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**Non-Putrescible
Waste Management Strategy**

Hornsby Shire Council

AUGUST 1990

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CONSULTING ENGINEERS

NON-PUTRESCIBLE

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WASTE MANAGEMENT STUDY: (940374)

HORNBY S/C

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Hornsby Shire Council

AUGUST 1990



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1. Introduction

1.1 BACKGROUND

Hornsby Shire Council recognises the fast growing waste disposal problem in the Sydney Metropolitan Region, and has taken the initiative to address this problem early.

In August 1986, the Hornsby Shire Council Waste Management Sub-Committee completed a study of methods of waste collection and disposal within the Shire. Its report identified a long term need for a non-putrescible landfill site. Since then, several potential landfill sites have been identified and background studies have been undertaken for a site off Hamley Road, Mt Kuring-gai. This site option was objected to by residents and others, particularly on the basis of environmental and visual impacts.

In December 1988, Council engaged Sinclair Knight & Partners to prepare a report on planning for disposal of non-putrescible wastes from the Shire and to identify the most promising site(s) for landfill disposal. This report summarises the findings of this study. Non-putrescible wastes are defined as the waste stream which is not subject to putrefaction, and usually includes the products of such things as Council cleanup operations.

1.2 OBJECTIVES

The aim of this work has been to establish the need for a non-putrescible waste landfill within the Hornsby Shire, to examine all potential landfill sites in the Hornsby Shire, and to identify a site or sites which may be suitable. This has involved:

- . thorough assessment of non-putrescible waste generation rates in the Shire, including a review of previous work done by Council, and allowance for expected development in the Hornsby CBD
- . assessment of population projections to the year 2040
- . calculation of estimated non-putrescible waste generation and cumulative landfill capacity required to the year 2040
- . brief assessment of existing disposal options and available capacities
- . development of a list of potential landfill sites from previous studies, discussions with Council staff, and consideration of the environmental planning processes
- . visits to all of the potential sites and consideration of their feasibility for landfilling in terms of a range of factors including capacity
- . selection of the most promising sites and preliminary assessment of these sites for environmental and operational suitability.

2. Summary and Recommendations

2.1 SUMMARY

The main findings of this report are:

- . the rate of generation of non-putrescible waste is expected to increase from 1.3 kg/capita.day in 1989 to 1.7 kg/capita.day in 1994 and to 1.9 kg/capita.day by the end of 1999
- . the population of Hornsby Shire is expected to increase to 128 000 by 1991 and to 135 000 by 1996
- . on the basis of the above trends, non-putrescible waste generation is expected to increase from about 62 700 tonnes/yr in 1990 to about 95 400 tonnes/yr in 2005. Cumulative waste disposal capacity required is summarised in Table 2 in Appendix A, a total capacity of 3 million cubic metres being required by 2010, and 8 million cubic metres by 2040
- . landfilling is the only technology which is readily available for the disposal of the bulk of non-putrescible waste. Most other technologies are applicable to the reduction of putrescible waste. Waste reduction methods such as incineration will only reduce the amount to be disposed by a practical maximum of 9%
- . existing waste disposal sites serving the major waste generation areas of the Shire are now almost fully utilised, and options outside the Shire for waste disposal are not considered feasible
- . there are few suitable locations for disposal of non-putrescible wastes in Hornsby Shire. Of the 13 potential sites considered, only three are considered to be feasible as potential landfills on the basis of location and access, proximity to populations, availability and ownership, and capacity. These sites are:
 - Cowan Quarry estimated capacity <6 years
 - Hornsby Quarry estimated capacity 30 years
 - Mundowi Road estimated capacity 20 years
- . Cowan Quarry is currently operating as a quarry, although it is understood that an application has already been made for it to be operated as a private non-putrescible landfill. This site may play a short term role in providing non-putrescible landfill for the Shire, and a longer role in serving the small northern communities of Brooklyn, Cowan, and Berowra. This site is not a major long term option for non-putrescible waste disposal in the Shire
- . Hornsby Quarry is not expected to become available for another 20 years. It is likely, however, to be the only major option for land fill disposal at that time.

- . Mundowi Road has been considered for environmental and operational suitability. On the basis of existing information, there appear to be few constraints to the further development of this option.

2.2 RECOMMENDATIONS

We recommend that:

- . the Mundowi Road site be accepted as the preferred site for the establishment of a non-putrescible landfill in Hornsby Shire.
- . the Hornsby Quarry site be recognised by Council as a long term option for non-putrescible landfill.
- . the Cowan Quarry site be recognised as a possible short term non-putrescible landfill site for the Shire.
- . this report be made available for public comment. The community response to the proposed option and any comments received should be considered by Council.

3. Solid Waste Disposal Options

3.1 SOLID WASTE DISPOSAL TECHNOLOGIES

General

Ultimately, all waste materials need to be disposed of to air, water or land. Non-putrescible waste generated from urban areas is typically disposed to land, due to the environmental constraints on air and water disposal.

Many technologies exist for the treatment of solid wastes to reduce quantities to be disposed. Most of these technologies, however, are only appropriate for the fraction of putrescible waste liable to putrefaction. Therefore, the only significant methods available for the modification and disposal of non-putrescible wastes are landfill, transfer prior to landfill, reduction of components by mulching or composting, and recycling.

Recycling

Council considers (WMC 1986) that recycling of wastes such as newspapers, bottles and tree clippings would be significant (maximum 23% reduction) for Hornsby Shire. This would have most impact on the putrescible waste stream. Council has developed a recycling strategy to help achieve this maximum reduction in waste disposal. Tenders have been called for agents to provide a monthly collection service for paper, paper products, glass products, PET plastic, aluminium cans from residences within the Shire. Recycling depots are proposed at Galston, Arcadia and Brooklyn to provide collection points for areas where houses will not be served. Recyclables will also be collected from commercial and industrial premises on a regular basis.

Recycling of demolition and excavation wastes is a suitable way of reducing the need for landfill for these objects. Similarly, composting by individual landowners can reduce the waste stream, although the existing disposal of much of this is through the putrescible waste stream and the 240 L garbage bins.

Incineration

Putrescible and organic wastes can be disposed of by incineration producing relatively small volumes of ash and clinker which must be disposed of to landfill. The establishment of an incinerator involves high capital and operational costs and, compared with the establishment of landfill, considerable time, effort and resources to obtain the necessary approvals.

Incineration is applied elsewhere in Sydney at the Waverley Woolahra Plant, where the process is estimated to cost approximately \$28 per tonne. This method, however, applies mainly to the putrescible waste stream.

Landfill

Landfill is a term used to describe a well designed and controlled operation for burial of wastes in the ground. Even if transfer or waste reduction methods are employed, landfill will be required for the ultimate disposal of the bulk of the non-putrescible waste.

Transfer

Transfer is a method of collection where waste is delivered to a transfer station and then loaded for bulk transportation to a landfill. The use of a transfer station is an extra cost over and above the cost of landfill, for the facility itself and for double handling the waste. Transfer is used, therefore, only where a landfill site is not within convenient trucking distance from the waste sources. Associated with these extra costs are the environmental costs of trucking the material through the road network.

The recent closure of the transfer station at Mt Ku-ring-gai was due to the extreme costs involved in operating such a service.

Waste Reduction

A significant proportion of the non-putrescible waste stream consists of organic material such as plant and tree clippings. This organic component of the waste could be reduced by application of waste reduction methods such as incineration or pit burning, mulching or composting. Investigation of the feasibility of these technologies could be undertaken, but will only reduce the amount to be disposed to landfill by a practical maximum of 9%.

Neutralysis

This is a relatively new method of disposing of solid wastes. The process involves the pulverisation of solid waste, the magnetic separation of ferrous materials, and the blending of the waste with milled clay and liquid waste, then the extrusion of a plug which is fired in a kiln. The resultant material is crushed and screened to produce a graded aggregate. Costs are thought to be similar to conventional transfer station/landfill technology. The process is being developed to pilot plant stage.

In summary the only available technology to dispose of the bulk of wastes at this time in Sydney is the landfill method. Advances are being made in the recycling of wastes, but landfill is still required.

3.2 PLANNING CONSTRAINTS

In assessing alternative non-putrescible waste disposal strategies, the following planning constraints need to be considered:

- . economic
 - capital costs
 - waste transport costs
 - operational costs and revenue
- . environmental protection
 - public health
 - water pollution
 - air pollution
 - noise pollution
 - nuisance
 - traffic generation
 - aesthetics
 - flora and fauna
- . engineering
 - geography and zoning
 - transport and access
 - operational suitability
 - topography and substrata characteristics
 - waste tracking
 - rehabilitation and future use
- . statutory requirements
 - provisions of environmental planning instruments
 - compliance with pollution control acts
 - WMA licensing
 - SPCC licensing
- . political
 - equity between groups
 - community acceptance

These have been considered in general for the full range of potential landfill sites.

4. Waste Generation and Existing Disposal

4.1 WASTE GENERATION RATES

4.1.1 Clean Fill

Clean fill described herein refers to "clean waste" material such as clean soil and excavation materials. The Waste Management Committee (1986) estimated a clean fill generation in Hornsby Shire of 120,000 tonnes/year (1986).

The disposal of clean fill is not addressed in this report. It will be important, however, for Council to consider the disposal of large quantities of this material in the near future. The requirements for disposal of clean fill are more readily met than for disposal of other wastes. Difficulties may arise, however, in locating sites with sufficient capacity for the clean material.

4.1.2 Total Solid Waste Generation

Total solid waste described herein refers to all waste materials, other than clean fill (described above).

The Waste Management Committee (1986) estimated a total solid waste generation rate in Hornsby Shire of 90 000 tonnes/year (1986), corresponding to a rate of 2.10 kg/capita.day (1986).

A review of literature on solid waste generation has found that estimates of solid waste generation rates can range from 1.3 kg/capita.day to 4.0 kg/capita.day. The Metropolitan Waste Disposal Authority (now Waste Management Authority) (1988) reported a total solid waste generation in the metropolitan area of 2.44 kg/capita.day (1986), although increases from 1.73 kg/capita.day in 1983 have been mostly attributed to increased quantities of demolition waste from the Sydney central business district.

On the basis of these historical figures, it would appear that a rate of 2.10 kg/capita.day is a reasonable figure for the 1986 period. It is expected, however, that this figure will increase significantly with the introduction of 240 L capacity mobile bins to replace 55 L bins and as a result of the projected development of the Hornsby central business district over the next 10 years.

Total solid waste is divided into two streams, putrescible and non-putrescible, as described below. The breakdown of this into proportions and total waste generation is shown in Figure 4.1.

4.1.2.1 Putrescible Waste Generation

Putrescible waste described herein refers to any waste stream containing organic matter which is liable to putrefaction. The most significant source of putrescible waste is from collection of household and commercial garbage.

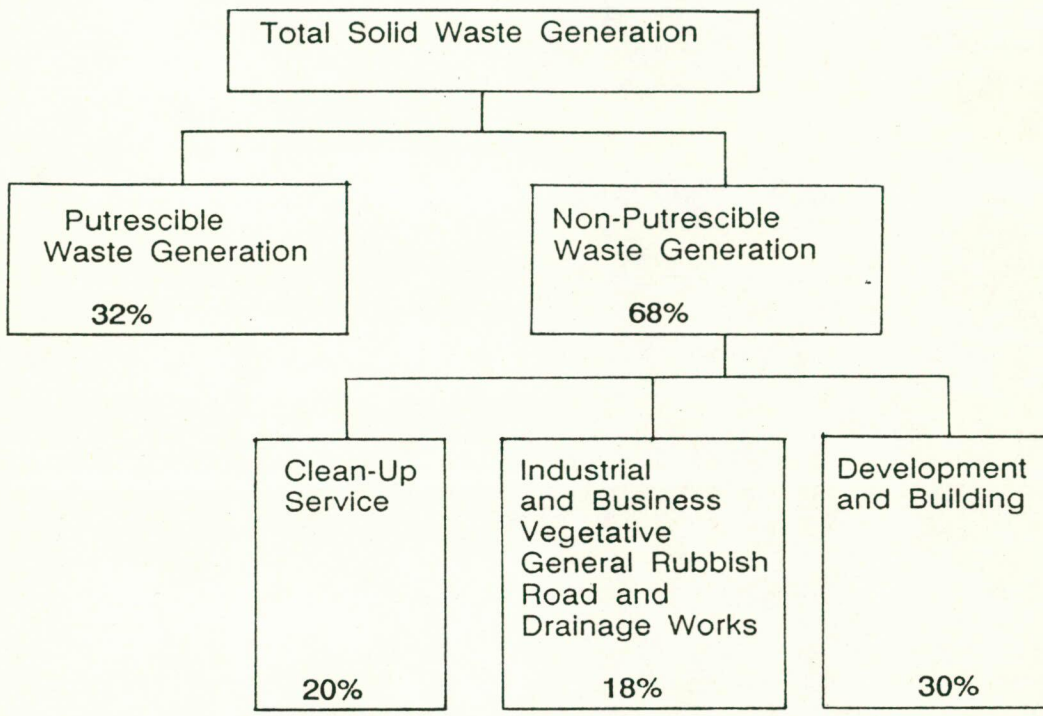


FIGURE 4.1 - WASTE GENERATION

The Waste Management Committee (1986) estimated a putrescible waste generation of 28 000 tonnes/year (1986), representing about 32% of the total solid waste generation in the Shire.

Recent information provided by Council on putrescible waste disposal at the North Ryde Transfer Station shows that the generation rates were 24 400 tonnes/year (1987) and 34 000 tonnes/year (1988). The increase from 1987 to 1988 was attributed to a 60% introduction of the 240 L mobile bins. The amount of putrescible waste for 1988 corresponds to a rate of approximately 0.76 kg/capita.day (1988).

Based on a survey of local government areas using 240 L mobile bins, the Metropolitan Waste Disposal Authority (1988) calculated a domestic garbage generation rate of 0.83 kg/capita.day (1988), representing 32% of total solid waste generation in the metropolitan area.

On the basis of this information, Council should expect putrescible waste generation of the order of 0.85 kg/capita.day (with the full introduction of 240 L mobile bins), representing approximately 32% of total solid waste generation in the Shire.

4.1.2.2 Non-putrescible Waste Generation

Non-putrescible waste described herein refers to any waste stream which does not contain any organic matter liable to putrefaction. This would include Council clean-ups, industrial and business wastes etc.

The Waste Management Committee (1986) estimated a non-putrescible waste generation of 62 000 tonnes/year (1986), representing about 68% of the total solid waste generation (90 000 tonnes/year) for the Shire.

Private Responsibility

The report (WMC, 1986) estimated that 26 000 tonnes/year (1986), representing 30% of the solid waste stream (or 42% of the non-putrescible waste), derived primarily from builders and excavation materials, was disposed of by private arrangement. Council currently believes that the majority of this waste has increasingly become the responsibility of Council and should therefore be taken into account in developing a non-putrescible waste disposal strategy.

Council Responsibility

The report (WMC, 1986) estimated that Council would be responsible for the remaining 36 000 tonnes/year (1986), representing 38% of the total solid waste stream, (or 58% of the non-putrescible waste). The report estimated the contribution of waste from each of the following sources:

(i)	Council Clean-up Service	19 000
(ii)	Industrial and Business Waste	4 000
(iii)	Vegetative Waste	1 800
(iv)	Building Waste	4 000
(v)	General Rubbish	3 000
(vi)	Road and Drainage Works Waste	4 000
	TOTAL	36 000 tonnes/year

In the Waste Management Sub-committee report (1986), a detailed review of waste collection and disposal alternatives found that the introduction of 240 L mobile bins could reduce item (i) - Council Clean-up Service by 3 600 tonnes/year (1986) and that the introduction of chip mulching could reduce items (i) and (iii) - Vegetative Waste by up to 13 400 tonnes/year (1986). As discussed in Section 4.1.2, putrescible waste generation has certainly increased with the introduction of 240 L mobile bins. Council has reported, however, that the alternative of chip mulching has not been found to be feasible.

On the basis of adding Council and private responsibilities, the amount of non-putrescible waste to be disposed of by Council can be conservatively estimated as 58 000 tonnes/year (1989). This is based on the 1986 non-putrescible figures, as outlined in Figure 4.1 and above, less the estimated 3 600 tonnes/year that would go into the putrescible stream via the big bins.

4.2 PROJECTED TOTAL NON-PUTRESCIBLE WASTE GENERATION

4.2.1 Planning Horizons

An appropriate planning horizon for any solid waste management strategy is 50 years, although any benefit cost decisions should be checked against a shorter planning period of, say, 30 years.

4.2.2 Future Commercial and Retail Development

There are currently about 2 500 business premises in Hornsby Shire. The Council is expecting considerable development in the commercial and retail sectors in the central business district in the next 10 years. The current and projected development for the central business district is summarised in Table 1 in Appendix A. It should be noted that these projections have been

based on current development applications with the Council. It is possible that some of these developments will not proceed.

Assessment of development projections indicates that the number of business premises in the Shire could more than double in the next 10 years. In selecting non-putrescible waste generation rates, therefore, allowance should be made for increases in industrial and business waste.

The level of development activity in the next 10 years is expected to be considerably greater than in recent years. Allowance should therefore be made for buildings wastes, to be increased significantly.

These major increases in building and business activities in the Shire will also affect waste sources such as vegetative wastes, general rubbish and road and drainage works waste.

On the basis of these increased levels of activity, the rate of generation of non-putrescible waste is expected to increase to 1.7 kg/capita.day by the end of 1994 and up to 1.9 kg/capita.day by the end of 1999 and beyond.

These non-putrescible waste generation rates, added to the estimated putrescible waste generation rate, would give total solid waste generation rates of 2.55 kg/capita.day in 1994 and 2.75 kg/capita.day in 1999. These rates are conservative for the purpose of developing a non-putrescible waste disposal strategy.

The following sections consider population projections for the planning period, and on the basis of the above rates, provide estimates of non-putrescible waste generation for the Shire.

4.2.3 Population

A census conducted in 1986 found that Hornsby Shire had a population of 117 565. The Council has reported estimates that the population may reach 128 000 by 1991 and 135 000 by 1996. The Council believes that beyond 1996 population growth will be restricted to less than 0.5% per annum and will mostly be attributed to "urban consolidation" (increasing concentration of medium density housing). The Department of Planning has made population projections which suggest that the population will actually diminish beyond 2001. These population projections are shown in Exhibit 1. On the basis of this information, population projections for a 50 year planning horizon have been estimated and are shown in Table 2 of Appendix A.

4.2.4 Waste Generation

Non-putrescible waste generation rates were considered in Section 4.1.2.2 of this report. Based on the trends discussed for the Shire, estimates of annual non-putrescible waste generation are also summarised in Table 2 in Appendix A.

The estimates of required capacity have been calculated using an effective volume of 600 kg/m³. Effective volume is defined as the weight of waste divided by the volume of waste plus cover material. The amount of cover material required is estimated to be of the order of 40 000 to 60 000 tonnes per year (or 20 000 to 30 000 m³/year).

On the basis of the trends shown in Appendix A, non-putrescible waste generation is expected to increase from about 62 700 tonnes/year in 1990 to about 95400 tonnes/year in 2005. Cumulative waste disposal capacity required is 3 million cubic metres by 2010, and 8 million cubic metres by 2040.

4.3 EXISTING DISPOSAL OPTIONS

Current options for disposal of non-putrescible waste within the Shire are:

- **Wisemans Ferry Landfill Depot:** This is a small Council operated non-putrescible landfill primarily for the use of residents in the local area. This landfill is not expected to reach capacity for 5 to 10 years.
- **Arcadia Park Landfill Depot:** This Council operated non-putrescible landfill is primarily for the use of residents in the local rural area. Under the present site management plan this landfill is expected to reach capacity in less than 1 year. Site management of this landfill is addressed in a separate report.
- **Hornsby Rifle Range Landfill Depot:** This depot is privately operated by Malabar Excavations Pty Ltd and currently accepts all of the Councils "clean-up service" waste and some building wastes. Under current loads this depot is expected to reach capacity within a short time.

Mt Ku-ring-gai Transfer Station was recently operated by Council for the acceptance of non-putrescible wastes. Waste collected at this facility was transferred to Hornsby Rifle Range landfill depot. This service was discontinued due to operating costs.

The only current option for disposal of non-putrescible waste outside the Shire is:

- **Ryde Transfer Station:** This is a regional depot operated by the Waste Management Authority at Wicks Road, North Ryde which currently accepts both putrescible and non-putrescible waste. The bulk waste disposal charge at this facility was increased in April 1989 to \$30.50 per tonne. The WMA has indicated that it will be phasing out acceptance of non-putrescible waste at this depot (see Appendix B).

5. Potential Landfill Sites

5.1 GENERAL

A full list of potential landfill sites (including existing sites) has been developed for Hornsby Shire. All of the sites discussed are shown in Exhibit 2. A full description and map of each of these sites is provided in Appendix C. It is considered important that all sites should be clearly evaluated in order to develop a short list for detailed study. In this way, the background to decisions is made clear and is available for explanation to interested parties.

The sites that have been identified include:

Existing

- . Wisemans Ferry Landfill Depot
- . Arcadia Park Landfill Depot
- . Hornsby Rifle Range

Potential

- . Forest Glen
- . Salloway Road
- . Cairnes Road Quarry
- . Cowan Quarry
- . Hornsby Quarry
- . Montview Oval
- . Paragon Drive
- . Dural Park
- . Mundowi Road
- . Hamley Road
- . Lyne Road
- . Sutherland Road
- . Calabash Road

Each of these sites has been considered in some detail in terms of the following factors (see Appendix C).

- (a) location and access
- (b) existing planning constraints
- (c) proximity to population centres
- (d) availability and ownership
- (e) environmental suitability
- (f) capacity
- (g) operational suitability

In terms of the overall waste management strategy, the existing landfill sites at Wisemans Ferry and Arcadia Park will continue to serve their respective local areas, although the life of Arcadia Park is less than one year. The existing capacity of Hornsby Rifle Range depot will be fully utilised within a short time.

For the purposes of short listing, each of the potential landfill sites have been assessed on the basis of their suitability for inclusion in the overall waste management strategy. This has been done on the basis of factors (a), (c), (d) and (f) above, and is summarised in Tables 5.1 and 5.2.

Those sites which are short listed on these criteria are assessed for suitability below.

TABLE 5.1 - SUITABILITY OF POTENTIAL SITES

	LOCATION and ACCESS	PROXIMITY to POPULATIONS	AVAILABILITY and OWNERSHIP	CAPACITY	OVERALL FEASIBILITY
Forest Glen	Poor	Good	Poor	N/A	Poor
Salloway Rd	Good	Poor	Good	Poor	Poor
Cairnes Rd	Poor	Good	Good	Poor	Poor
Cowan Quarry	Good	Good	Good (3 yrs)	N/A	Good
Hornsby Qua.	Good	Good	Good (20 yrs)	Good	Good
Montview Oval	Good	Poor	Good	Poor	Poor
Paragon Dr	Poor	Good	Good	Poor	Poor
Dural Pk	Good	Poor	Good	Poor	Poor
Mundowi Rd	Good	Good	Good	Good	Good
Hamley Rd	Good	Poor	Good	Good	Poor
Lyne Rd	Good	Poor	Good	Poor	Poor
Sutherland Rd	Poor	Poor	Good	Poor	Poor
Calabash Rd	Poor	Good	N/A	Poor	Poor

N/A = Not Assessed.

TABLE 5.2 - ESTIMATED CAPACITIES

SITE	(m ³)	CAPACITY	(YEARS)
Forest Glen	-	-	-
Sallaway Road	800 000		6
Cairnes Road Quarry	<750 000		<6
Cowan Quarry	<300 000		<6
Hornsby Quarry	4 500 000		30
Montview Oval	<750 000		<6
Paragon Drive	<750 000		<6
Dural Park	<750 000		<6
Mundowi Road	3 000 000		20
Hamley Road	2 000 000		15
Lyne Road	<750 000		<6
Sutherland Road	<750 000		<6
Calabash Road	<750 000		<6

5.2 SHORT-LISTED SITES

5.2.1 Cowan Quarry

This site has not been inspected as it is privately owned. It is understood that it may become a privately operated non-putrescible landfill in the near future (less than three years). Some points which can be made with respect to this site are:

- . it has an estimated capacity of less than 300 000 m³ and so would become a short term option for disposal of non-putrescible waste in the Shire
- . it is located in the northern end of the eastern half of the Shire and so, once a large, long term landfill site is chosen, may have a role in serving the small local communities of Brooklyn, Cowan, and Berowra
- . operation of this site is not likely to have a significant impact on the amount of non-putrescible waste remaining to be disposed of by Council.

5.2.2 Hornsby Quarry

This site has not been inspected as it is privately owned. It is understood that this site will not become available as a potential landfill site for approximately 20 years. Some points which can be made with respect to this site are:

- . it is likely to be the only major option for disposal of non-putrescible waste in 20 years' time
- . it has an estimated capacity of at least 30 years
- . if the site were operated as a landfill some environmental and engineering concerns would include:
 - proximity to heavily populated areas
 - difficulties of access
 - lack of cover material
 - aesthetics
 - potential for groundwater contamination.

It is considered that these concerns could be appropriately addressed by careful planning and engineering measures

- . the site is privately owned and so it is not committed to Council use.

5.2.3 Hamley Road

A number of environmental and operational studies have been undertaken on this site, as described below.

- . TJ Fatchen and Associates (1987) undertook a study on the flora and fauna of the Hamley Road area.

They described the vegetation as comprising Angophora costata - Eucalyptus piperita open-forest in gullies; a distinctive stream flora with Callicoma serratifolia, Tristaniopsis laurina and other full shrubs/small trees; woodland of E. gummifera and stringybarks on areas of greater exposure; and low woodland of scribbly gums (E. haemastoma, E. racemosa) on ridges.

They concluded that, given the lack of regional significance of the vegetation and the low chance of rare species being present, the importance of direct impacts becomes a local rather than regional issue.

The fauna aspects of the study concluded that, despite the loss of habitat for many wildlife species which, once displaced, may not be able to re-establish elsewhere, there will not be any significant impact on the overall status of the fauna, either in the region or over their range.

The potential for downstream water pollution was emphasised, and without careful design and provision for waste-water and run-off management, off-site pollution impacts could be significant.

Golder and Associates (1987) indicated that the site is suitable for the proposed dry non-putrescible waste disposal activity from the geotechnical engineering viewpoint. The hydrology and hydrogeology of the site should provide no abnormal constraints to the proposed usage provided sound engineering planning of the waste disposal facility is carried out. The roll of groundwater contamination by leachate was considered to be able to be reduced to a minimum by adopting appropriate planning and construction techniques, and the use of a positive leachate extraction system for the landfill.

Brayshaw and Associates (1986) undertook an archaeological survey of the area. The study area and its surrounds contained a total of 5 sites, comprising grinding grooves, pound marks, stone arrangement sites, and a shelter site with undefined charcoal drawings. In addition, 7 shelters with potential archaeological deposits were located.

The study recommended the preservation of the stone arrangement sites due to their considerable archaeological interest. If other sites were to be destroyed by the proposed development, it was recommended that they be fully recorded prior to destruction.

The following observations can also be made:

although located adjacent to an existing industrial area, the nearest residential areas are less than 1 km away, and the site would be fully visible along the gully from existing residences at Berowra to the north

some operational difficulties would be experienced in access, drainage and staging of the filling of the site because of its rough terrain and location on only one side of the valley.

On the basis of the above information, we conclude that although the environmental and engineering constraints to the development can be overcome, the social consequences of proximity to residential development suggest this option should not be pursued further.

5.2.4 Mundowi Road

No detailed environmental or engineering studies have been undertaken at this site. However, the following observations can be made:

the flora and fauna are likely to be similar to that found at Hamley Road. The general mapping of vegetation of the Sydney area undertaken by the Royal Botanic Gardens (Benson, 1980) showed extensive areas (Mapping Unit 10A) in the region similar to that described by Fatchen (1987) at Hamley Road. This mapping unit included the vegetation at Mundowi Road.

It is of note that clearing and subsequent regrowth of heath communities (dominated by Hakea teretifolia and Banksia ericifolia) has occurred close to Mundowi Road. Further downstream the vegetation is relatively undisturbed, and appears similar to that described by Fatchen. More detailed studies would be required to verify this.

Similarly, the fauna is likely to be similar to that described by Fatchen; more detailed studies would be required for confirmation.

No Aboriginal site surveys have been undertaken, and the National Parks and Wildlife Service Site Register indicates no known sites from the area. However, the area has potential for sites as the conditions are similar to those at Hamley Road. A site survey would be required prior to development.

The site is visible from the surrounding industrial estate, but would not be able to be seen from any existing residential areas. The nearest residences at Hornsby Heights (about 1 km away) are separated by a ridge line.

Good access to the site is available through the industrial estate, located off the Pacific Highway.

The potential for downstream water pollution exists, primarily due to the existing drainage lines through the site. Proper design and operation of surface water and leachate collection and treatment systems would be required.

The site is a large shallow valley and is therefore ideally suited in terms of operation and staging.

Visual inspection of the site indicates that considerable volume of cover material is available on the site.

On the basis of existing information there appear to be few environmental or engineering constraints to the further development of this option. We suggest that further studies be undertaken, as part of the environmental planning process, to determine the appropriateness of this site.

5.3 SUGGESTED IMPLEMENTATION PROCESS

The Mundowi Road site is currently zoned 4(c) Special Industrial, and 7(e) Valley Escarpment, under the Hornsby Planning Scheme. A landfill depot would appear to be a permissible use with consent of Council within the 4(c) zone, although a recycling centre (the term 'junk yard' is used in the planning scheme) would not. Both are prohibited under the 7(e) zoning. A local environmental plan (LEP) to amend the zoning would therefore be required before a development application could be lodged for the depot and recycling centre.

A local environmental study would need to be prepared in association with the draft local environmental plan, then certified by the Department of Planning, exhibited to the public, amended and/or approved, and gazetted. Once this has occurred, Council would then lodge a development application and associated statement of environmental effects for the proposed development. Although there is no statutory requirement to prepare an environmental impact statement (waste landfill sites are not designated development), Council may wish to request an EIS be prepared in any case.

Given the long planning process involved, and the environmental studies which will be required at both the rezoning and development application phases, we recommend that a phase of public consultation would be beneficial at this stage, to gauge public response and assess public concerns.

We therefore suggest that :

- . this report be circulated to the public, landholders, community groups and government authorities, and responses to the option and its alternatives sought. A press release should be issued with the report, explaining the reasons for it, the need for public consultation, and the recommendations of the report. Community response can be gained through a series of meetings with individual groups, public meetings with the community at large, and/or written responses sent to a nominated Council officer for assessment.
- . the responses from the community be assessed, and a report on the community feeling on the proposal be provided for Council.
- . should Council decide to proceed with the development of the site, the planning process begin by resolving to prepare a draft LEP for the site. The process of rezoning and development application would follow, as described above.

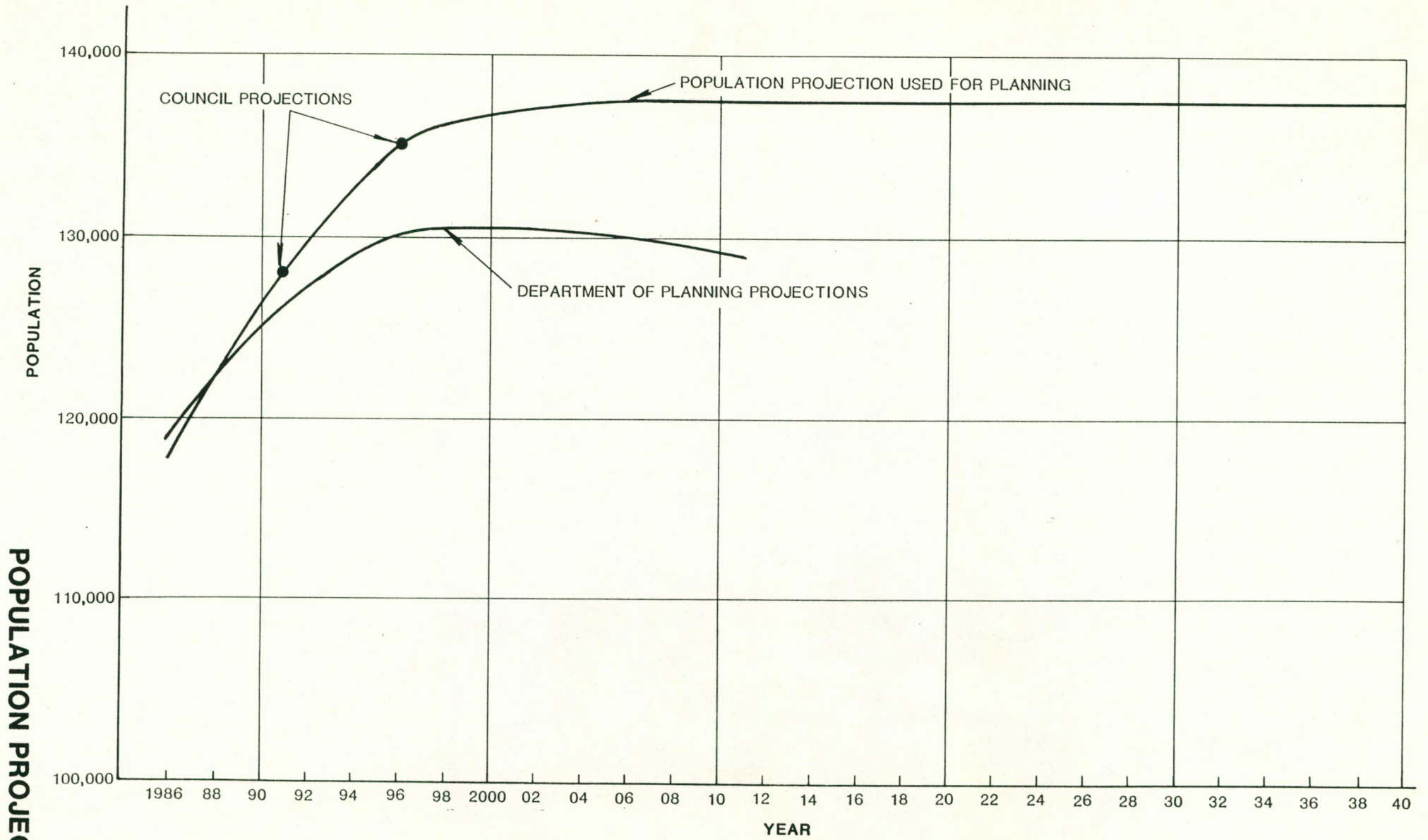
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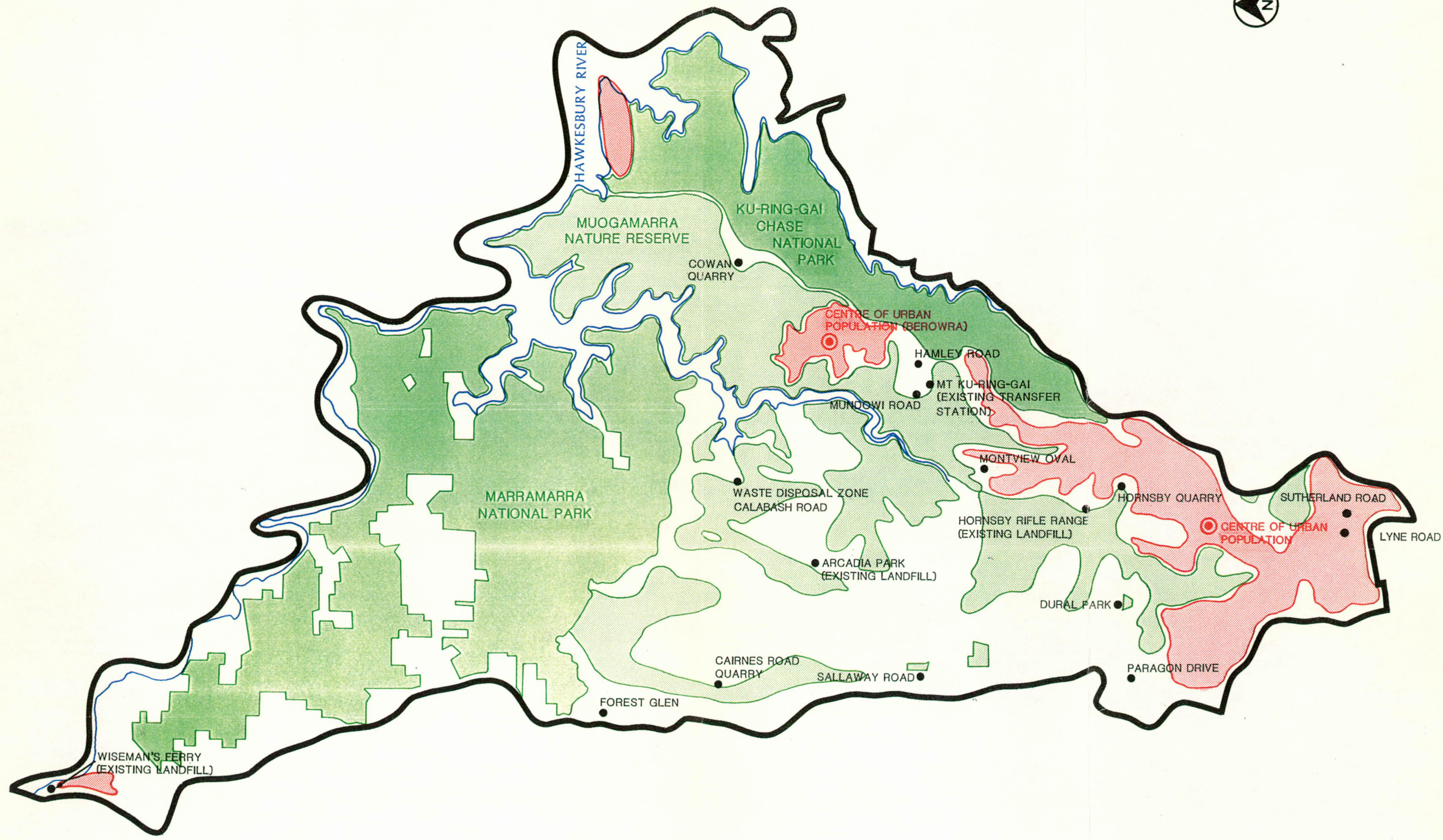
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Report No 72/88

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Report No 76/88

Chief Health/Building Surveyor
RECYCLING



POPULATION PROJECTIONS



SHIRE ZONING AND POTENTIAL LANDFILL SITES

Appendix A - Data Projections

TABLE 1- CURRENT AND PROJECTED DEVELOPMENT IN THE CBD

Sector	Existing Floor Space (m ²)	Development Projections		Total (m ²)
		1989-1994(m ²)	1995-1999(m ²)	
Retail	92 000	7 000	8 000	107 000
Commercial	32 000	61 000	110 000	203 000
Manufacturing	50 000	-	-	50 000
TOTAL (m²)	174 000	68 000	118 000	360 000

TABLE 2 PROJECTED POPULATION AND NON-PUTRESCIBLE WASTE GENERATION

Year	Population Growth (%/year)	Projected Population	Waste Generation Rate (kg/capita.day)	Non-Putrescible Waste Generation (tonnes/year)	Cumulative Total From 1990 (tonnes)	Required Capacity From 1990 (m ³)
1986	-	117 565	0.75	32 000	-	-
1987	2.28	120 250	0.93	40 800	-	-
1988	1.87	122 500	1.10	49 200	-	-
1989	1.43	124 250	1.28	58 000	-	-
1990	1.61	126 250	1.36	62 700	62 700	104 500
1991	1.39	128 000	1.45	67 700	130 400	217 300
1992	1.37	129 750	1.53	72 500	202 900	338 200
1993	1.16	131 250	1.61	77 600	280 500	467 500
1994	0.95	132 500	1.70	82 200	362 700	604 500
1995	0.94	133 750	1.74	84 900	447 600	746 000
1996	0.93	135 000	1.78	87 700	535 300	892 200
1997	0.56	135 750	1.82	90 200	625 500	1 042 500
1998	0.34	136 250	1.86	92 500	718 000	1 196 700
1999	0.18	136 500	1.90	94 700	812 700	1 354 500
2000	0.18	136 750	1.90	94 800	907 500	1 512 500
2001	0.18	137 000	1.90	95 000	1 002 500	1 670 800
2002	0.09	137 125	1.90	95 100	1 097 600	1 829 300
2003	0.09	137 250	1.90	95 200	1 192 800	1 988 000
2004	0.09	137 375	1.90	95 300	1 288 100	2 046 800
2005	0.09	137 500	1.90	95 400	1 383 500	2 305 800
2006	0	137 500	1.90	95 400	1 478 900	2 464 800
2007	0	137 500	1.90	95 400	1 574 300	2 623 800
2008	0	137 500	1.90	95 400	1 669 700	2 782 800
2009	0	137 500	1.90	95 400	1 765 100	2 941 800
2010	0	137 500	1.90	95 400	1 860 500	3 100 800
2020	0	137 500	1.90	95 400	2 814 500	4 690 800
2030	0	137 500	1.90	95 400	3 768 500	6 280 800
2040	0	137 500	1.90	95 400	4 722 500	7 870 800

Appendix B - WMA Letters

Metropolitan Waste Disposal Authority



Level 4, Zenith Centre,
821 Pacific Highway
(PO Box 699)
Chatswood 2067
N.S.W. Australia

The Shire Clerk,
Hornsby Shire Council, 5273 ME
P.O. Box 37,
HORNSBY, N.S.W. 2077

Our reference: 358 REM/vm

Your reference:

Phone: 412 1368
Fax: 411 8634

3rd March 1989

HORNSBY SHIRE COUNCIL			
MTG.		PARKS	
S.C.		ENV	
ADMIN		P.P.	
ACCTS		H.B.E.	✓
RATES		D.P.	
LIB			

Dear Sir,


CHARGES FOR SOLID WASTE DISPOSAL

The Authority advised by letter dated 10th January, 1989, that charges for solid waste disposal will be increased from 1st April 1989. The advice indicated that a differential rate would apply between Council waste and Commercial waste.

Following enquiries from various Councils, the Authority has determined that the Council rate for disposal charges will apply to all waste charged to the account of Council and not to a Contractor's account. In the event that the waste is charged to a contractor the normal commercial rate will apply. As you will appreciate this rule will be applied in order to ensure that the benefit of lower charges is only applied to Council waste.

We trust that this information clarifies the application of our disposal charges.

Yours faithfully,


R. E. Moran
for DIRECTOR

LOOSE LETTER ONLY
FILE WITH HBE 12.1.89

Metropolitan Waste Disposal Authority



Level 4, Zenith Centre,
 821 Pacific Highway
 (P.O. Box 699)
 Chatswood 2067
 N.S.W. Australia

J RT 13/11
C

The Shire Clerk
 Hornsby Shire Council
 P.O. Box 37
 HORNSBY N.S.W. 2077

Our reference: 358 GMK:HA

000804 ME

HORNSBY SHIRE COUNCIL			
MTG.		PARKS	
S.C.		ENG	
ADMIN		T.P.	
ACCTS		H.B.E.	✓
RATES		D.P.	
LIB			

12 JAN 1988

Your reference:

Phone: 412 1388
 Fax: 411 8634

10th January, 1988.

SHIRE CLERKS
 MAIL

Dear Sir

Charges for Solid Waste Disposal

It is the usual practice for the Authority to review its charges for the receipt of waste at its depots on an annual basis and for the revised charges to be introduced in January.

- As you are aware, it has been an objective of the Authority to contain its price rises below the level of CPI increases and this objective has been met since 1981. In fact charges for the receipt of solid waste were held constant in the years 1982, 1985 and 1986.

Over recent months the Authority has been most conscious of the decline in its financial position caused by significant cost pressures which are seen to be ongoing. Two significant areas have been the decision by the former NSW Government that the Authority will ~~no longer be able to lease Crown land on which to establish its landfill depots~~ and the heavy costs being incurred in the provision of ~~aftercare at filled landfill sites~~, particularly in terms of leachate and landfill gas control measures.

As a result of the Government decision, the Authority is now faced with the ~~acquisition of land at market price~~ for the establishment of its depots. This has already had a considerable impact in the cost of land purchased for extensions to the Eastern Creek and Castlereagh Regional Depots.

The accounts of the Authority are audited by the NSW Auditor-General and in his report to Parliament for 1987-88 he drew attention to the situation facing the Authority when he reported as follows:-

LOOSE LETTER ONLY
 FILE WITH CHEBS 9/1

- 2 -

"The major concern for the future is the reduced capacity of the Authority to generate operating surpluses and the decline in the Authority's monetary assets. If the policy that price increases are to be held below Consumer Price Index movements is maintained, it seems the ability of the Authority to meet its operating costs and capital expenditure from waste disposal charges is in doubt. This situation has, for the most part, been brought about by the construction costs and the expected operating result for the aqueous waste treatment plant and the generally increasing costs of waste disposal from the Sydney area."

In the same report the Auditor-General commented:-

"Audits of the Authority's accounts and analysis of the financial statements over recent years as well as the budget for 1988-89 show the Authority's financial affairs to be well managed."

Because of the financial pressures being faced, the Authority undertook a complete review of its financial structure during the latter part of 1988 and in this review it was assisted by a prominent firm of public accountants. Following this review and acting on recommendations emanating therefrom the Authority approved of a new scale of charges for 1989 and for the first time differential charges for Council and commercial wastes are to be implemented.

The Authority has become increasingly concerned about the large quantities of non-putrescible waste from commercial and industrial sources being delivered to its regional depots. Differential charging has therefore been introduced as an incentive to the private sector to provide non-putrescible waste disposal facilities and to allow the Authority to make best use of its facilities for the disposal of putrescible waste for which the depots have primarily been designed.

The concurrence of the Minister for the Environment was sought to the new pricing proposals and because of their impact on the community through local government, industry and commerce the Minister arranged for the proposals to be examined by the N.S.W. Treasury. This review found the charges to be appropriate and they were therefore endorsed by the Minister.

A schedule outlining the new charges is attached for your information. As previously mentioned, the charges usually apply as from January but because of the lateness of the notice and in order to cushion the effect it is now proposed that the new rates will apply as from 1st April, 1989.

It will be noted that charges for the receipt of special wastes, which are those wastes that require special handling, have also been revised to take account of the additional costs of handling such wastes.

It would be appropriate at this time to draw Council's attention to the opportunities available to minimise the cost of waste disposal charges by increasing recycling activities. Through the work of the NSW Recycling Committee, which includes representation of the Local Government Association and the Institute of Health Surveyors, a large potential for increasing the level of recycling has been identified. The role of individual Councils is seen as vitally important in meeting this potential and the Authority is prepared to actively support Councils in this area.

At the present time the Authority is sponsoring a programme to increase recycling levels and has allocated a total of \$100,000 to those Councils who responded to the Authority's invitation to introduce or expand recycling schemes in their areas.

Should Council's staff wish to discuss the opportunities available for increasing recycling levels, I would be pleased to make Authority officers available for such discussions.

Yours faithfully,



(G. M. King)
ACTING DIRECTOR

Encl.

NEW CHARGES AS FROM 1ST APRIL, 1989

SOLID WASTE DISPOSAL

	<u>Current Charges</u>	<u>1989 Charges</u>
	\$	\$
Landfill Depots -		
Bare Creek - Council	11.50/tonne	13.00/tonne
Commercial	11.50/tonne	16.00/tonne
Other Depots - Council	10.80/tonne	13.00/tonne
Commercial	10.80/tonne	16.00/tonne
Cars/S.W.	0.90	1.50
Utes, Vans & Trailers	3.60	6.00
Transfer Stations		
Council	25.40/tonne	30.50/tonne
Commercial	25.40/tonne	37.50/tonne
Cars/S.W.	1.20	2.00
Utes, Vans & Trailers	4.80	8.00

CASTLEREAGH REGIONAL DEPOT

<u>Waste Type</u>	<u>Current Charges</u>	<u>1989 Charges</u>
	<u>per Tonne</u>	<u>per Tonne</u>
	\$	\$
Sludge	11.00	20.00
Contaminated Soil	11.00	20.00
Drums:		
Flash point -		
200 l < 61°C	140.00	200.00
200 l > 61°C	110.00	170.00
Packaged:		
Flash point -		
< 61°C	140.00	200.00
> 61°C	110.00	170.00
Bulk Liquids (incl. Grease Trap)	80.00	100.00

SPECIAL WASTES

<u>Waste Type</u>	<u>Current Charges per Tonne \$</u>	<u>1989 Charges per Tonne \$</u>
Tyres - unshredded	20.00	50.00
- shredded		16.00
Asbestos	As listed in other Classifi- cations below.	50.00 (min.charge \$32.00)
Security and Customs	-do-	50.00 (min.charge \$32.00)
Other Classifications:		32.00 (min.charge \$32.00)
Animal)		
Food)		
Pharmaceuticals)	0 to 5 tonne:	
Large Drums)	weighbridge	
Drums containing liquids)	charge + \$27.00	
Large concrete segments)	5 tonne and	
Bulky demolition wastes)	upwards:	
Sawdust)	weighbridge	
Carbon black)	charge + \$5.40	
Fine dusty wastes)	per tonne or	
Tobacco wastes)	part thereof	
Other (as designated))		

Appendix C - Potential Landfill Sites

C.1 Existing Landfills

Wiseman's Ferry Landfill Depot

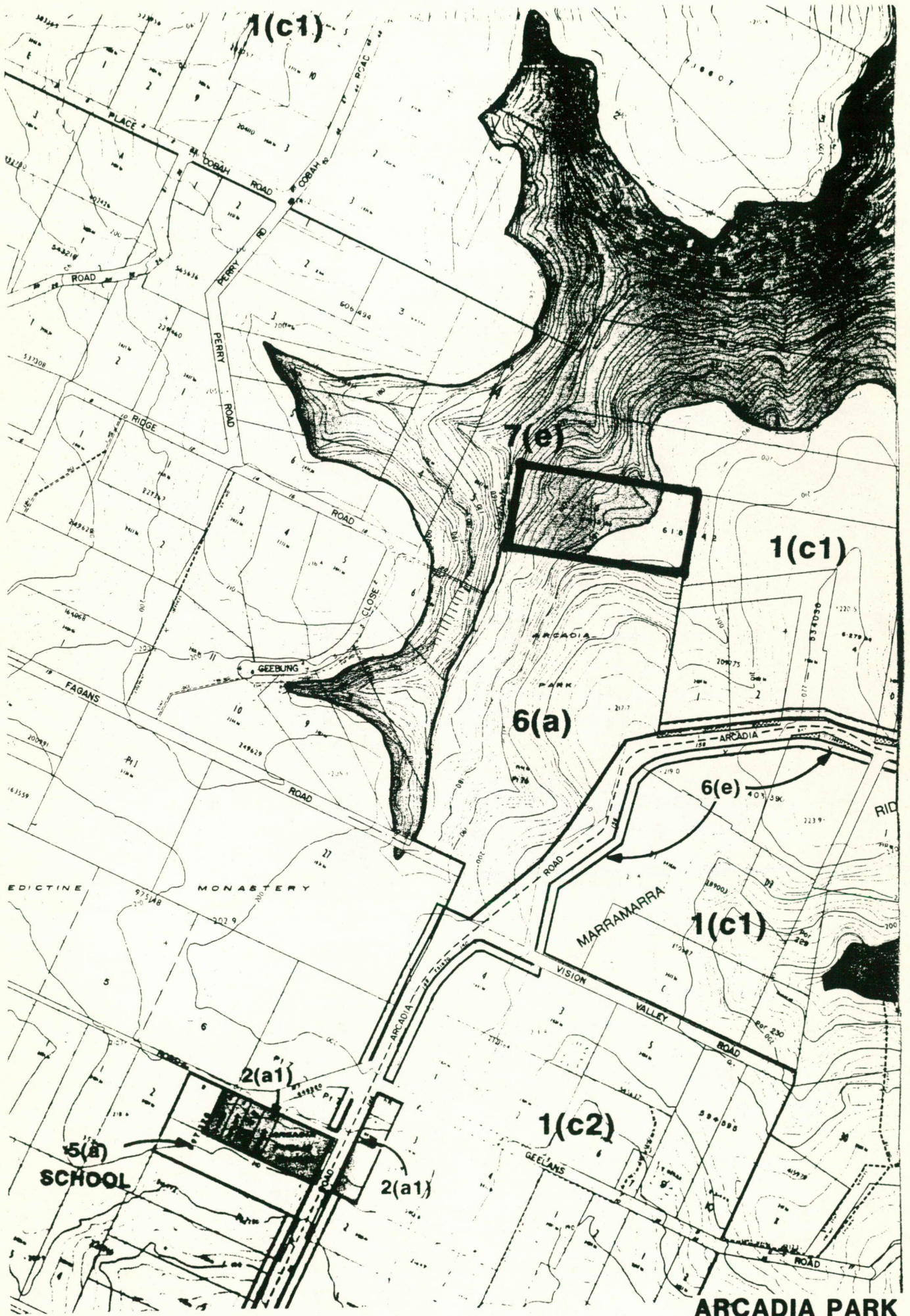
- (a) This landfill is located in the remote Northern end of the Shire, on Old Northern Road approximately 10 km South of Wiseman's Ferry.
- (b) The site is currently zoned rural.
- (c) The site is a considerable distance from the main population centers of the Shire, and therefore is primarily used by residents of Wiseman's Ferry.
- (d) The landfill is owned and operated by the Council.
- (e) Council expect that this landfill will operate for at least another 10 to 20 years and therefore does not impact significantly on the overall waste management strategy. However, a longer term plan should be considered for this area.

Arcadia Park Landfill Depot

- (a) This landfill is located in Arcadia, in the Western, rural region of the Shire. The site has good access off Arcadia Road.
- (b) The site is currently zoned "rural" and "valley/escarpment".
- (c) The landfill is located centrally in the Shire's rural community. The site is a considerable distance from the main population centres of the Shire.
- (d) The landfill is owned and operated by Council.
- (e) Under the current management plan, Council expect that this landfill will reach capacity within one year. No extension to the site is proposed.

Hornsby Rifle Range

- (a) This landfill is located within the Hornsby Rifle Range, North West of Hornsby. The site has access off Rosamond Street.
- (b) The site is currently zoned for "special uses".
- (c) The landfill is located close to the central business district of the Shire.
- (d) Currently, this depot is owned and operated by Malabar Excavations Pty Ltd and accepts all of the Councils "clean-up service" waste, some building wastes, and waste transported from the Mt Ku-ring-gai Transfer Station.
- (e) Under current loads (1989) this depot is expected to reach capacity and close within 2 years.



ARCADIA PARK

6(a)

MT OWN VILLA, SOWA
RESIDENTIAL HOMES
439
1884
1811

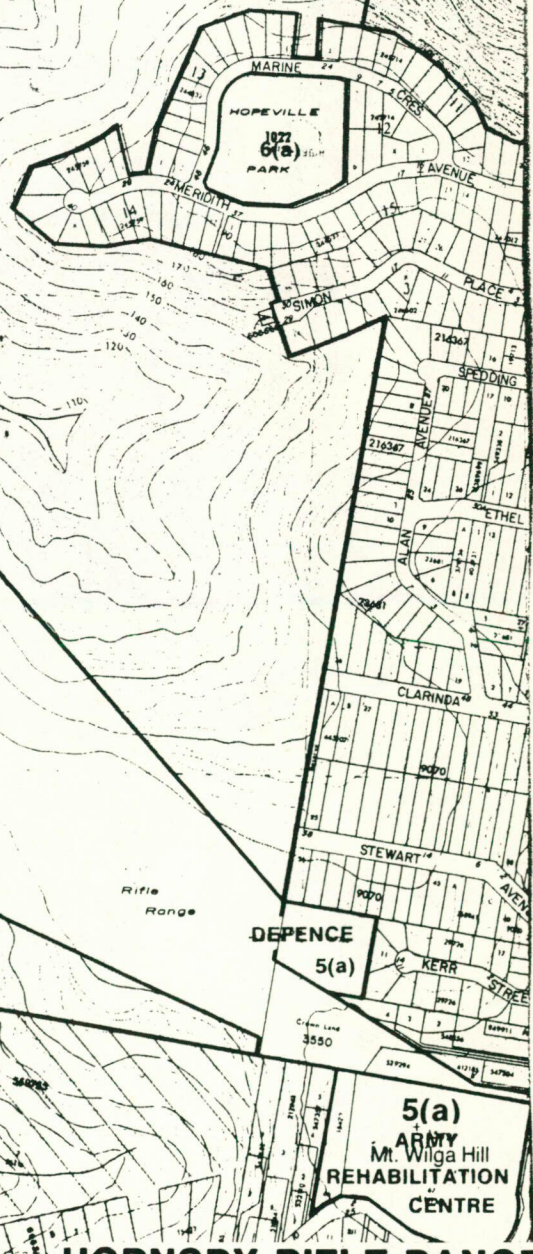
Crown Land

6(a)

NGE

RIFLE RANGE

5(a)



6(b)

5(a)
ARMY
Mt. Wilga Hill
REHABILITATION
CENTRE

HORNSBY RIFLE RANGE

6(a)

C.2 Potential Landfill Sites

Forest Glen

- (a) This site is located off the Old Northern Road, North of the township of Forest Glen. This site is privately owned and was not available for inspection. Access to the site has not been assessed.
- (b) The site is currently zoned "rural".
- (c) The site is a considerable distance from the main population centers of the Shire.
- (d) The site is privately owned.
- (e) It is possible that some environmental concerns could be raised about this site due to its close proximity to Marramarra National Park.
- (f) The potential capacity of this site is not known.
- (g) The operational suitability of this site is not known.

This site is not considered feasible because of its private ownership and its considerable distance from the main population centers of the Shire.

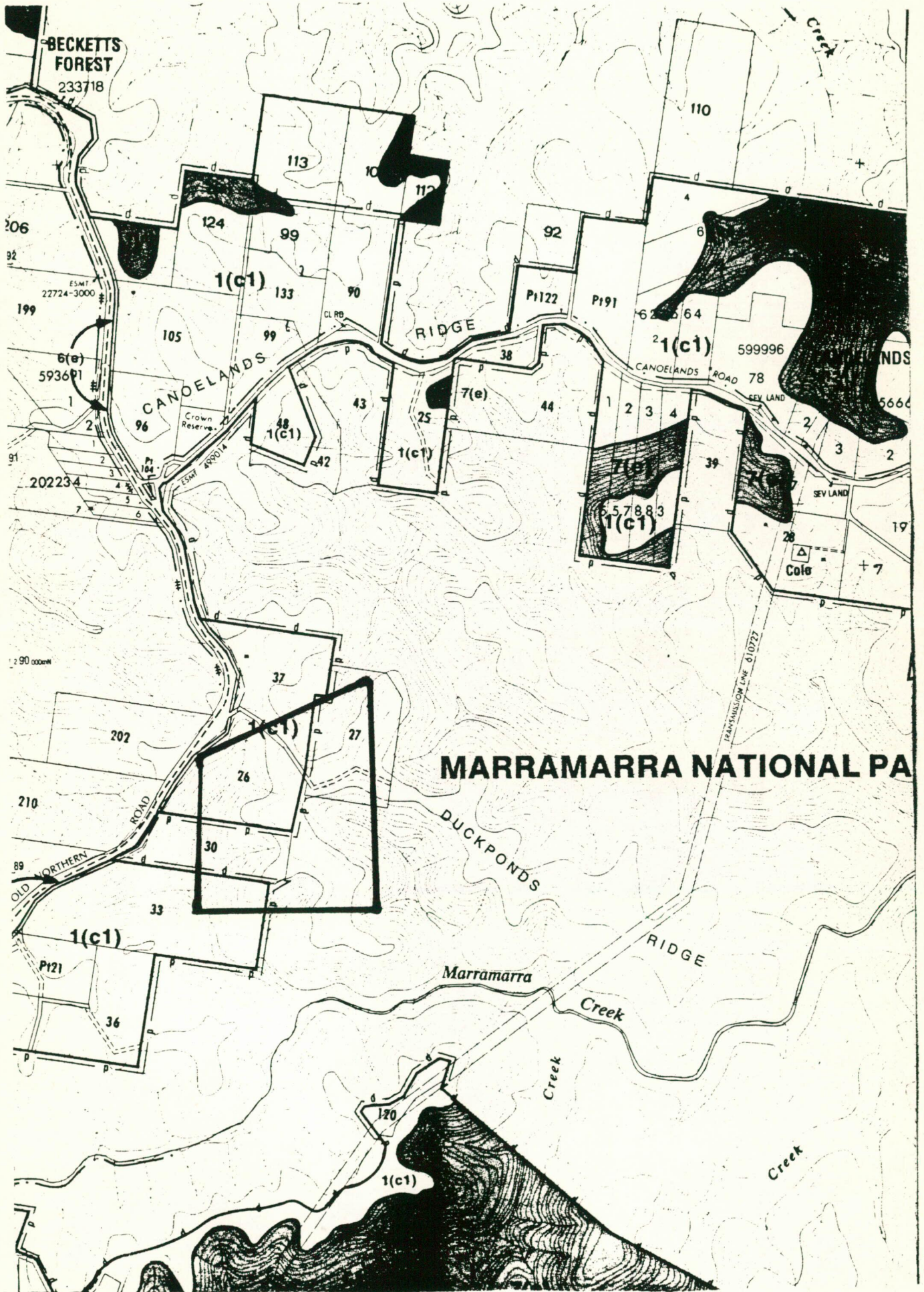
Salloway Road

- (a) This site is in Middle Dural just West of Galston and has good access off the Old Northern Road. The site is accessed off the intersection of Mid-dural Road and Salloway Road.
- (b) The site is currently zoned "existing recreation".
- (c) The site is located near encroaching rural-residential blocks. The site is a considerable distance from the main population centres of the Shire.
- (d) The site is owned by the Crown.
- (e) The site is a relatively undisturbed environment surrounded by rural properties. The site is bounded by Colah Creek and a tributary to this creek flows through the site.
- (f) The site is relatively small (of the order of 600 00 m³).
- (g) The shape of the site is well suited to landfill operation, on a small scale.

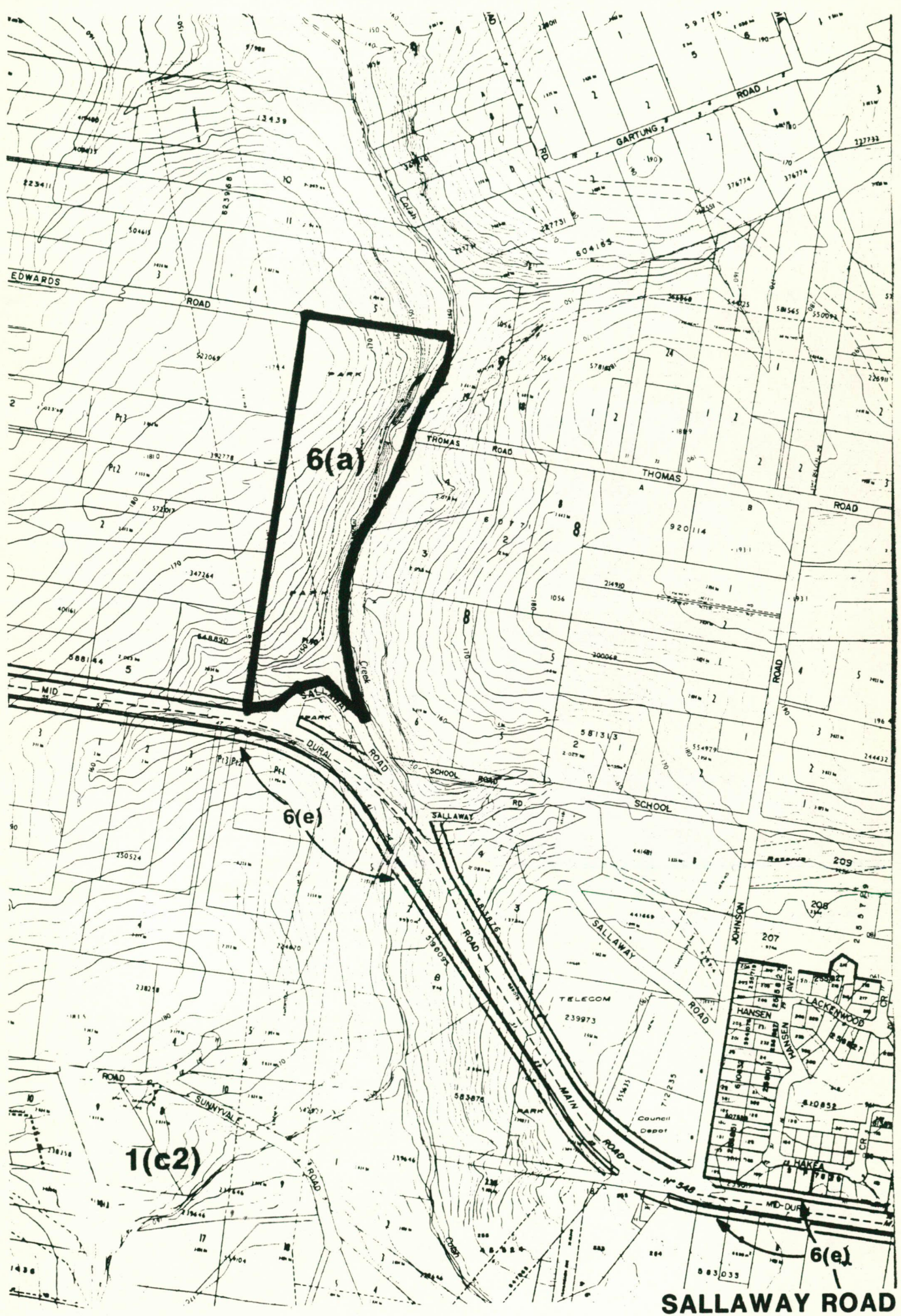
This site is not considered feasible because of environmental concerns, its proximity to residences, and its relatively small size.

Cairnes Road Quarry

- (a) This site is located on Cairnes Road, North of Glenorie. Access to the site is poor.
- (b) This site is currently zoned "rural".



MARRAMARRA NATIONAL PA



6(a)

6(e)

1(c2)

6(e)

SALLOWAY ROAD

- (c) The site is a considerable distance from the main population centres of the Shire.
- (d) The site is owned by the Crown.
- (e) Some environmental concerns may be raised because of the sites close proximity to Marramarra National Park.
- (f) The potential capacity of this site is small (less than 500 000 m³).
- (g) The shape of the site would be well suited for operation as a landfill.

Use of this site is prohibited by long transport distances from the urban population and poor access into the site.

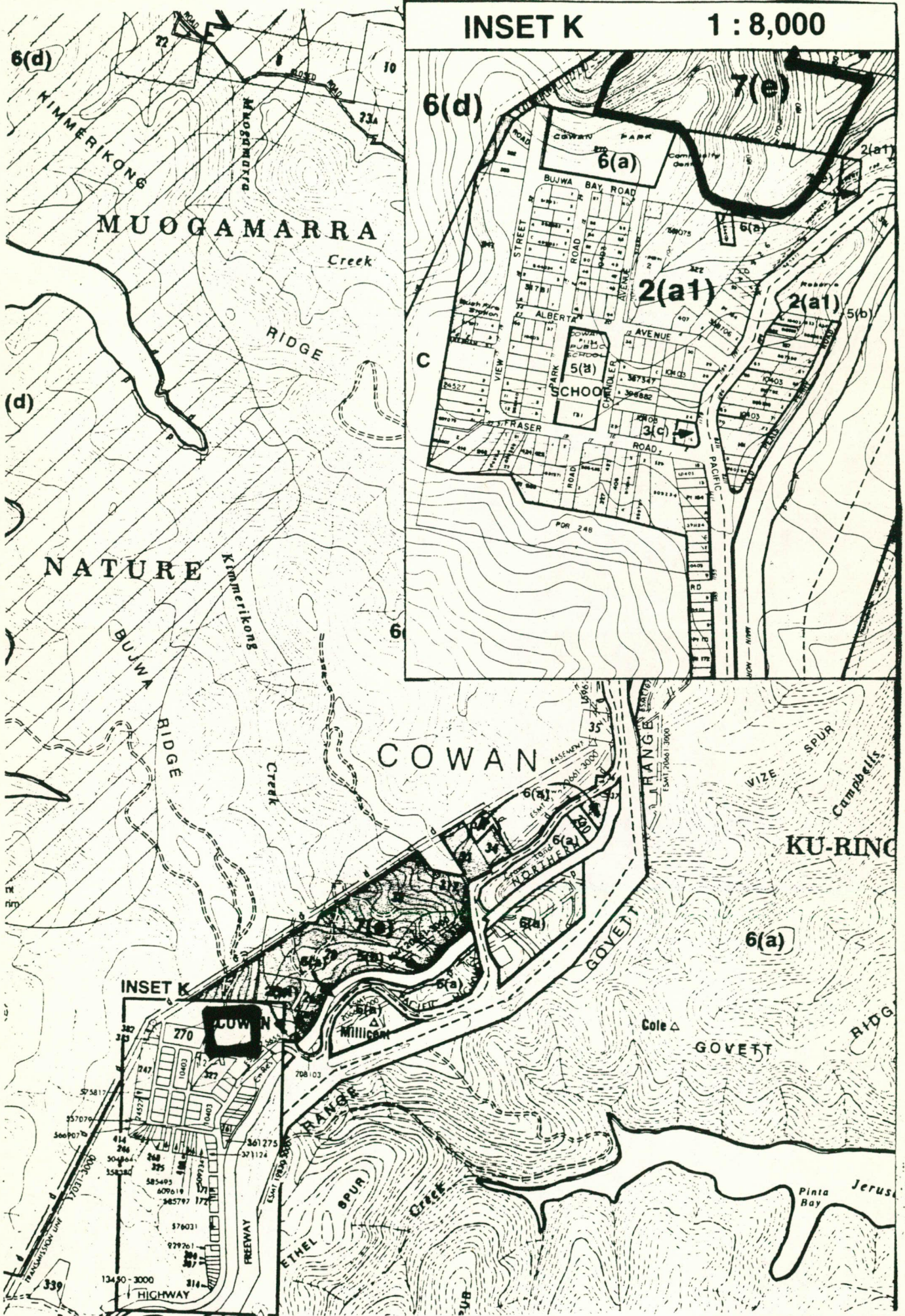
Cowan Quarry

- (a) Cowan Quarry is located in the North Eastern part of the Shire in Cowan. The site is accessed from the Pacific Highway.
- (b) The site is currently zoned "rural".
- (c) The site is located close to Cowan and North along the Pacific Highway from the main population centres of the Shire.
- (d) The quarry is currently operated by Malabar Excavations and is currently undergoing procedures to become licensed as a landfill. If the site becomes available it is probable that it will do so as a private operation.
- (e) The site is probably well suited for a landfill operation as a disused quarry.
- (f) The potential capacity of the site is approximately 300 000 m³

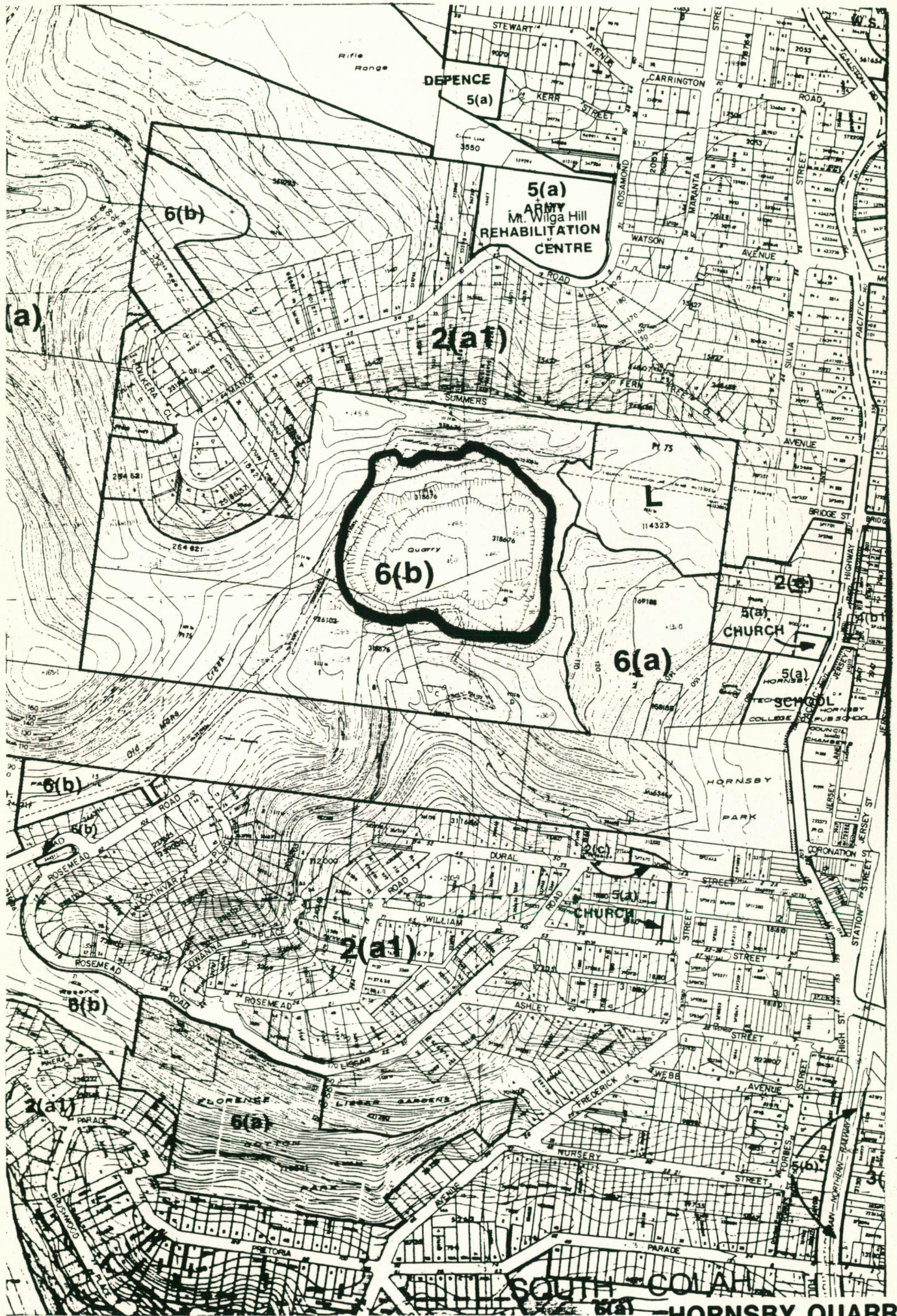
If the site does become available as a privately operated landfill it will augment other disposal alternatives for residents in the local communities (Cowan, Brooklyn, Berowra). It is not considered an option for Council due to its private ownership.

Hornsby Quarry

- (a) Hornsby Quarry is located in Old Mans Valley just west of the Hornsby central business district.
- (b) The site is currently zoned "proposed recreation".
- (c) The site is located within close proximity of residences, however, the form of the quarry may reduce the impact of this aspect of the site.
- (d) The Quarry is currently operated by Readymix and is not expected to become available as a potential landfill within the next twenty years. It is considered that dual operation of the site as a quarry and landfill is not feasible. It is expected that if the site were to become available as a potential landfill it would do so as a private operation. This site should certainly be considered as an integral part of the longer term waste management strategy.



COWAN QUARRY



DEPENDE
5(a)

5(a)
ARMY
Mt. Wilga Hill
REHABILITATION
CENTRE

6(b)

2(a1)

6(b)
Quarry

6(a)

5(b)
CHURCH

5(a)
SCHOOL

2(a)

6(b)

2(a1)

5(a)
CHURCH

8(b)

6(a)

2(a1)

SOUTH COLAH
HORNSBY QUARRY

- (e) The site is considered to be environmentally acceptable as a landfill, although the permeability of the rock strata would need to be tested. Landfilling of disused quarries is an ideal option for rehabilitation of such sites.
- (f) The site, in twenty years time, could have sufficient capacity to serve the needs of the Shire for at least 20 to 30 years.
- (g) The quarry may pose some difficulties from a landfill operation point of view, however technologies do exist to overcome such difficulties.

This site is not considered an immediate option for Council because it is not available for another 20 years and because of its private ownership.

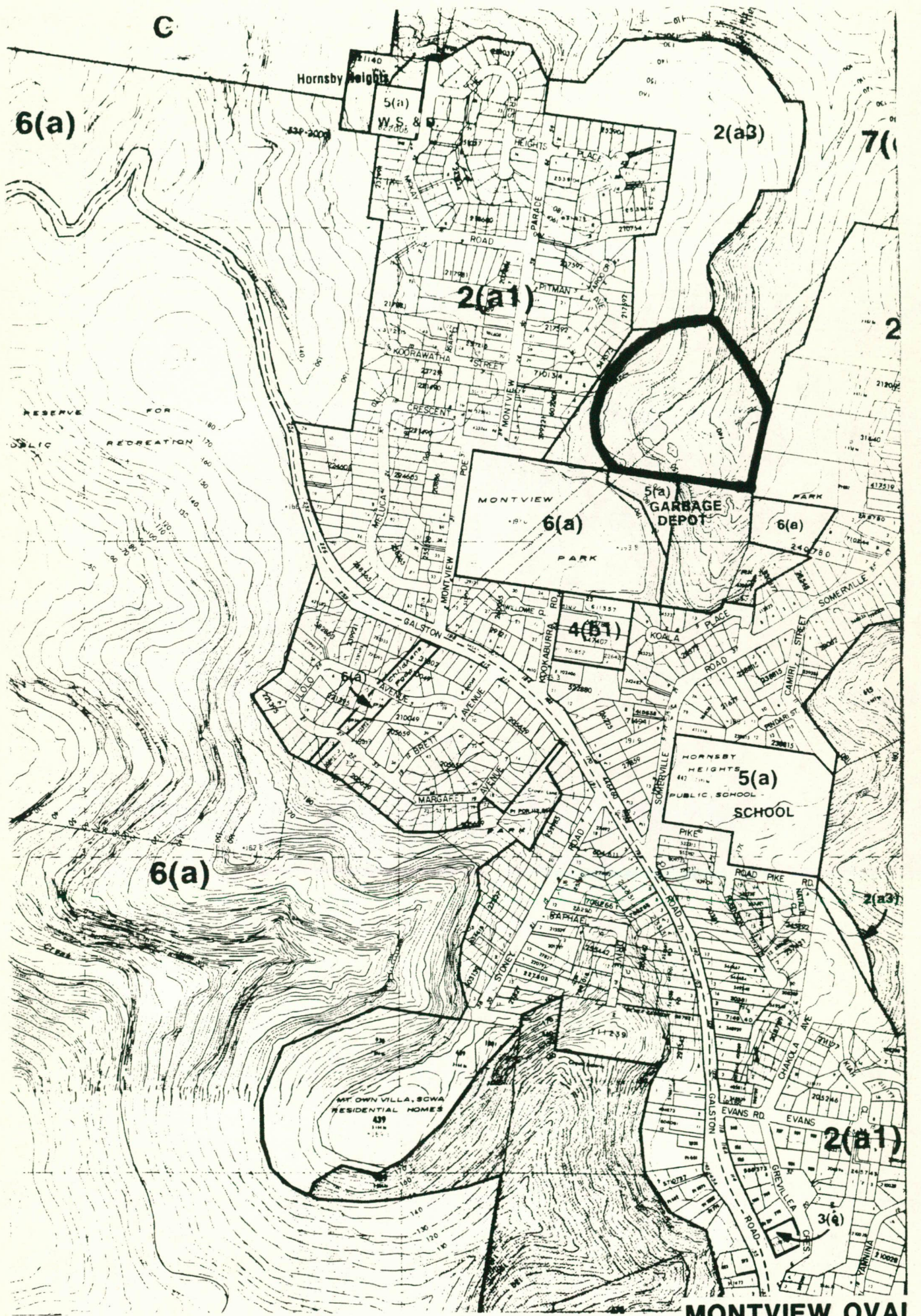
Montview Oval

- (a) This site is adjacent to a developed oval and park located in Hornsby Heights. The site is centrally located and has good access off Galston Road?
- (b) This site is currently zoned "proposed recreation".
- (c) The site is located within close proximity to residences and the access passes through residential areas.
- (d) The site is owned and operated by Council.
- (e) The main environmental concern with this site will be impacts on surrounding areas close to residences.
- (f) The site is considered small (of the order of 600 000 m³).
- (g) The operational suitability of the site has not been assessed.

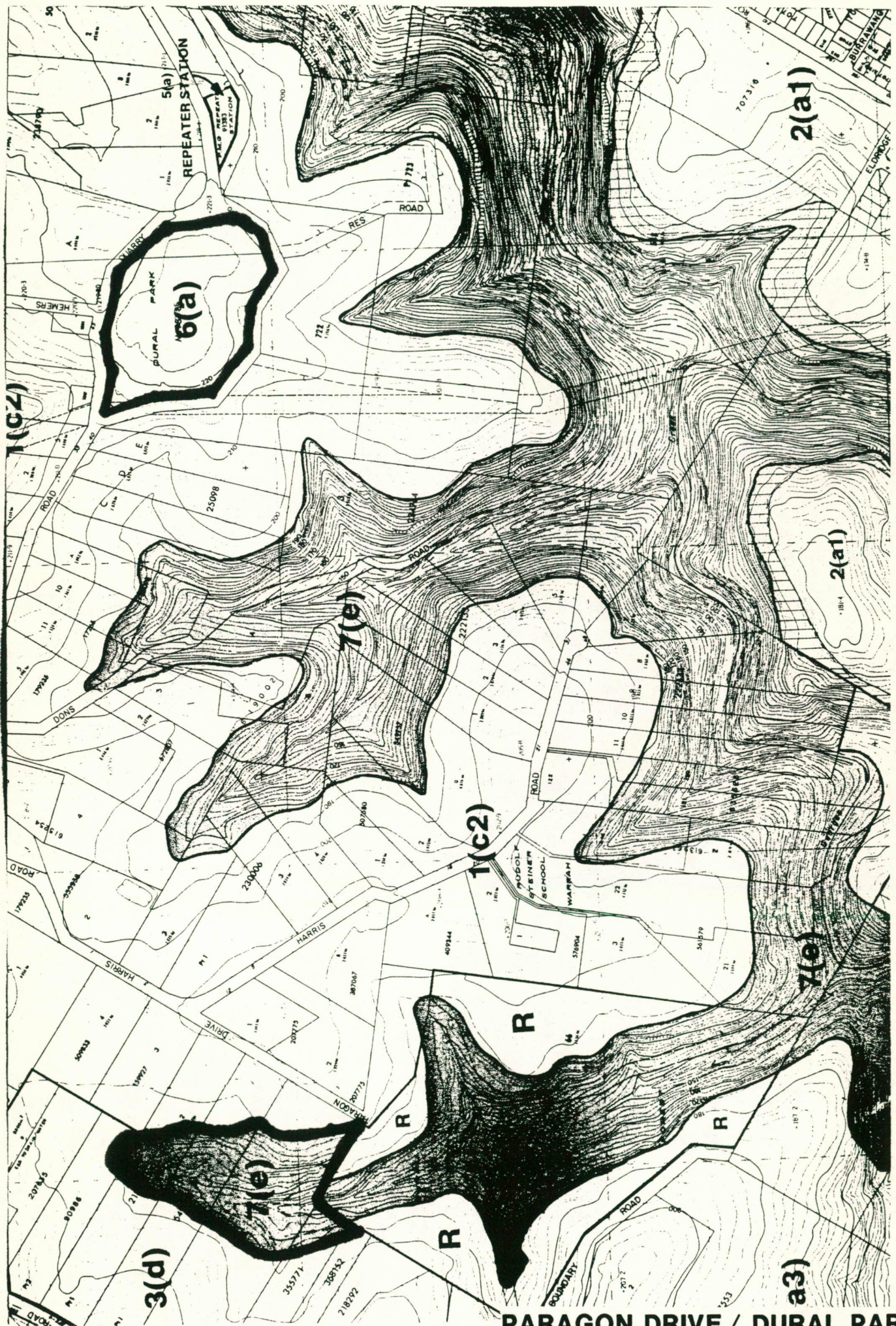
This site is not considered feasible because of its small size and close proximity to residences.

Paragon Drive

- (a) This site is located North of Cherrybrook and is a valley bounded by New Line Road, Paragon Drive and Cumberland State Forest Extension. There is no existing access to this site, although a business property on New Line Road could be purchased to access the site.
- (b) The site is currently zoned "valley/escarpment".
- (c) The site is relatively close to the main population centres of the Shire, however it is also close to existing residences on both Paragon Drive and Old Northern Road.
- (d) The site is owned by the Crown.
- (e) The site is located well upstream at the head of a catchment and therefore does not pose a significant threat to surface waters. The environmental suitability of the site would need to be determined by more thorough examination. The site is adjacent to a State Forest.
- (f) The site potential capacity of this site is of the order of 600 000 m³.



MONTVIEW OVAL



PARAGON DRIVE / DURAL PARK

- (g) The site is a valley offering ideal conditions for operation of a landfill.

This site is not considered feasible as a potential landfill site for Council because of its small potential capacity and its close proximity to residences.

Dural Park

- (a) This site is located off Quarry Road just North of South Colah. The site is currently used for recreational purposes (tennis courts and an oval). There is good access to the site along Quarry Road. The site is within a suitable distance from the main population centers of the Shire.
- (b) The site is currently zoned "existing recreation".
- (c) The site is located close to residences although is well screened by vegetation.
- (d) It is possible that this site may have already been used in the past as a landfill. This possibility should be investigated before the site is considered further.
- (e) The environmental suitability of the site has not been assessed.
- (f) The capacity of the site is small (less than 500 000 m³).
- (g) The operational suitability of the site has not been assessed.

The site is not considered feasible because of its existing recreational use.

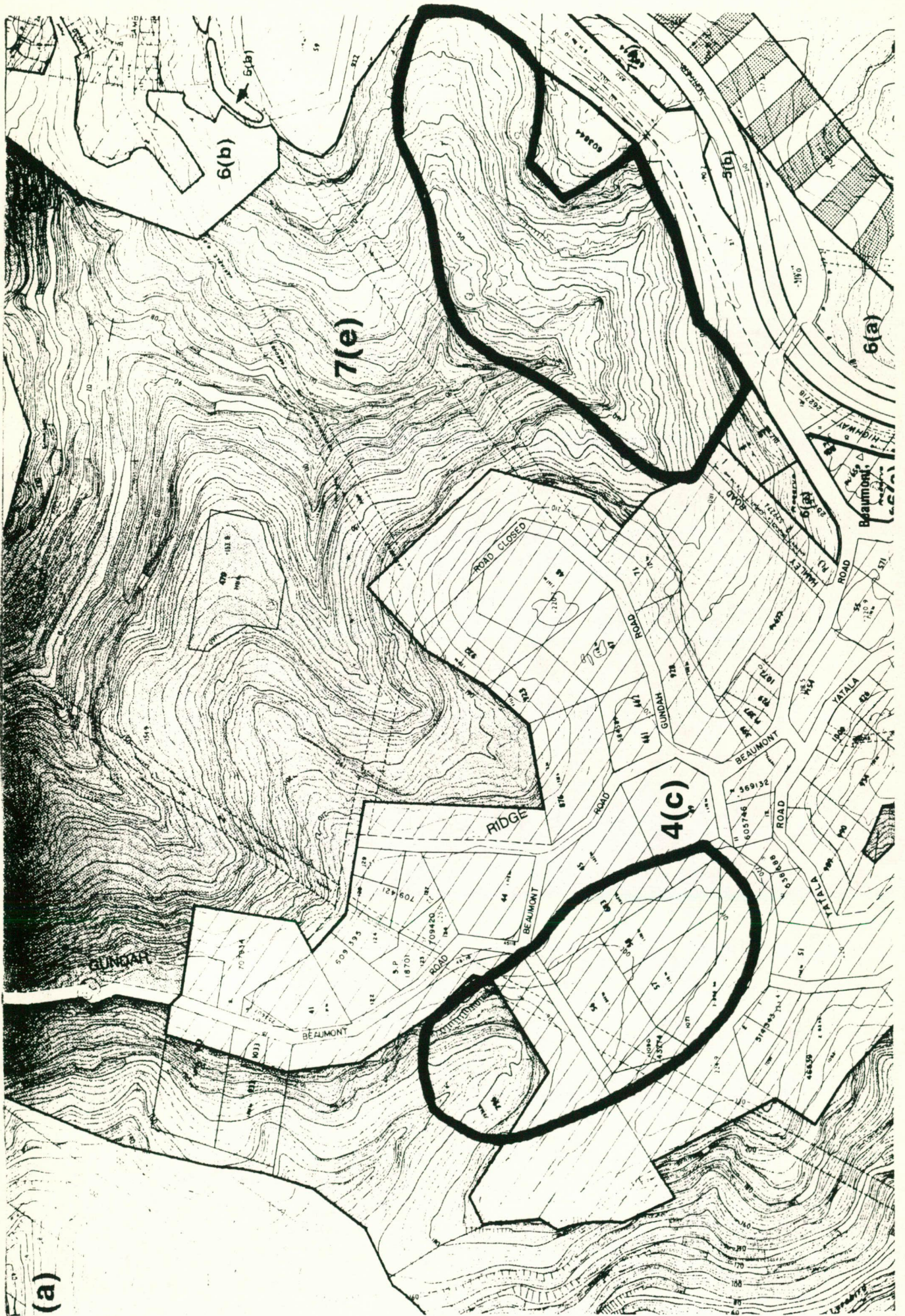
Mundowi Road

- (a) This site is located on the Northern side of Mundowi Road, Mt Ku-ring-gai.
- (b) The site is currently zoned "special industrial" and "valley/escarpment".
- (c) The site is central to the Shire's urban population, and is isolated from residential areas. The site is not visible from Berowra, Mt Ku-ring-gai, or Hornsby Heights.
- (d) The industrial area of the site is privately owned and would need to be purchased by Council. The other part of the site is owned by the Crown.
- (e) The industrial part of the site has been cleared in the past and it is likely therefore that this area will be environmentally suitable. The environmental suitability of the site will need to be considered further.
- (f) The site has considerable capacity (of the order of 3 000 000 m³).
- (g) The terrain of the site is ideally suited to landfill operation.

This site is considered feasible as a landfill and should be considered further.

Hamley Road

- (a) This site is located at the end of Hamley Road, Mt Ku-ring-gai.



MUNDOWI ROAD / HAMLEY ROAD

- (b) The site is currently zoned "valley/escarpment".
- (c) The site is located away from residential areas, although it is visible from Berowra.
- (d) The site has already been the subject of extensive investigation as a potential landfill for the Shire and the subject of intense opposition from the local community.
- (e) Serious concerns with the environmental suitability of this site have been raised in the past.
- (f) The site has considerable capacity, although it is located on only one side of a valley (of the order of 2 000 000 m³).
- (g) Due to the nature of the terrain of this site it would be considered difficult to operate.

This site is not considered as feasible because of environmental concerns, particularly its visibility from nearby residences.

Lyne Road

- (a) This site is a park located at the end of Lyne Road, Cheltenham. Access to the site is good.
- (b) The site is currently zoned "existing recreation".
- (c) The site is within close proximity to residences.
- (d) The site is owned by Council.
- (e) Runoff from the site would flow to Devlins Creek. The site is highly visible from nearby residences.
- (f) The potential capacity of the site is small (less than 500 000 m³).
- (g) The operational suitability of the site has not been assessed.

This site is not considered feasible as a potential landfill site because of its close proximity to residences and small capacity.

Sutherland Road

- (a) This site is located between Sutherland Road and Devlins Creek, adjacent to the North Shore railway.
- (b) The site is currently zoned "existing recreation".
- (c) The site is within close proximity to residences.
- (d) The site is owned by Council.
- (e) The site is bounded by Devlins Creek which flows through residential areas. The site is highly visible from nearby residences.
- (f) The capacity of the site is small (less than 500 000 m³).

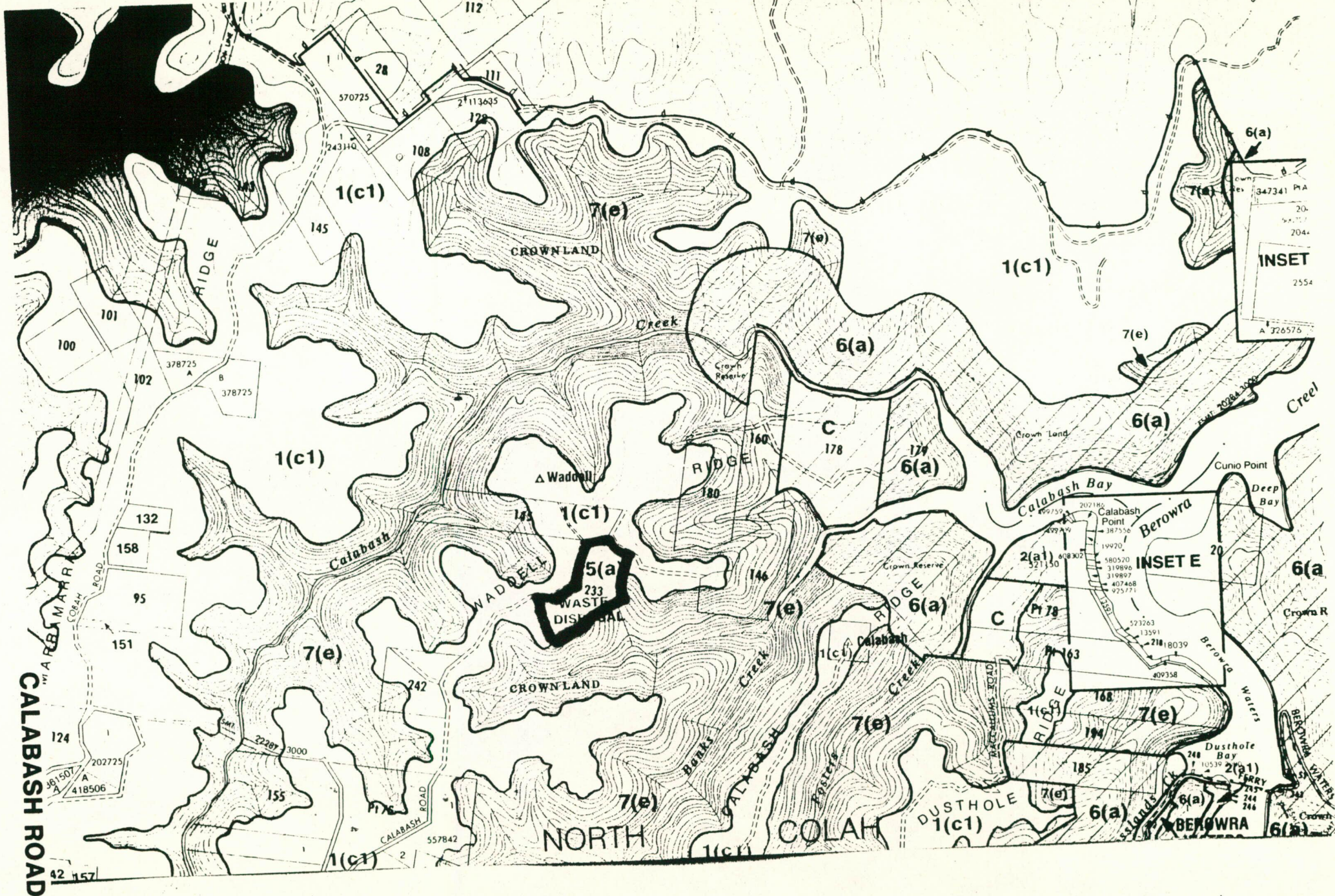
- (g) The operational suitability of the site has not been assessed.

This site is not considered feasible as a potential landfill site because of its close proximity to residences and small capacity.

Waste Disposal Zone

- (a) This site is located on Calabash Road on Waddell Ridge. Access to the site is poor along a four wheel drive trail.
- (b) The site is currently zoned "special uses".
- (c) The site is extremely remote, located just South of Marramarra National Park.
- (d) The site is available to Council.
- (e) The site is located near environmentally protected areas.
- (f) The potential capacity of this site is less than 750 000.
- (g) The operational suitability of this site has not been assessed.

This site is not considered as feasible as a potential landfill because of its distance from the waste collection area.



CALABASH ROAD

INSET
2554

INSET E

NORTH

COLAH

BEROWRA