47,500
2	NPWS rest area				
	eastern camping area				
	- pipeline	250	m	15.60	3,900
	- hose tap	1	item	500.00	500
	- landscaping	10	per site	100.00	1,000
	- composting toilet	1	item	2,870.00	2,870
	- toilet superstructure	1	item	21,500.00	21,500
	foot bridge to walk-in camping area	38	m ²	800.00	30,400
3	Camping areas				
	eastern sites				
	- landscaping	10	per site	100.00	1,000
	- composting toilet	2	item	2,870.00	5,740
	- toilet superstructure	1	item	21,500.00	21,500
	- hose tap	1	item	500.00	500
	- pipeline	610	m	15.60	9,516
	- pumping system	1	item	10,000.00	10,000
	western sites				
	- landscaping	10	per site	100.00	1,000
4	Access roads				
	boom gate	1	item	4,150.00	4,150
	widening lower loop road				
	- clearing, base course (incl. grading)	2630	m ²	15.90	41,817
	widening upper loop road				
	- clearing, base course (incl. grading)	3500	m ²	15.90	55,650
5	Picnic area/group camping area				
	carpark				
	- landscaping	25	per bay	100.00	2,500
	boom gate	1	item	4,150.00	4,150

Table 1.1 continued

No.	Description	Quantity	Unit	Rate \$	Amount \$
5	Picnic area/group camping area				
cont.	picnic/campsite				
	- landscaping shelter	30	per site	100.00	3,000
	- incl. gas barbecue, sink and tables toilet block	1	item	40,000.00	40,000
	- demolish existing toilet block	1	item	2,000.00	2,000
	- composting toilet	4	item	2,870.00	11,480
	- toilet superstructure	1	item	31,500.00	31,500
	Mine workings area				
6	walking track brochure box	1	item	70.00	70
7	loop walking track No. 1				
	- install track markers	18	item	20.00	360
	- close-off surplus tracks	20	m	22.00	440
	- address track erosion	400	m	100.00	40,000
	- boom gate	1	item	4,150.00	4,150
8	viewing platform at Golden Crown	30	m ²	700.00	21,000
9	restore and re-roof stamper	1	item	4,000.00	4,000
10	mines				
	- install safety barriers/signs	1	item	5,000.00	5,000
				Sub-total	\$456,068
	survey/investigation/design		15%		\$68,410
	contingencies		20%		\$91,214
				Total	\$615,692

Table 1.2
Capital Costs – Stage 2

No.	Description	Quantity	Unit	Rate \$	Amount \$
11	Council house				
	compound - fence	100	m	55.00	5,500
	information booth (incl. display graphic design)	1	item	10,000.00	10,000
	gateway entry structure	1	item	10,000.00	10,000
	parking bays				
	- clearing, landscaping	5	per bay	100.00	500
12	Boat launching area				
	viewing and fishing platform	25	m	700.00	17,500
	delineate parallel parking area				
	- landscaping	10	per bay	100.00	1,000
13	Picnic area/group camping area				
	construct gazebo/shade structure	1	item	30,000.00	30,000
	install pontoon for fishing/viewing	6	m	1,745.00	10,470
	delineate swimming area with buoys	1	item	1,000.00	1,000
14	Southern picnic area				
	carpark				
	- landscaping	20	per bay	100.00	2,000
	tables	2	item	915.00	1,830
	shade trees	20	item	50.00	1,000
	composting toilet	2	item	2,870.00	5,740
	toilet superstructure	1	item	21,500.00	21,500
	buffer plants to overflow camp area	80	item	15.00	1,200

Table 1.2 continued

No.	Description	Quantity	Unit	Rate \$	Amount \$
15	Mine workings area				
	loop walking track No.2				
	- install track markers	12	item	20.00	240
	- construct boardwalk	35	m ²	700.00	24,500
				Sub-total	\$143,980
	survey/investigation/design			15%	\$21,597
	contingencies			20%	\$28,796
				Total	\$194,373

Table 1.3
Capital Costs – Stage 3

No.	Description	Quantity	Unit	Rate \$	Amount \$
16	Overflow parking				
	delineate overflow parking areas				
	- landscaping	10	per bay	100.00	1,000
17	Picnic area/group camping area				
	construct walking track to mine area				
	- clearing, base course (incl. grading)	900	m ²	15.90	14,310
	Mining workings area				
18	Interpretive signs at Chapmans Battery and Golden Crown Mine (incl. graphic design)	2	item	8,000.00	16,000
19	loop walking track No.3				
	- install track markers	34	item	20.00	680
	- closed off surplus tracks	30	m	22.00	660
	- address erosion/formalise track	1700	m	15.50	26,350
(a/b)	- upgrade barriers and signs	1	item	4,500.00	4,500
(c)	- formalised Homeward Bound picnic area	1	item	1,000.00	1,000
(d)	- level out tunnel floor	100	m ²	45.00	4,500
(e)	- construct elevated boardwalk	310	m ²	700.00	217,000
				Sub Total	\$286,000
	survey/investigation/design			15%	\$42,900
	contingencies			20%	\$57,200
				Total	\$386,100

Table 1.4
Indicative Capital Costs – Future Development

No.	Description	Quantity	Unit	Rate \$	Amount \$
20	Walking track link - camping areas				
	clearing, base course (incl. grading)	1050	m ²	15.90	16,695
21 & 22	Cabins	3	item	41,000.00	123,000
	(40 m ² each)				
23	Yarramunmun Tops Fire Trail				
	relocate boom gate	1	item	500.00	500
24	Walking track link between track No.s 2 and 3				
	clearing, base course (local laterite)	600	m ²	15.90	9,540
				Sub-total	\$149,735
	survey/investigation/design			15%	\$22,460
	contingencies			20%	\$29,947
				Total	\$202,142

1.2 Recurrent Costs

1.2.1 Salaries and Wages

It is assumed that a Council ranger would be stationed permanently at Yalwal. Pay scales for Council rangers range from about \$40,000 per annum for a 'General Ranger' to \$50,000 per annum for a 'Senior Ranger' (this includes allowances for weekend work etc). As the Council house is only two bedrooms and somewhat removed from town services (schools etc) it is considered the position of Yalwal Ranger would be more attractive to a young, single person and so a salary of \$40,000 has been assumed, plus on-costs.

Other staff requirements will be the employment of an interpretation officer to develop signage, brochures, tours and activities. NPWS has suggested that a part-time position (Project Officer) be established, together with a part-time Aboriginal ranger position to develop information on the indigenous values of the area. The annual salary for a project officer would be about \$40,000 (part-time, say \$20,000). Ranger pay scales range from \$39,571 to \$54,296 per annum (this would probably be a more junior, part-time position, so also say \$20,000 per annum). An allowance of \$40,000 per annum, plus on-costs has been adopted for these part-time positions for a period of three years.

It is assumed that after a three year period an interpretation plan would be complete and the running of tours and activities would be taken over by commercial or other interests. It is also assumed that a fee collector would be employed. These positions would be on a commission basis and are accounted for under revenue, see **Section 2.2.1.**

1.2.2 Site Management Costs

This will include costs for utilities and services (eg Council rates), operating supplies (eg toilet paper, fire wood, LPG for barbecues), garbage removal, cleaning of toilets and litter removal etc. An allowance of \$66,000 per annum has been made for this, based on an average cost of \$1,000 per week, plus an additional \$14,000 in total for peak periods when more frequent cleansing will be required and there will be additional costs for supplies.

1.2.3 Site Maintenance Costs

Costs associated with maintenance of access roads, walking tracks, reserve structures and park furniture etc have been based on a percentage of capital costs. Maintenance costs have been increased at each stage of the development in consideration of increasing costs with age of infrastructure. Also, maintenance of walking tracks in the old gold mine workings area will be higher due to the need to undertake this work by hand, as vehicle access is limited.

The assumed site maintenance costs are as follows:

- Stage 1 3% of capital cost per annum
- Stages 1 & 2 3.5% of capital cost per annum
- Stages 1, 2 & 3 4.0% of capital cost per annum.

1.3 Other Costs

As recommended in the mine hazards report (see **Appendix B**) a management plan for the mine workings area should be prepared. This will include further searching and mapping of the area to identify additional mines and an on-site workshop to identify appropriate controls and priorities for management. As part of the Yalwal Management Plan, McGowan and O'Keefe (1998) recommended the preparation of a conservation and interpretation plan for the mine workings area. It is considered

that these tasks could be combined and that Council and NPWS have the necessary in-house expertise to undertake this work, and that this will be part of the duties of staff described in **Section 1.2.1**.

Promotion and marketing (although outside the scope of this study) is another aspect which needs to be considered. It is assumed that this will be part of the normal responsibilities of Council's Tourism Officer. Yalwal could be incorporated in existing marketing strategies and plans for the Shoalhaven and promoted through the visitor centres at Nowra and Ulladulla and in existing tourism publications. In addition, Yalwal could be promoted through NPWS visitor centres, eg Fitzroy Falls Visitor Centre and the Minnamurra Rainforest Centre. Costs associated with this will be the development and publication of material specifically relating to Yalwal. An allowance of \$10,000 has been made for initial promotion and marketing, with an ongoing allowance of \$3,500 per annum.

Management of Yalwal will also involve administration costs relating to employment and the preparation of licence agreements for commercial tour operators, fee collectors or franchises (eg canoe hire). An allowance of 8% of entry fees has been made to cover these costs.

2 Revenue

2.1 Estimated Visitation

2.1.1 Site Capacity

The Concept Development Plan recommends a total of 30 campsites (assuming an average of three people per site, approximately 90 people) at the smaller camping areas and facilities to cater for approximately 40 campers (say 13 sites) at the main picnic/group camping area. An allowance for overflow camping is also made, say approximately seven sites, giving a total of 50 sites overall, or approximately 150 campers.

The number of sites is based on catering for recorded peak visitation levels, utilising existing cleared areas and the retention of separate camping areas with fewer sites (rather than a large camping area(s)) to preserve the 'bush camping experience'. Facilities have been sized for this number of people (although port-a-loos may be required for overflow camping) and, together with the proposed booking system, set the maximum number of campers for Yalwal.

In addition to campers at the main picnic/group camping area, allowance has been made for 60 day visitors, with the southern picnic area (near the mine workings area), catering for about 30 people and the NPWS rest area (with 10 carparks) also catering for about 30 people (total of 150 day visitors). Excluding parking for camping a total of 52 formalised parking bays are proposed which would cater for this number of visitors, assuming car occupancy was three people. Given that visitors will come and go throughout the day, maximum day visitation could be about 25% higher, or approximately 200 people, given that some people will just stay for a couple of hours to do the mine walk or go fishing, or stay for a half day for picnics etc.

2.1.2 Current Annual Visitation

There is no information available on annual visitation to Yalwal or Morton National Park (there is only data on visitation to the Fitzroy Falls Visitor Centre). Accordingly, estimates of annual visitation have been made by extrapolating traffic counts and with reference to other tourism data. From the three weeks of traffic counts in Autumn (April/May 2000) (see **Appendix A Market Analysis**) during a 'normal week' approximately 17 cars travel to and from Yalwal. From the Easter week traffic counts, approximately 50 cars travel to and from Yalwal during a 'peak week'.

From the limited information on visitors, on the 16 May there were approximately 60 day visitors and 45 campers at Yalwal (letter to Nelson Consulting from SCC 28/5/2000). From the 1998-99 National Visitor Survey (BTR 2000) there were 2,637,000 overnight visitors to the South Coast Region and 2,138,000 day visitors. Therefore, say typical visitation to Yalwal comprises 50% day visitors and 50% campers, and that campers stay for two nights during normal weeks (ie stay for the weekend) and three nights during peak weeks.

Visitation patterns for the South Coast Region are not applicable to Yalwal because they are influenced by high visitation to beaches during summer. In the absence of any other information, the overall NSW overnight visitation patterns from the 1998-99 National Visitor Survey (BTR 2000) have been used to estimate seasonal visitation for Yalwal (see Table 2.1).

Table 2.1
Seasonal Visitation Patterns

Month	% Visitation NSW	Season	Adopted % Visitation for Yalwal
June	7	Winter	22
July	8		
August	7		
September	8	Spring	26
October	9		
November	9		
December	8	Summer	27
January	12		
February	7		
March	7	Autumn	25**
April	9		
May	8		
total	99*		100

Notes: *does not add up to 100% due to rounding

**extra 1% added to Autumn as rangers identified Autumn to Spring as the busiest time at Yalwal

Assuming Autumn visitation comprises 12 normal weeks and one peak week (ie Easter/school holidays) and that the average car occupancy is three people, current Autumn visitation is estimated at 1218 visits/visitor nights as shown in Table 2.2. Scaling this up using the seasonal percentages in Table 2.1 gives an estimated annual visitation for Yalwal of about 4872, say 4800 per annum.

Table 2.2
Yalwal - Estimated Current Autumn Visitation

Autumn	time	no. weeks	no. cars	occu- pants	nights	total visits/visitor nights
day visits:	normal	12	8.5	3		306
	peak	1	25	3		75
campers:	normal	12	8.5	3	2	612
	peak	1	25	3	3	225
total						1218

2.1.3 Increases in Visitation and Visitor Groups

To assist in guesstimates of the potential increase in visitation and visitation per visitor group, reference has been made to other parks and visitor surveys.

Promotion and marketing will be important in attracting new visitors to Yalwal. The only material publicly available at present is the brochure *Protecting Yalwal and your Water Supply*, which is distributed to campers on site. The availability of information on the values and 'attractions' of Yalwal at tourist information centres, national parks visitor centres, tourist accommodation etc will increase visitation to Yalwal. As an example, the release of the first visitor map and guide to Namadgi National Park (which is about 30 minutes drive from Canberra's southern suburbs) in 1990 has resulted in about a 30% increase in visitation (pers. comm. Virginia Logan, Namadgi National Park) (Nelson Consulting 2000).

Manly Warringah War Memorial Park, in Sydney's northern beaches area is another source of information. The focus of the park is a recreational dam (Manly Dam). The park is primarily a day use area, with limited camping permitted for groups, such as scouts. Its size (3.75 km² including the dam, which is smaller than Danjara Dam) is comparable with Yalwal. The most popular activities are picnics/barbecues, swimming, walking and fishing (it is also stocked with Australian Bass).

The averaged, annual increase in visitation between 1986 and 1996 was estimated at 2%, based on traffic count data. Although Manly Dam has been used for recreation since the 1920s, it was not until 1982 that a professional park manager and staff were appointed (Nelson Consulting 1998). Accordingly, the traffic data essentially covers the period from commencement of formal management of visitation to the park.

For the Blue Mountains, Veal (1991) predicted the average, annual increases in various activities between 1989-2001 as shown in Table 2.3. These show general sightseeing and picnics/barbecues in particular, as becoming more popular.

Table 2.3
Blue Mountains – Predicted Increase in Various Activities

Activity	Predicted Averaged Annual Increase 1989-2001
just driving through	1.3
sightseeing	5.3
bushwalking/hiking	2.5
walking	2.5
watersports	0.3
other sports	0.3
picnic/bbq	2.8
camping	0.3
other	0.8

Groups

Attracting school and other groups to increase week day and off-peak camping will also be important in increasing visitation to Yalwal. Estimates of the percentage of group visitors from previous visitor surveys are set out below.

- ACT Parks and Forests campgrounds, 1996/97 Christmas school holiday survey - about 5% of campers were with an organised group (note that this is based on a very small sample size) (Nelson Consulting and UTS 1997)

- Manly Warringah War Memorial Park, Sunday 5 October 1997 survey - 1% of visitors were with an organised group (Nelson Consulting 1998)
- Blue Mountains walking tracks, January-March 1997 survey - 6% of walkers were with an organised group (UTS 1997).

In 1996 there were 109 group bookings for Namadgi National Park's three campgrounds, involving approximately 2,030 visitors (about 1.6% of visitors to the park). For ACT Forests in 1996, there were 128 group bookings (covering the three formal campgrounds and other smaller reserves) involving 5,628 visitors (about 1% of visitors to the forests). It should be noted that these figures only relate to groups using formal booking systems. ACT Forests estimated that groups using the forest campgrounds would be about 50% higher than the actual recorded bookings (UTS and Nelson Consulting 1997).

For the ACT parks and forests group bookings included schools, tertiary institutes, church groups, scout groups, the armed forces, conservation groups, bird watching groups, hunting clubs, 4WD clubs, horse riding clubs, car clubs, orienteering groups, rogaining groups, running clubs, bushwalking groups, retirees groups, service clubs, training course operators and wedding parties (UTS and Nelson Consulting 1997).

From the above information, indicative breakdowns for current visitor groups (see Table 2.2 in the main report, which provides a description of these groups) and an estimate of visitation at Year 10 of the Concept Development Plan are shown in Table 2.4. It is anticipated that visitation would stabilise at this point, on completion of Stage 2 of the capital works. Table B in the Appendix provides an estimate of annual increases in visitation to Yalwal by visitor type. The annual increases assume that marketing and promotion is undertaken, particularly to target groups which will increase weekday and off-peak visitation to Yalwal.

Table 2.4
Yalwal - Indicative Breakdown of Visitor Groups

Type of Visitor	% of Total Visitors/annum	No. of Visitors/annum	No. of Visitors at Year 10
day visitors	45	2160	4304
excursions	5	240	1704
campers	40	1920	3060
group campers	5	240	1704
national park users	5	240	240
total	100	4800	11,011

2.1.4 Participation in Guided Tours

From Namadgi National Park, annual visitation was estimated at 130,000 in 1996/97 (ACT Government 1997). In this year fees for ranger guided walks were introduced, with the number of participants being 611. Participation in walks peaked in 1991/92 at 991 before fees were introduced, so maximum participation is about 1%. For all ACT parks, annual visitation was estimated at 2,900,000 in 1996/97. Participation in ranger guided walks in 1993/94 was 16,000 and in 1994/95 was 13,000. So about 0.5% of visitors participated in ranger guided walks.

Tidbinbilla accounts for about 80% of ranger guided walks in the ACT parks - this is a destination attraction, ie formalised walks, animal exhibits etc. Annual visitation was estimated at 160,000 in 1996/97. If the 1994/95 figures are used approximately 10,400 visitors participated in guided walks, or about 6.5% of visitors to Tidbinbilla (ACT Parks and Conservation Service 1997).

For the Blue Mountains during 1995/96, Discovery Program school bookings increased by 15%, the total number of participants increased by 10% and the number of participants in commercial canyoning increased by 4% (UTS 1997).

Based on the above information the following participation rates in tours/guided walks have been adopted for Yalwal:

- years 1-3, 8% of day visitors and 4% of campers
- years 4 onwards, 4% of day visitors and 2% of campers.

The drop off in participation after Year 3 is anticipated due to repeat visitation and further development of the old mine workings walking tracks, making them more suitable for self-guided walks. This gives an annual participation in tours of 267 people for Year 10 onwards, see Table C in the Appendix.

2.2 Revenue Sources

2.2.1 Camping and Reserve Entry Fees

Camping fees in NSW National Parks and State Recreation Areas range from about \$5.00 to \$12.00 depending on the level of facilities provided and the popularity of the area. Camping in NSW State Forests and Sydney Catchment Authority camping areas is usually free. Table 2.5 shows the fees charged in the South Coast/Southern Highlands area for park entry and camping at formal campgrounds.

Table 2.5
NSW South Coast/Southern Highlands Park Fees

Campground	Facilities	Camping Fee (site/night)	Park Entry Fee (per car)
Booderee NP - Cave Beach - Bristol Point - Greenpatch	toilets, showers, drinking water, fireplaces, picnic tables	from \$8.00	\$5.00
Morton NP - Gambells Rest	toilets, showers, drinking water, fireplace, picnic tables and shelter	from \$10.00	\$7.50
Murramarang NP - Depot Beach - Pebbly Beach - Pretty Beach	all have toilets, showers, drinking water, fire places barbecues, picnic tables and shelter also at Depot Beach and Pebbly Beach	from \$10.00	\$7.50
Wombeyan Caves	toilets, showers, drinking water, fire places, bbq, picnic tables and shelter	from \$12.00	-

Source: Lewis and Savage 1999

Camping fees for ACT Parks and Forests also generally vary according to the range of facilities available, as shown in Table 2.6.

Table 2.6
Camping Fees - ACT Parks and Forests

Campground Type	Facilities	Camping Fee
'Modern'	flush toilets, hot showers, individual camping and caravan sites, picnic and bbq area and shelters	\$10 for two people and \$2 per additional person
'Semi-modern'	flush, pit or composting toilets; tank water and hand basins (cold showers at some locations); defined camping area (defined sites at some locations); individual fireplaces and picnic tables or group facilities and shelter	\$6 for two people and \$2 per additional person
'Semi-primitive'	pit or composting toilet; defined camping area; fireplaces; (picnic tables at some locations)	\$5 for two people and \$2 per additional person

Source: UTS and Nelson Consulting 1997 (fees are still current)

Note: solo campers – half the fee for two people and community groups \$2 per person

When the *Campground Strategy for ACT Parks and Forests* (UTS and Nelson Consulting 1997) was prepared there were no fees charged for camping at Namadgi National Park campgrounds. The results of a survey of campers over the 1996/97 Christmas school holiday period indicated that most were willing to pay between \$3 to \$5 per person, per night, to camp at the formal campgrounds in the park.

It is recommended that camping fees be introduced at Yalwal (as soon as practical, possibly Easter 2001) following adoption and publicising of the Concept Development Plan. This would provide some initial revenue for improvement works and get people used to paying for camping sites.

Reserve entry fees are also recommended. The future closure of the Yarramunmun Tops Fire Trail and the one access road to the reserve facilitates entry fee collection. It is assumed that a fee collector would be engaged on a commission basis (ie 5% of fees collected). During periods of low visitation an honour system for fee collection would be required, or collection by the resident ranger.

Suggested reserve entry and camping fees are shown in Table 2.7. These are shown as \$ per person for ease of calculation in the financial evaluation. In reality fees may be imposed per car, or per site for camping.

Table 2.7
Yalwal Entry and Camping Fees

Visitor Type	\$ per person
day visitor	2.00
camper	5.00
group campers (ave./visitor night to allow discount for schools etc/normal rate for others)	4.00
excursions (average rate to allow discounts for schools etc)	1.50
national park visitors (same as day visitors)	2.00

2.2.2 Tours and Other Services

Fees for NPWS Discovery Program two hour to half-day activities are generally as follows:

- children \$3.00 - \$5.00
- adults \$4.00 - \$10.00
- families \$10.00 - \$20.00

These programs only operate during school holiday periods.

Table 2.8 sets out suggested fees for tours and other services. It is estimated that 5% of excursions would require exclusive bookings or a ranger guide and similarly 5% of bushwalkers would require secure parking. After Year 10 this would involve and estimated 85 excursion visitors per annum. Table D in the Appendix provides details on annual revenue.

Table 2.8
Yalwal Tour and Other Service Fees

Tours and Services	\$ per person
guided tours (ave. fee allowing discounts for children/higher fees for adults)	5.00
guided tour commission after Year 3	1.00
ranger guide for excursions	1.00
exclusive use of an area/special event booking fee*	1.00
secure parking (average, ie assumes vehicles left for two nights)	1.00

Note: *booking/cordoning off of specific area of reserve for birthday/Christmas parties, corporate functions, commercial tours and sporting events.

It is assumed that after three years the running of tours and activities would be undertaken by commercial or other interests. For example, the Nowra LALC may be interested in running tours on Aboriginal sites and culture, and a member of the Shoalhaven Historical Society may be interested in running tours of the old gold mine workings area.

Private tour operators pay a licence fee to operate in areas managed by NPWS. Licence fees also generally apply for activities on Crown land and activities on land subject to management plans, prepared under the Local Government Act (eg licence for canoe hire). Revenue from these sources is only likely to be minor so has not been considered in the financial evaluation.

Walking track guides and other general reserve publications are envisaged as simple, one colour, A4, double-sided pamphlets which would be distributed free of charge. Other documents developed, such as a guide to the historic cemetery, could be sold but it is likely that revenue would only cover printing costs.

NPWS charge market rentals for ranger houses. The Council house at Yalwal is a basic, two bedroom, fibro structure and would be unlikely to fetch more than \$100 per week. In addition, to attract a ranger to manage the area it is likely that the house would be offered rent free, as part of a salary package. Accordingly, no allowance for rental income has been included in the financial evaluation.

2.2.3 Funding Assistance

The Shoalhaven ACC has identified the following potential funding sources.

Contributions to development costs (including infrastructure) from Federal Government programs, ie

- Regional Assistance Program
- Regional Solutions Program
- Heritage programs.

Employment and wage subsidies schemes, ie

- Work for the Dole scheme
- Indigenous wage subsidies
- Traineeships/apprenticeships
- Green corps.

Funding assistance to install safety barriers etc in the mine workings area may also be available from the Department of Mineral Resources.

3 Financial Evaluation

3.1 Example of Established Park Income and Expenditure

As an example of running costs for an established park, Table 3.1 provides information on the estimated recurrent income and expenditure for Manly Warringah War Memorial Park.

Obviously, being located in the Sydney metropolitan area, visitation is high. For the Sunday of the 1997 October long weekend (overcast morning, mild weather conditions) approximately 600 people entered the park, with peak visitation levels more than double this number (Nelson Consulting 1998). Current peak daily visitation at Yalwal is in the vicinity of 120 (campers and day visitors).

Table 3.1
Park Income and Expenditure
for Manly Warringah War Memorial Park

Item	Estimate for 1998/99
Income:	
Park entrance fees (net after payment of fee collector's wage)	\$ 9,000
Booking fees (picnic areas, sporting events etc)	\$ 5,000
Water ski fees (annual fee plus percentage of hire charges)	\$ 6,500
Sailboard, canoe etc hire (percentage of hire charges)	\$ 100
Filming fees (varies from \$0 to \$4,000 annually)	\$ 1,400
Total	\$25,600
Expenditure:	
Salaries and wages (two full time staff plus casuals)	\$115,000
Overheads (annual leave, superannuation etc)	\$ 25,500
Operating costs (garbage removal, sullage service, rates, electricity, phone, vehicle running, purchase of goods and services etc)	\$ 40,500
Water quality monitoring	\$ 25,000
Total	\$206,000

Source: Nelson Consulting 1998

Notes to Table 3.1:

- park entry fees relate only to non Manly-Warringah residents, ie only about 20% of visitors pay the park entry fee of \$6, which applies on weekends and public holidays, weather permitting (ie fee collector only works during fine weather when visitation is highest – there is no fee collection on Good Friday or Christmas day).
- water quality monitoring is comprehensive (ie costs are high) due to potential blue-green alga problems.

As for Manly Warringah War Memorial Park, potential revenue from fees relating to reserve entry, camping or other services would not cover running costs for Yalwal, as outlined in Section 3.2.

3.2 Financial Evaluation of Yalwal Concept Development Plan

The financial evaluation for Yalwal was carried out in compliance with NSW Treasury (1997) guidelines. Cash flow analysis was used (see Table A, Appendix) to model the costs and financial benefits associated with the implementation of the Concept Development Plan, over a 20 year period. This method was adopted because predicted increases in visitation and participation in tours etc would only impact on costs and revenues to a small degree.

For the purposes of the financial evaluation it is assumed that Stage 1 of the Concept Development Plan is undertaken in Year 1, followed by Stage 2 five years later and Stage 3 at Year 10 (see Table A, Appendix). The 'Future Development Stage' has not been modelled as costs provided are indicative only and a decision on whether to proceed with cabin accommodation (the major component of future development) will depend on a number of factors including private sector interest and assessment of the demand for such accommodation (this could be gauged, for example, through future visitor surveys on-site and at the Nowra Visitor Information Centre).

In reality the timing for each stage of the Concept Development Plan will be dependent on available funding sources and the urgency of addressing specific management issues.

3.2.1 Assumptions

For a concept plan (ie where detailed design of works etc has not been undertaken), the following assumptions are considered necessary.

- Cash flow modelling over a 20 year evaluation period. As the reserve is not likely to be a profit-maker, no residual value at the end of the 20 year period is assumed.
- Cash flows are presented in real terms based on today's dollar values. This makes it possible to ignore inflation projections, and moreover aids understanding of the evaluation, as costs and revenues in any year are presented as if they are incurred at today's prices. This is permissible only if cash flows do not progress into debt financing and taxation (see below). Both revenues and costs are assumed to include GST at 10%.
- The assumption is made that the capital works program will not be financed by raising debt, nor is it assumed that any taxes other than GST are payable.
- A real discount rate of 8% per annum (pa) is assumed. A real rate is one without consideration of inflation. The 8% rate equates to a nominal rate of 10.2% assuming 2% pa inflation and 13.4% if inflation were at 5% pa. The nominal discount rate is often defined as the proponent's weighted average cost of capital (WACC). Most Councils would use a nominal cost of capital aligned to the Local Government Indicative Borrowing Rate which averages around 7% over the long term. This converts to a real rate of just below 5% pa once 2% of inflation is eliminated. However, adding a 3% risk premium would be reasonable for this

proposal, resulting in a discount rate of around 8% pa. Sensitivity tests were carried out at different discount rates above and below this rate.

3.2.2 Performance Measurement

The financial performance of a venture can be measured according to several criteria or financial performance measures, each with its own strengths and weaknesses. The most relevant are described below:

- The Net Present Value (NPV) of cash flows consolidates a time-series of annual cash flows into a single dollar value by applying the principle of the appropriate time value of money. The NPV should be positive for financial feasibility, and the option with the greatest NPV is preferred, although this is often debated. However, the NPV depends on the selected discount rate, which itself often causes disagreement.
- The so-called Net Present Value per Dollar of Capital Invested (NPVI) attempts to account for the efficiency of capital application. As for the NPV, the NPVI should be positive for financial feasibility, and the option with the greatest positive NPVI is usually preferred. As for the NPV, it is also dependent on an agreed discount rate.
- The Benefit Cost Ratio (BCR) is perhaps most universally understood, but is more appropriate to economic analysis. The present value of the benefits or revenue stream is divided by the present value of the cost stream to give a dimensionless index that should equal or exceed unity for financial feasibility. Again, calculation of the BCR is dependent on the discount rate to be applied (see above). Also, there is disagreement as to whether the recurrent costs should be treated as negative revenues by netting them off the income stream. In this evaluation, recurrent revenues are considered costs and are part of the denominator.
- The Internal Rate of Return (IRR) is perhaps the purest performance measure in that it is not directly dependent on an agreed discount rate. The IRR is the discount rate at which the NPV of cash flows equals zero, and should equal or exceed an agreed threshold rate of return for financial feasibility. However, it does have its problems, such as some difficulties in explaining it to the lay person. It is also impossible to calculate in instances where cash flows are always positive, always negative (as in this case) or switch from positive to negative erratically. Also, the distinction between the real IRR (no inflation) and the nominal IRR (forecast inflation included) needs explanation.

Only the first three performance measures are used in this evaluation because, as noted above, the IRR does not compute because annual cash flows are always negative for Yalwal.

3.2.3 Financial Outcome

The results of the financial evaluation indicate that development of Yalwal will require a net annual subsidy in the order of \$170,000 during the first two or three years. Once visitation has stabilised in Year 10, this shortfall may decline somewhat to plateau around \$135,000 per annum.

The financial results are summarised in Table 3.2. The annual cash flows (Table D) can be found in the Appendix.

Table 3.2
Financial Results

Financial Outcome	Stages 1, 2 & 3	Discount Rate per annum
Net Present Value of Cash Flows (NPV)	-\$2,195,000	8%
NPV per Dollar of Capital Invested (NPVI)	-2.53	8%
Benefit Cost Ratio (BCR)	0.11	8%

Although the above results are all below the conventional threshold for financial feasibility, there are other benefits in proceeding with the Concept Development Plan. These include protection of the Danjera Dam water supply, ensuring public safety and reducing environmental damage to the area. These benefits are difficult to quantify in dollar terms and hence have not been included in the financial analysis.

3.2.4 Sensitivity Analysis

Three tests were carried out (see Table 3.3) to assess the sensitivity of the assumptions upon which the financial evaluation was based, ie:

- impact on evaluation if the rate of visitation to Yalwal proves to be either substantially higher or substantially lower than anticipated;
- effect of increases or decreases in recurrent costs; and
- effect of different discount rates on the financial outcome.

Table 3.3
Sensitivity Test Results

With visitation numbers:	-20%	BASE	+20%	
the Net Present Value is	-\$2,250k	-\$2,195k	-\$2,141k	discounted at 8% pa
the NPVI is	-2.59	-2.53	-2.47	discounted at 8% pa
the Benefit Cost Ratio is	0.09	0.11	0.13	discounted at 8% pa
the Year 3 net cash flow is	-\$171k	-\$166k	-\$161k	(undiscounted)
the Year 11 net cash flow is	-\$142k	-\$136k	-\$129k	(undiscounted)
With recurrent costs:	+20%	BASE	-20%	
the Net Present Value is	-\$2,516k	-\$2,195k	-\$1,875k	discounted at 8% pa
the NPVI is	-2.90	-2.53	-2.16	discounted at 8% pa
the Benefit Cost Ratio is	0.10	0.11	0.13	discounted at 8% pa
the Year 3 net cash flow is	-\$204k	-\$166k	-\$128k	(undiscounted)
the Year 11 net cash flow is	-\$169k	-\$136k	-\$102k	(undiscounted)
With discount rate at:	5% pa	8%pa	11%pa	
the Net Present Value is	-\$2,630k	-\$2,195k	-\$1,882k	
the NPVI is	-2.76	-2.53	-2.36	
the Benefit Cost Ratio is	0.12	0.11	0.10	
the Year 3 net cash flow is	-\$166k	-\$166k	-\$166k	(undiscounted)
the Year 11 net cash flow is	-\$136k	-\$136k	-\$136k	(undiscounted)

Table 3.3 illustrates how insensitive the results are to fairly major changes in assumptions. The financial outcome is fairly similar for an increase in visitation and a decrease in recurrent costs, except that the recurrent costs have a larger influence on the results. Variations in recurrent costs would also have a greater influence on the Year 3 and Year 11 net cash flows.

The level of subsidy of about \$32 per visitor initially, falling to about \$12 per visitor after Year 10, is considered reasonable. This is in view of the other benefits of the Concept Development Plan and costs that would be incurred by Council and others if management issues were not addressed.

4 References and Bibliography

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Appendix

Table A
Capital and Recurrent Costs

Costs	Total Cost \$	PV @ 8% \$	Year																			
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Capital etc																						
Stage 1	615,692	570,085	615,692																			
Stage 2	194,373	142,870			194,373																	
Stage 3	336,393	168,280																				
marketing	10,000	9,259	10,000																			
sub-total	1,156,458	867,446	625,692		194,373																	
Recurrent																						
salaries:																						
resident ranger	1,000,000	490,907	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
other staff	150,000	128,854	50,000	50,000	50,000																	
management	1,320,000	647,998	66,000	66,000	66,000	66,000	66,000	66,000	66,000	66,000	66,000	66,000	66,000	66,000	66,000	66,000	66,000	66,000	66,000	66,000	66,000	66,000
maintenance:																						
years 2-5	73,883	56,646	18,471	18,471	18,471	18,471																
years 6-10	141,761	77,044				28,352	28,352	28,352	28,352	28,352	28,352											
years 11-20	458,583											45,858	45,858	45,858	45,858	45,858	45,858	45,858	45,858	45,858	45,858	45,858
marketing	70,000	34,364	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500
administration	48,927	22,416	1,258	1,545	1,831	2,090	2,295	2,421	2,515	2,600	2,665	2,701	2,701	2,701	2,701	2,701	2,701	2,701	2,701	2,701	2,701	2,701
sub-total	3,263,154	1,600,760	170,758	189,516	189,802	140,062	140,265	150,274	150,368	150,452	150,517	150,553	168,059	168,059	168,059	168,059	168,059	168,059	168,059	168,059	168,059	168,059
total costs																						
	4,419,612	2,468,206	796,449	189,516	189,802	140,061	334,638	150,274	150,368	150,452	150,517	486,946	168,059	168,059	168,059	168,059	168,059	168,059	168,059	168,059	168,059	168,059

notes:

- PV = Present Value at 8% discount rate
- all amounts include GST, real (uninflated) values, before interest depreciation or tax
- salaries include on-costs

Table D
Estimated Revenue

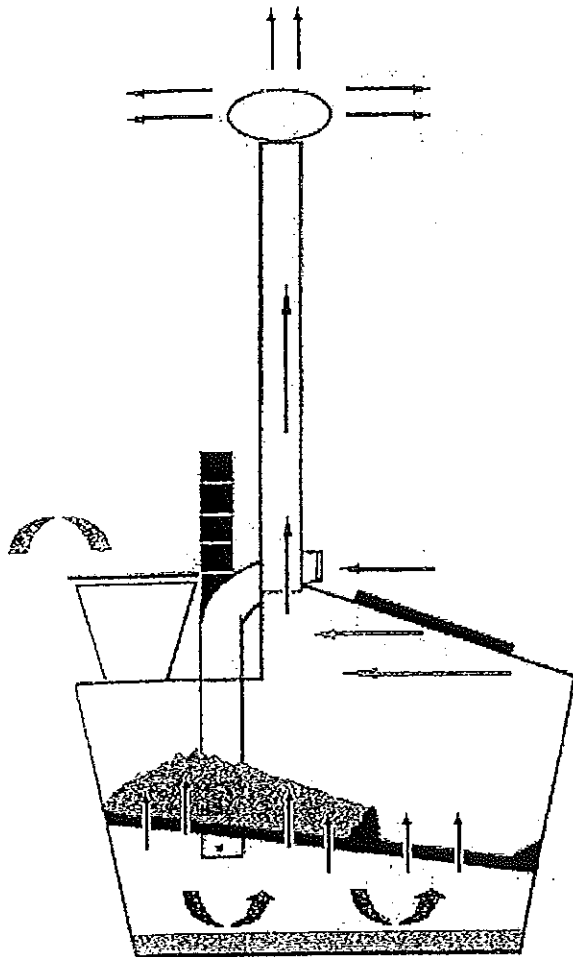
Revenue	Total Rev. \$	PV @ 8% \$	Year																				
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Entry Fees																							
day visitors	160,955	74,970	4,320	5,400	6,480	7,452	8,197	8,607	8,607	8,607	8,607	8,607	8,607	8,607	8,607	8,607	8,607	8,607	8,607	8,607	8,607	8,607	8,607
excursions	40,164	16,630	360	522	731	987	1,283	1,603	1,924	2,212	2,434	2,555	2,555	2,555	2,555	2,555	2,555	2,555	2,555	2,555	2,555	2,555	2,555
campers	293,764	139,545	9,600	11,520	13,248	14,573	15,301	15,301	15,301	15,301	15,301	15,301	15,301	15,301	15,301	15,301	15,301	15,301	15,301	15,301	15,301	15,301	15,301
group campers	107,103	44,348	960	1,392	1,949	2,631	3,420	4,275	5,130	5,900	6,490	6,814	6,814	6,814	6,814	6,814	6,814	6,814	6,814	6,814	6,814	6,814	6,814
NP users	9,600	4,713	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480
less collection fee	-30,579	-14,010	-786	-966	-1,144	-1,306	-1,434	-1,513	-1,572	-1,625	-1,666	-1,688	-1,688	-1,688	-1,688	-1,688	-1,688	-1,688	-1,688	-1,688	-1,688	-1,688	-1,688
sub-total	581,006	266,195	14,934	18,348	21,743	24,816	27,247	28,754	29,870	30,876	31,646	32,070	32,070	32,070	32,070	32,070	32,070	32,070	32,070	32,070	32,070	32,070	32,070
Tours etc																							
tours - yrs1-3	4,830	4,107	1,296	1,610	1,923																		
tour comm.	4,447	1,869				220	242	255	259	263	266	267	267	267	267	267	267	267	267	267	267	267	267
excl. book.	1,339	564	12	17	24	33	43	53	64	74	81	85	85	85	85	85	85	85	85	85	85	85	85
sec. parking	180	70						12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
sub-total	10,795	6,600	1,308	1,628	1,948	253	258	320	335	349	359	365	365	365	365	365	365	365	365	365	365	365	365
total revenue	591,802	272,796	16,242	19,976	23,691	25,070	27,532	29,074	30,206	31,224	32,005	32,435	32,435	32,435	32,435	32,435	32,435	32,435	32,435	32,435	32,435	32,435	32,435
Net Cash Flow	-3,827,811	-2,195,411	-780,207	-169,540	-166,111	-114,991	-307,106	-121,200	-120,162	-119,228	-118,512	-135,624	-135,624	-135,624	-135,624	-135,624	-135,624	-135,624	-135,624	-135,624	-135,624	-135,624	-135,624

notes:

- PV = Present Value at 8% discount rate
- all amounts include GST, real (uninflated) values, before interest, depreciation or tax
- salaries include on-costs
- exclusive bookings include specific area booking or ranger guide for excursions

Appendix D

OPERATING PRINCIPLES:



- Separation of liquids and solids.

- Evaporation

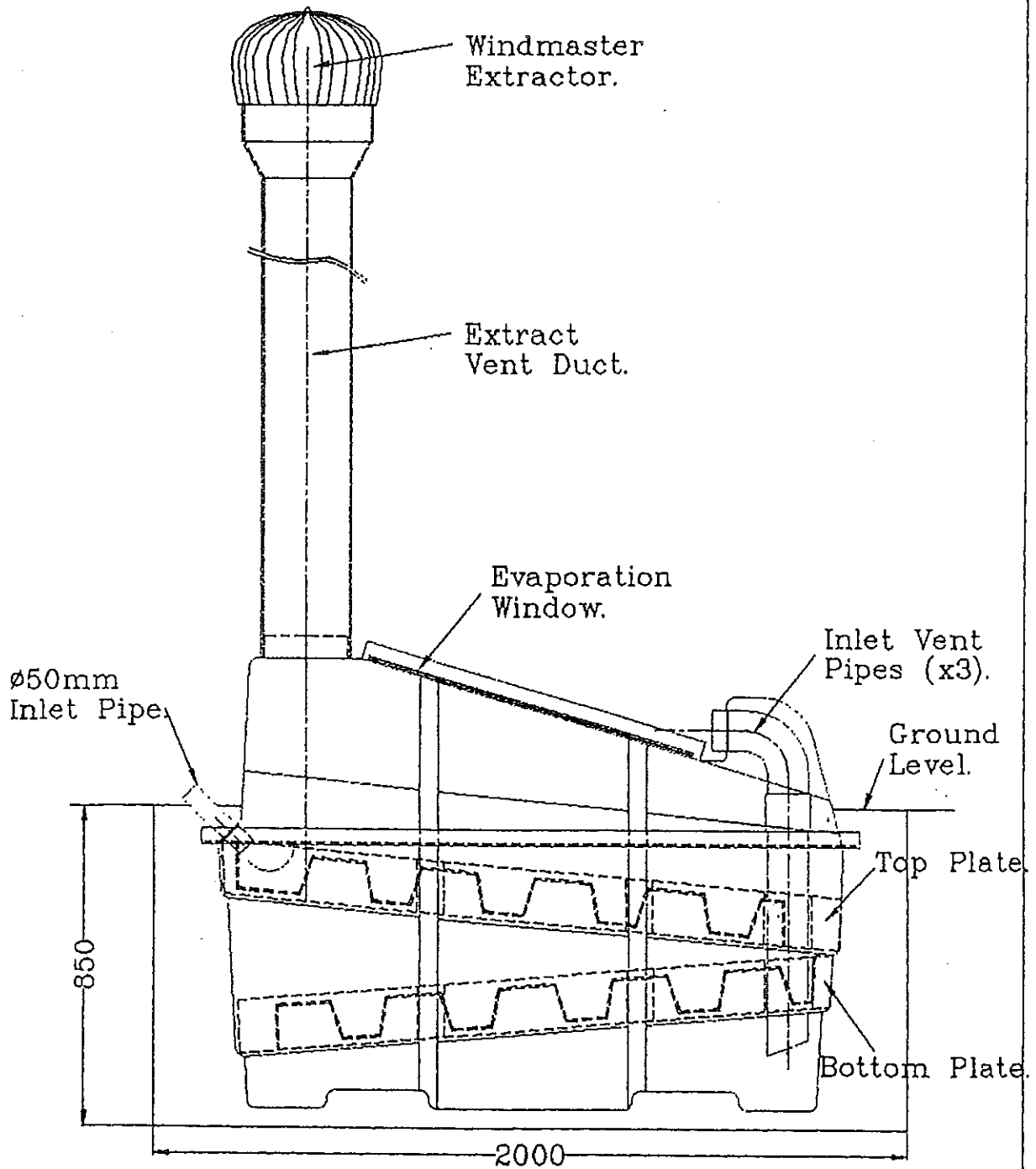
- Airflow

- Heat



ELLU-001

ELLU-001



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 PATENT NO. 94/2596, 95/5640, 95/5641, 95/5642
 ENVIRO LDO ®

Title	Enviro Loo
Product	Urinal 2000
Drawing	Installation (Side View)
Scale	As Shown
Drawing no.	ELLU-001
Revision no.	1
Change	
Drawn By	A. J. Ferblanche
Date	27-10-1991

PATENT NUMBER: 94/2596
 PATENT NUMBER: 95/5640
 PATENT PENDING: 95/5641
 PATENT PENDING: 95/5642
 PATENT PENDING: 95/5643

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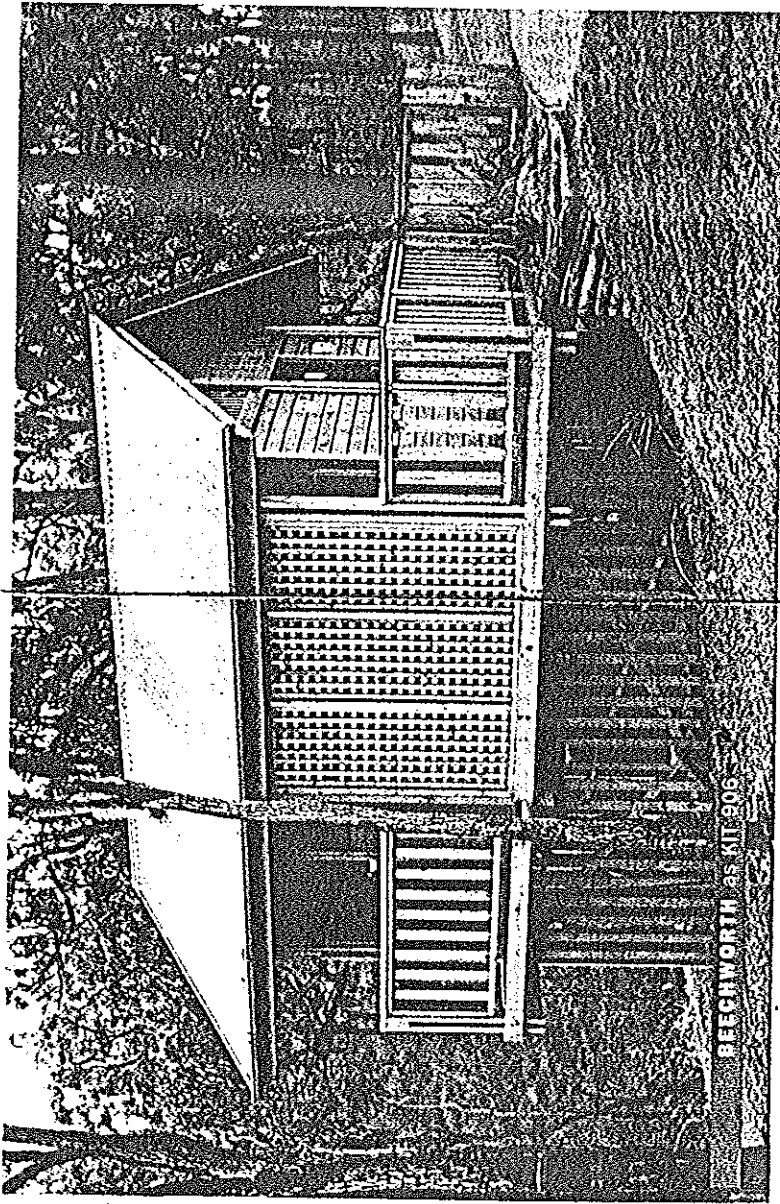
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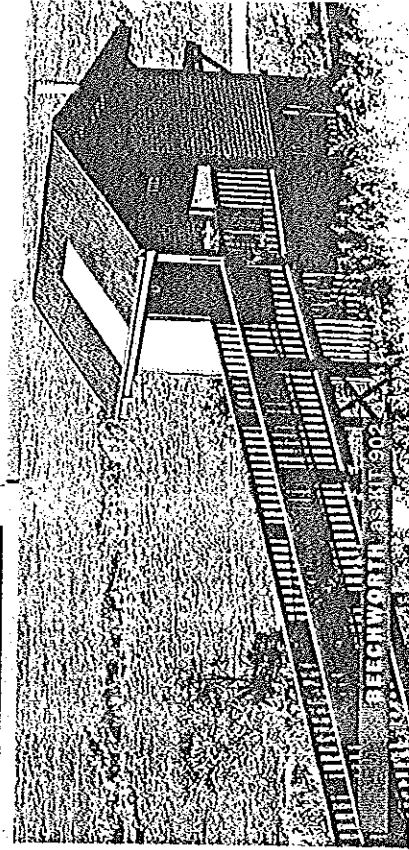
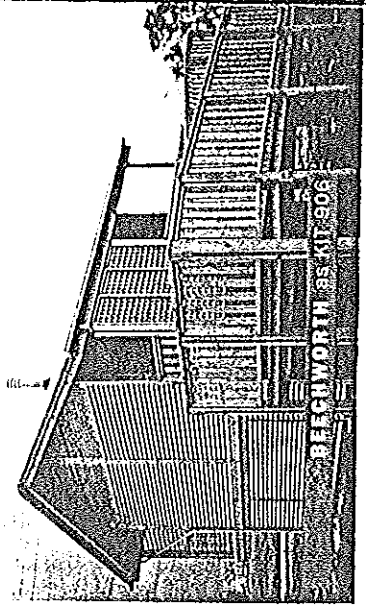
ELLU-001

ELLU-001



BEECHWORTH timber-and-steel combination public toilet facilities in widely diverse locations. Note that while all the Rest Rooms depicted on these pages have elevated profiles in order to accommodate dry-composting waste management systems, Landmark designs will adapt equally well for conventional septic or sewer connection.

Pictured above and right:
BEECHWORTH in Kit 906 format, in this case constructed using optional steel framing and CFC flooring



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PLEASE NOTE: (1) All of the kits depicted include optional modifications to please discuss your own requirements with your local distributor. (2) Landmark reserves the right to alter designs and specifications without notice.

Landmark

Welcome to Landmark

COUNCILKITS MANUAL
INTRODUCTION PAGE 1-1

Landmark

CouncilKits



Landmark

Innovative design. Engineered strength and durability.



WK	DETAILS OF AMENDMENTS	INIT.	DATE

REDUCTION RATIO

1:250

ALL LEVELS ARE IN METRES
ALL CHANGES ARE IN
METRES ALL OTHER
DIMENSIONS ARE IN
MILLIMETRES UNLESS SHOWN
OTHERWISE

DESIGNED:	FIELD BOOK:	ORIGIN OF LEVELS:
SURVEYED:	LEVEL BOOK:	ADJUST:
DRAWN:	DATA:	DRAWING FILE:
DATE:	CHECKED:	REVISION FILE:



MANAGER, SCHOOL/HEALTH CENTER	DO
PLANNING & DEVELOPMENT MANAGER	DO

FILE NO:

PLAN REFERENCE