North West Transport Links East

Environmental Impact Statement

Working Paper

LANDSCAPE AND VISUAL IMPACT

Bruce Mackenzie and Associates Pty Ltd

Prepared for
Maunsell Pty Ltd

on behalf of
The Roads and Traffic Authority of NSW
Sydney Western Region

April 1992

NORTH WEST TRANSPORT LINKS ENVIRONMENTAL IMPACT STATEMENT

PENNANT HILLS ROAD TO EPPING ROAD

Roads and Traffic Authority
Maunsell Pty Ltd

LANDSCAPE & VISUAL IMPACT : March 1992
Bruce Mackenzie & Associates Pty Ltd Landscape Architects

in conjunction with:

Olsen Environmental Services – Ecological Advice

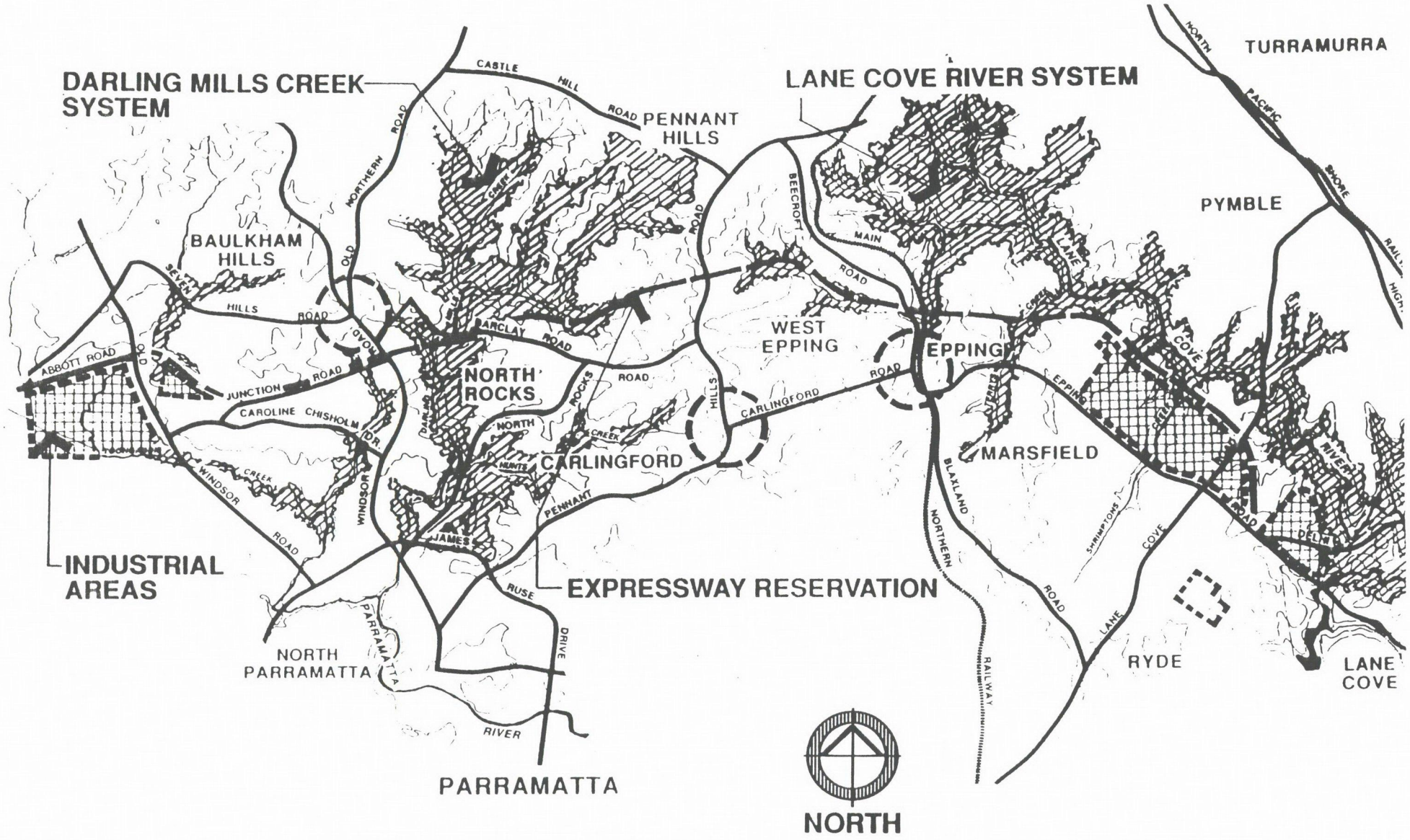

FIGURE 1.1

OLD WINDSOR ROAD - EPPING ROAD LANE COVE
OVERALL STUDY AREA (WEST AND EAST)

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NORTH WEST TRANSPORT LINKS ENVIRONMENTAL IMPACT STATEMENT

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LANDSCAPE & VISUAL IMPACT

1. INTRODUCTION

This report of existing conditions and assessment of visual impact, covers the transport links study area to the east of Pennant Hills Road. Bruce Mackenzie & Associates Pty Ltd have also prepared a similar report of landscape and visual impact for the transport links study area to the west between Old Windsor Road, Baulkham Hills and Pennant Hills Road. The issues to be considered and the objectives which guide the two reports are common to the overall study purpose and where appropriate, the material content of the reports will be the same.

1.1 BACKGROUND

Bruce Mackenzie & Associates prepared the report 'Landscape Study' April 1989 as part of the EIS for the F2 Castlereagh Freeway which became the subject of the Commission of Enquiry conducted by Commissioner John Woodward. An additional report was subsequently prepared entitled 'Landscape Study: Visual Assessment of Noise Barriers' October 1989.

The original landscape study dealt with the then designated freeway alignment, located within the F2 Reservation, and endeavoured to illustrate its visual impact and its effect upon the landscape qualities of the corridor generally and particularly its more environmentally sensitive areas.

1.1.1 Urban Bushland Qualities

The experience of the enquiry process gave emphasis to the fact that urban bushland qualities needed to be given more attention and importance in the evaluation of transport proposals. This was borne out in the content of many submissions to the enquiry and in the conclusions and recommendations of the Commissioner's report.

1.1.2 Alternative Transport Solutions

However, the recommendations contained in the Commissioner's report included also the need to investigate alternative transport solutions and/or transport route alignments. The brief for this current study includes in its objectives investigation and assessment of those other alternatives.

1.1.3 Arterial Road Upgrades

Of particular interest in regard to landscape and visual impact is the proposition that alternative options to be investigated might involve upgrading of existing arterial roads in the general area including, for example such routes as Carlingford, Epping and Pennant Hills Roads.

Other options of a similar nature were also considered possible using existing traffic routes.

1.1.4 Acceptable Noise Levels

A major implication of this type of alternative draws attention to the further requirement of the Commissioner's recommendations which identified certain standards to be obtained relating to acceptable noise levels for homes adjacent to a transport route. This in turn would involve noise barrier structures which constitute substantial new vertical and very visible elements in the road environment – and consequently in the environmental margins of the road.

1.1.5 Arterial Road : Magnitude

Of much importance too, is the potential of the arterial road upgrade option to need a new road formation in physical dimensions equal to or larger than that of say an expressway standard in order to achieve traffic handling functions of more or less equal capacity.

This factor introduces the prospect of significant effects being imposed upon existing landscape and visual conditions because of the sheer scale of the new transport corridor and the resultant destruction of existing circumstances that would include homes and other properties, trees, gardens and other amenities which contribute to the environmental character of a local area.

1.1.6 Limited Perspective

The F2 Commission of Enquiry dealt with a specific proposal which focused upon a single route aligned within a designated corridor which contained to a large extent, bushland and open space. Consequently, discussion and argument tended to centre upon impacts to urban bushland qualities and the alternative impacts of the expressway construction and operation, on homes bordering the reservation.

1.1.7 Emotive Issues

The present study of landscape and visual impacts addresses a broader area of potential change including possible impact upon bushland quality and impact upon extensive residential environments quite remote from the bushland. In the latter case, the residential domain can be an equally emotive subject for debate when considering environmental qualities and potential change or impairment.

This report endeavours to examine these issues and to convey as clearly as it is able, the reality of impacts to specific environments, the broader environment and to short term and long term circumstances.

It is fair to anticipate that this report will not recommend better versions of conventional practices which may only expect to enjoy short-term success. However, knowledge of the prevailing conditions prior to undertaking the study, pre-empts the notion that some immediate relief from existing traffic circumstances may be a critical need prior to establishing the stages of a long term programme of benefit.

1.2 REPORT OBJECTIVES

The landscape study will endeavour to provide ...

- an understanding and description of the existing site conditions.
- assessment of the relative value of existing features and characteristics of the landscape and its current landuses.
- evaluation of the nature and physical forms of transport options and the corridors that are aligned with them.
- estimated impact of the options in terms of effect upon
  - landform
  - vegetation
  - visual qualities
  - access opportunities
  - recreational values
  - existing living/working lifestyles.
- recommendations for reducing impacts and enhancing the quality of possible changes.

Quality of life is understood by the landscape architect to be the over-riding issue and this concept requires that consideration be given to many issues, apart from visual impacts, including:

- matters of efficiency
- preservation of the integrity of natural areas and human living and working environments.
- concerns for safety and health.

1.3 STUDY PROCESSES

1.3.1 Undertake broad site investigations by travelling through the local street network and conducting detail examinations on foot, to obtain a realistic understanding of the area and the relevant issues.

1.3.2 Record detail information of the existing conditions making full use of photographic material.

1.3.3 Compile relevant information from records of the client organisation, other consultant studies and scientific data, municipal authorities and community groups, in conjunction with site inspections, to prepare background maps of landuses, landuse corridors, drainage, topographical and vegetational information.

1.3.4 In consultation with design engineers, compose three-dimensional images of proposals including possible alternatives.

1.3.5 Describe in words and with diagrams the physical changes and effects of the proposals in the context of existing landscape and landuse conditions.

1.3.6 Examine construction methods, alignments, associated structures and road furniture in the context of visual and physical impact on surroundings; make comment and recommendation on possible variations to reduce undesirable impacts as may be appropriate.

1.3.7 Consider the environment internal to the road corridor as well as that of its margins.

1.3.8 Make recommendations in consideration of preserving or offering suitable alternatives for the existing pedestrian facility of the general area and particularly that which tends to traverse, and be divided by, the road corridor.

1.3.9 Prepare, in conjunction with a written report, graphic communication designed to provide reasonable evidence of existing and changed conditions, in forms that are suitable for both professional and general public viewing.

1.3.10 Endeavour to describe the relative environmental benefits and disbenefits of the alternative options in terms of present and future circumstances.

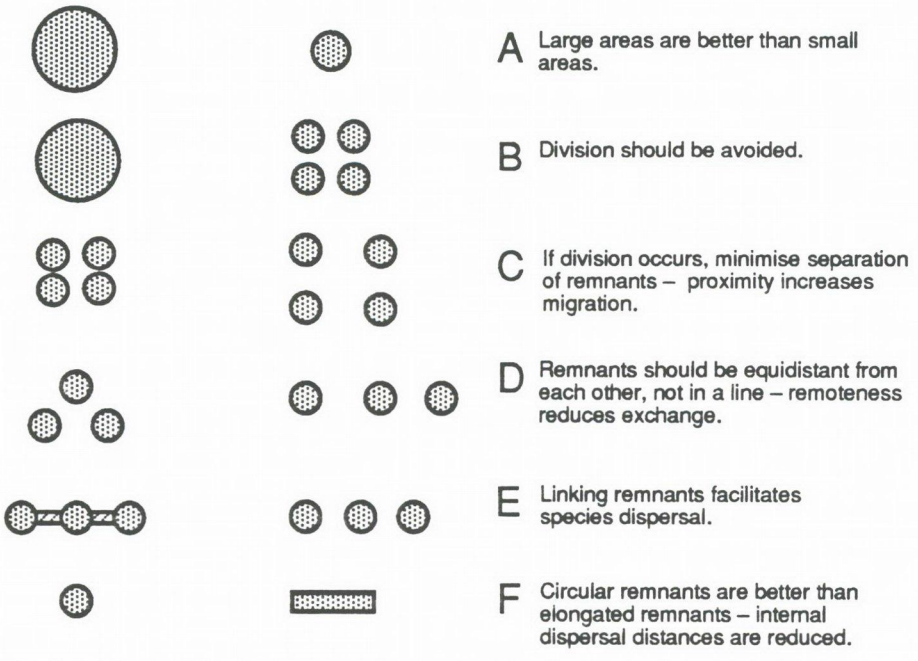
1.3.11 Describe the general and detail effects of a recommended proposal or the various alternatives and include both negative and positive values so as to assist members of the public in understanding the environmental consequences and to be able to assess their own conclusions.

1.3.12 Geometric Principles for the Design of Natural Reserves

These geometric principles, derived from the island biogeographic studies of Diamond (1975) illustrate designs that reduce species extinction rates. The example of these principles is included in this discussion concerning transport options because it relates to the understanding of management of urban bushland. The policies addressed indicate the potential impacts resulting from fragmentation, divisiveness and exposure of new edges to incompatible adjacent activity.

Principle A: Large reserves are better than small reserves. A large reserve can hold more species at equilibrium and will have lower extinction rates.
Principle B: The reserve should be divided into as few disjunctive areas as possible. Separate reserves in an inhomogeneous reserve may each favour the survival of a different group of species.
Principle C: If the available area is to be broken into disjunctive reserves then these reserves should be close together. Proximity will increase immigration rates between reserves.
Principle D: Where several disjunctive reserves occur they should be grouped equidistant from one another rather than grouped linearly. This arrangement will allow populations to recolonise or be recolonised from another reserve. In the linear arrangement the terminal reserves are relatively remote from each other, reducing exchange of colonists.
Principle E: Connecting reserves by corridors of protected habitat will facilitate species dispersal.
Principle F: Reserves should be as nearly circular in shape as possible. This condition will minimise dispersal distances within the reserve. Elongated reserves may promote local extinctions in the outlying parts.

It is of interest to consider the common ground of these principles where they may also apply to the habitats of communities of a human population; where fragmentation and divisiveness can be destructive of the status quo; and conversely, where larger and cohesive communities ... "can hold more species at equilibrium and will have lower extinction rates"



Geometric Principles for the Design of Natural Reserves (Diamond 1975)

2. SUMMARY

2.1 GENERALLY

The summary briefly describes the general content of each of the report's section headings.

2.2 STUDY AREA : Existing Conditions (Section 3)

The discussion refers to the natural characteristics of the general area over which the transport links have been investigated. While interest extends to the overall corridor length, ie. from Old Windsor Road to Epping Road, Lane Cove, this report focuses on the area to the east of Pennant Hills Road.

Typically, land development has followed the logical patterns which would be defined by the natural landscape. The study area is divided between the terrain of Hawkesbury Sandstone and Wianamatta Shale geology and the soil characteristics which result. Consequently, land development and loss of natural conditions has coincided with the more fertile shale-derived soils, while natural conditions and vegetation have survived in the typically rugged and agriculturally unproductive environment of the sandstone country.

Most of the study area consists of developed land which is predominently residential. Landscape qualities within the residential zones, including both vegetation (introduced and occasionally, remnant indigenous examples) and built urban characteristics, are of good quality. The designated F2 Expressway Reservation traverses both developed and more or less natural environments. Consequently, in the surrounding circumstances of largely-cleared land (i.e. cleared of natural vegetation), the reservation has become a respository of some of the better aspects of surviving urban bushland.

2.3 TRANSPORT OPTION CORRIDORS (Sub-Section 3.2)

This section briefly describes the main option corridors which have been investigated and assessed including potential arterial road developments based on existing road alignments and the F2 Expressway Reservation. Site conditions are discussed and illustrated in terms of existing landuse and visual conditions, landuse types and qualities.

2.4 BUSHLAND QUALITIES (Section 4)

The more significant aspects of the existing vegetation and its relationship to geological land units are discussed in the context of landscape and conservation values. These values are of importance when considering the potential impacts of the road transport proposals. A more detailed account of vegetation is presented in the report prepared by Mt. King Ecological Surveys (Flora and Fauna Evaluation – Bushland Effect and Management). The question ... bushland or homes? ... in relation to long term values is discussed in this section.

2.5 POTENTIAL IMPACTS (Section 5)

Impacts are examined in order to assist the understanding of the relevant implications of the proposals. For example, the present-day reality of a major road construction can raise the possibility of effects that society is not fully acquainted with and certainly not accustomed to ... effects of scale and magnitude unusual in suburban circumstances.

2.6 EXPRESSWAY : EFFECTS AND PROPOSED LANDSCAPE TREATMENT (Section 6)

The expressway proposal (in the designated reservation) is described as a concept design so that its general effects can be undertood in visual and landscape impact terms. Also, with the assistance of diagrams, recommendations for landscape treatment including mitigative measures, are presented. Discussion of alignment options related to the sensitive bushland and residential zones in the Devlins Creek environment between Pennant Hills Golf Course and Murray Farm Road is further developed and a general summary of the expressway proposal's impacts is provided.

2.7 ARTERIAL ROAD: EFFECTS AND PROPOSED LANDSCAPE TREATMENT (Section 7)

A similar brief account of typical effects is discussed in this section using cross-section diagrams, to illustrate the scale and the potential impact of the arterial road proposal based on the Carlingford/Epping Road alignments. Typical conceptual landscape treatment in representative locations is also presented. A summary of the arterial road proposal is included. Carlingford and Epping Roads are also discussed as separate segments because of the different circumstances which apply to the two roads.

2.8 LANDSCAPE : RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION (Section 8)

This section describes landscape design potentials in principle and details particular measures which would help to conserve existing valuable qualities and avoid unnecessary losses. Recommendations are made in regard to mitigative treatment.

2.9 EXPRESSWAY & ARTERIAL ROAD PROPOSALS COMPARED (Section 9)

Based on the discussion 'Potential Impacts' (Section 5), the expressway and arterial road proposals are discussed and compared using the basic criteria which are listed below. The sequence of impacts does not necessarily represent an order of priority or importance – particular impact types will vary in severity from site to site according to detail circumstances.

Severe Impacts

1. Division of built and/or natural environments.
2. Division created between built and natural environments.
3. Physical destruction and loss of natural bushland.
4. Changes to the quality of the community environment as a consequence of the effects of division and destruction.

Lesser Impacts

1. Partial loss of property and consequent loss of landuse values.
2. Introduction of new and undesirable activity in the immediate neighbourhood as a replacement of familiar existing circumstances.
3. Loss of trees/vegetation.
4. Loss of views.
5. Introduction of new and undesirable views.
6. Loss of amenity through the introduction of visual effects and noise which are disagreeable or discomforting.

2.10 CONCLUSION (Section 10)

The report concludes with recommendations selected from the various alternatives and options investigated. Allied with the recommendations is a discussion of urban design considerations and schematic illustrations which refer to a process of comprehensive planning for future development.

3. THE STUDY AREA : EXISTING CONDITIONS

3.1. GENERALLY

3.1.1 Landform

The eastern study area covers a broad east-west corridor roughly defined by (but not precisely limited to) a line south of Epping and Carlingford Roads and the Lane Cove River valley to the north, cutting across to Pennant Hills Road to the north of Copeland Road, Beecroft. The Epping Road bridge over the Lane Cove River marks the eastern approach to the corridor which adjoins the western study area along Pennant Hills Road.

The land drains generally north-east towards the Lane Cove River which flows south-east to enter the Parramatta River at Greenwich Point. Relatively flat land on broad ridgelines lies between Epping Road and the Lane Cover River valley supporting broadacre landuses such as that of the Macquarie University and large industrial and commercial sites. The lateral streams Shrimptons Creek, Terrys Creek, Devlins Creek and other lesser streams, cut across the undulating shale capped plateau creating steeper side slopes and causing steep dips in the existing east-west road alignments.

The entrenchment of Terrys Creek gives rise to steep and rugged valley sides and this formation penetrates through the width of the study area.

Immediately west of Terrys Creek the north-south ridgelines of Epping, Cheltenham and Beecroft, support older built development related to the railway and existing transport corridor.

Moderately steep undulating land extends west from the Epping/Beecroft ridgelines along Carlingford and Copeland Roads. However, the slopes are more even in the vicinity of North Rocks and Murray Farm Roads. Devlins Creek follows fairly gentle grades between Pennant Hills Road and the Main Northern Railway which is located on the eastern edge of the Beecroft–Cheltenham ridgeline.

Pennant Hills Road follows its own north-south ridgeline which separates the watershed catchments of the Darling Mills Creek system to the west and the Devlins Creek/Lane Cove River system to the east.

3.1.2 Vegetation

The characteristics of vegetation relate directly to the basic geology of the study area and resulting soil types, in conjunction with landuse characteristics which follow patterns largely defined by landform and soil qualities.

Consequently the poor quality sandstone soils of the entrenched Lane Cove River and Terrys Creek still support the typical bushland of Sydney's sandstone topography. This bushland

persists in fairly good condition within the Lane Cove River State Recreation Area and the public open space of the Terrys Creek Valley.

The shale capping of the lands bordering the Devlins Creek, Terrys Creek and Lane Cove River system would once have supported tall forest on relatively productive soils, attracting the interest of agricultural activities and in turn, a vigorous clearing process.

Current residential, commercial and institutional land development has almost completely taken the place of the earlier rural activity, so that the land beyond the bushland valleys is virtually devoid of original natural vegetation. Where new domesticated gardens have not been established, the remnant rural land is typified by pasture grasses and broad-leafed weeds. A rough mix of rural and domestic weeds, and exotic and native species occurs along the interface of the shale soil edges and the upper limits of the sandstone valley formations.

The close association of the surviving bushland and surrounding urban (and prior rural) development generates weed intrusions which reduce the quality of bushland generally and causes intense infestations along edge margins and along watercourses. Bushland quality is affected in terms of impact upon the cost of management, reduction of species diversity and diminished aesthetic value. These negative values are prone to quick expansion in response to further disturbance.

The denuded character of the developed lands is partly compensated in visual terms by the occasional specimen or small stand of native species, typically, but not exclusively, Eucalypts of various ages, including some large mature examples. These trees occur in random locations, along otherwise cleared and weed-infested creekbeds (e.g. Shrimptons Creek and Devlins Creek below Murray Farm Road) and occasionally on built sites and in small local parks.

Vegetation of many descriptions occurs as an effective greening element in residential, institutional and commercial areas.

However, the overall situation related to the lack of surviving natural vegetation in shale-derived soils makes more important, the presence and quality of the vegetation types still existing in the Devlins Creek environment (particularly upstream from Murray Farm Road); this forest area is further enhanced as a remnant example of natural conditions by its association of differing forest types and its relationship with the Hammondville soil association.

The rugged and densely vegetated character of the Terrys Creek and Lane Cove River systems, though not unique in a general overview of Sydney, are of great value to the region. As contrasting, largely natural evidence of the region's original qualities, their future persistence and integrity as natural systems are matters which demand serious consideration.

Existing vegetation, whether representative of shale or sandstone soils, or simply that associated with local reserves and domestic gardens, has a further value as an important screening element where it occurs in potential transport corridors.

3.1.3 Landuse

The study area, beyond its entrenched valley system, is virtually committed to existing and imminent building development. Institutional, commercial and industrial landuses, typically on large sites, are developments of relatively recent times. Residential development along with both passive and active public parkland and open space constitute the balance and a large proportion of landuses in the study area.

Housing activity has been pursued over a long time period accounting for the older and more mature residential environments around the Epping town centre, and westwards along Carlingford Road. Housing development has continued progressively up to the present day so that a broad range of housing types and ages occurs.

The wide corridor of Epping Road which carries a substantial traffic-load, represents the only significant traffic route of appropriate dimensions within the study area. Other roads such as Carlingford Road have acquired an importance as improvised traffic arteries operating on basically unchanged road formations. The outcome is of heavy traffic being carried in circumstances which impair the local residential environment while being at the same time unsatisfactory as transport corridors.

3.2 TRANSPORT OPTION CORRIDORS

3.2.1 Expressway and Arterial Options

A number of possible routes have been investigated throughout the study area in order to identify the better or more likely solutions which may have been further developed as design proposals. Their initial selection was made either because of their existing functions as traffic routes or because of their possible suitability related to topography and as logical connecting alignments. Within the study areas generally, virtually all land has already been committed to urban development other than designated open space reservations and the actual reservation of the F2 Expressway corridor. The prospect of investigating and analysing a study area in an objective response to the landbase without being severely constrained by existing landuse conditions or the existing road network was not a possibility.

Each of the options, including the F2 expressway reservation in this report section was investigated and assessed in terms of existing conditions and potential impacts.

Arterial road circumstances and potentials are similar in many respects to those of the western zone and therefore the assessment of Carlingford, Epping and other potential arterial road options have many aspects common to the western study area. They typically traverse established and settled residential domains revealing a vegetative character which can be mainly identified with domestic gardens in a mix with occasional remnant groups and small stands of original forest character. Beyond the immediate impact of sometimes very busy local traffic corridors, the residential environments are usually peaceful and quietly attractive situations without especially significant features, except perhaps at vantage points overlooking bushland; their main characteristics amongst a mix of old and new development are observed as being harmonious and convenient places of residence.

Schools, other institutions and public reserves occur frequently throughout the study area and often adjacent to existing main roads. Industrial and commercial land uses feature in the mix of landuses where residential development is the predominate type.

The physical amenity and visual qualtities of the study area are undesirably affected by the presence of existing traffic streams on main roads, creating noise impacts, hazard potential and fragmentation of residential land units. These effects diminish the value of the broad landscape environment and particularly that of residential areas.

3.2.2 Carlingford and Epping Roads

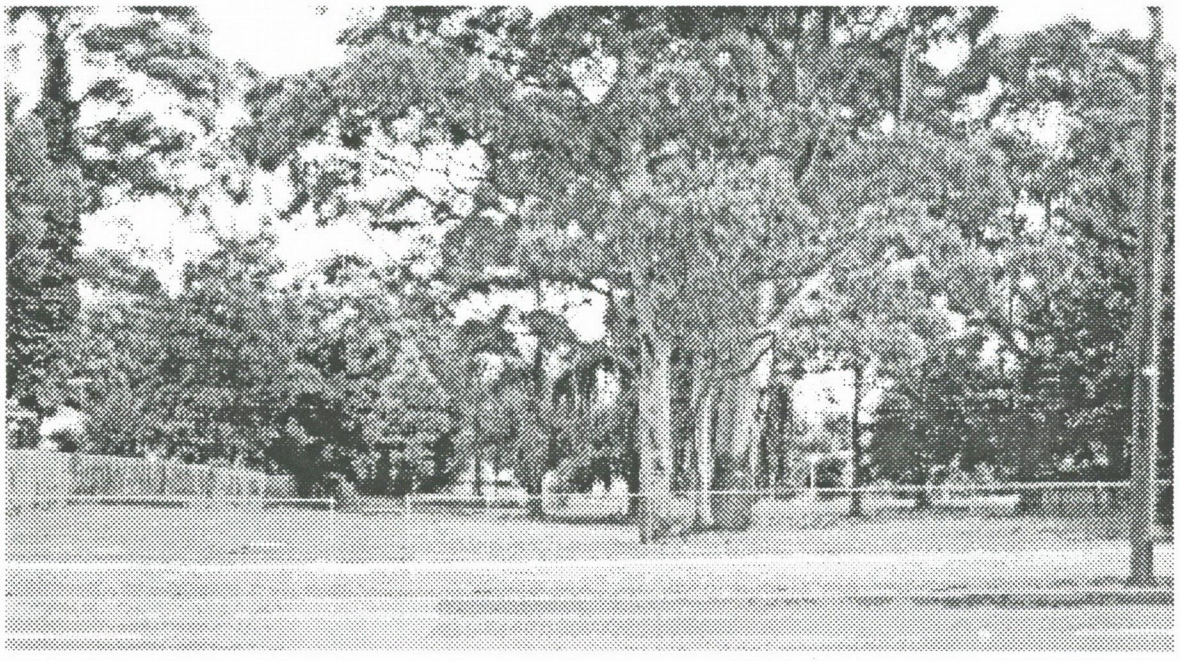
Carlingford Road reveals quite different circumstances to Epping Road which is predisposed towards a function as a traffic artery with an existing broad reservation, sometimes broad clear margins and to some extent, compatible landuses developed at its edges. While some low-density residential development occurs close to Epping Road's carriageways, most of the development on its margins is industrial, commercial, institutional or medium density low-rise residential. Some open space also abuts.

By contrast, Carlingford Road is a thoroughfare committed to four lanes between fixed kerb-lines fully developed on both sides to a pattern which reflects its suburban intention. Though mostly low-density residential, development includes an interesting mix of landuse types covering a range of periods from recent to comparatively old. Epping West Public School, for example, between Downing and Ward Streets dates to 1927 while new development includes medium-density housing and large commercial buildings towards Epping town centre.

CARLINGFORD ROAD

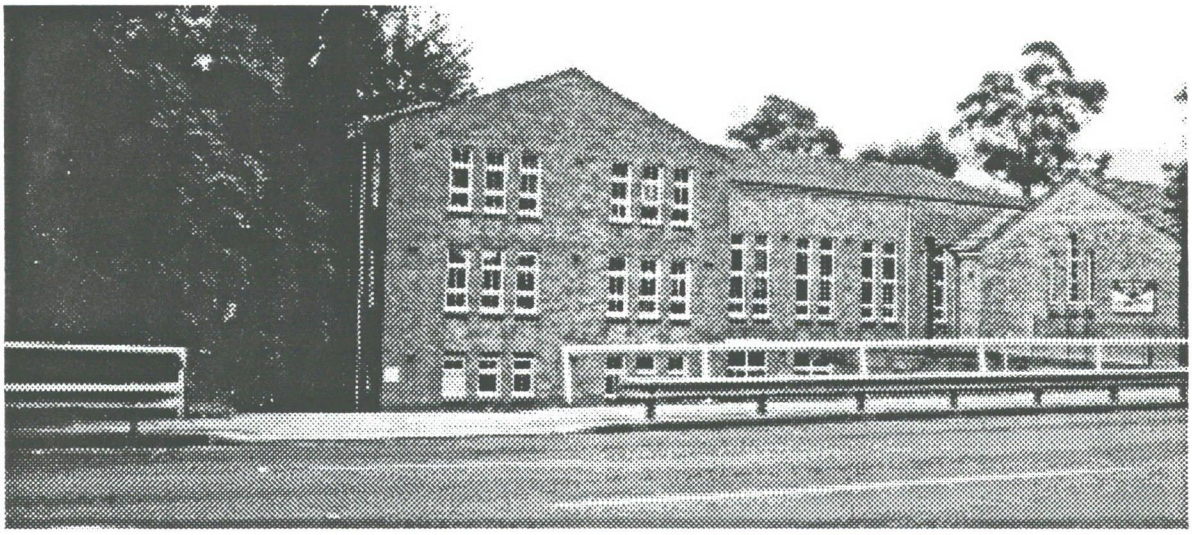
CARLINGFORD ROAD HAS ATTRACTED REGULAR BUSY TRAFFIC LOADS SO THAT ITS CARRIAGEWAY IS FULLY UTILISED AS A FOUR-LANE THOROUGHFARE. THE MIX OF ESTABLISHED RESIDENTIAL GARDENS AND LARGE TREE SPECIMENS PROVIDES SUBSTANTIAL GREENED MARGINS TO THE ROAD. PROPERTY TYPES VARY CONSIDERABLY TO INCLUDE SCHOOLS, COMMERCIAL BUILDINGS, LOW DENSITY AND NEW MEDIUM DENSITY RESIDENTIAL HOUSING. TYPICALLY, DEVELOPMENT IS RELATIVELY TIGHTLY ARRANGED AGAINST THE ROAD RESERVATION AND THE ABSENCE OF PARKED CARS AND, AT THE TIMES OF INSPECTIONS, OF PEDESTRIANS, GAVE A SENSE OF THERE BEING A SHARP DIVISION BETWEEN THE ENVIRONMENT OF THE ROAD AND THAT OF ITS ADJACENT COMMUNITY.

Three churches border the road along with pockets of public open space. The well-established gardens of Carlingford Road and small park reserves contain many mature trees including indigenous species of the original environment. A less pleasing reality is the growth of traffic which has transformed Carlingford Road into a type of arterial road and with noise congestion and sometimes hazardous conditions, its suburban amenity has already been diminished.



TYPICAL OF THE MATURE NATIVE TREES TO BE FOUND IN SMALL PARKS ON CARLINGFORD ROAD AND OTHER IMPORTANT ROAD ROUTES. THIS GROUP OF BLACKBUTT (EUCALYPTUS PILULARIS) IS IN KILPACK PARK ON THE NORTH SIDE OF THE ROAD.

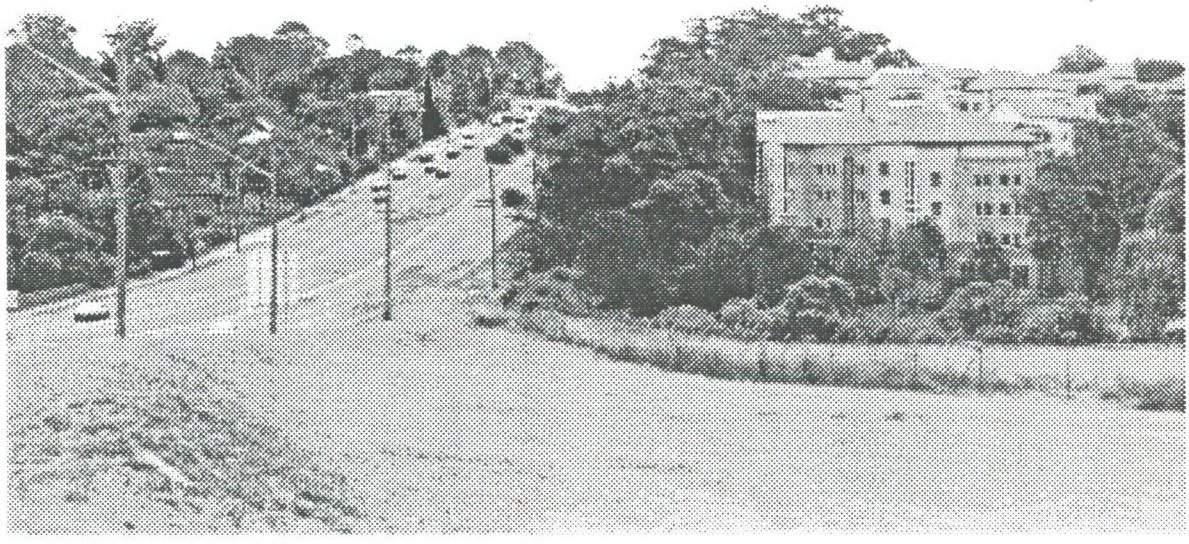
THE REASONABLY STRAIGHT ALIGNMENT OF CARLINGFORD ROAD TRAVERSES A SERIES OF RIDGES AND VALLEYS TO FORM FAIRLY STEEP GRADES. THE ROAD IS TYPICALLY APPROXIMATELY 12 METRES WIDE WITH 4 METRE WIDE FOOTPATHS.



CHURCH BUILDINGS ON THE NORTHERN MARGIN OF CARLINGFORD ROAD BETWEEN CLIFF STREET AND BEECROFT ROAD.

Bearing in mind the possible dimensional requirements of an arterial road upgrade in these circumstances, at least one side of the existing road would involve demolition of its built edge. Neither side offers an obvious choice.

An arterial road design would generally follow existing grades, but even so, new construction would have a major initial impact on existing development, vegetation and landform. Any need to improve gradients with cut and fill works or to develop significant intersection geometry would expand the impact accordingly.

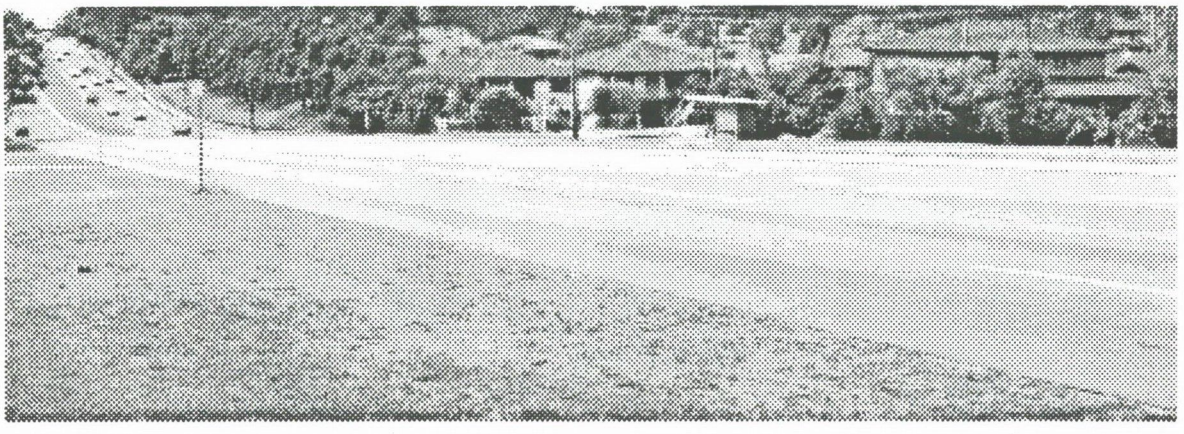


EPPING ROAD

EPPING ROAD, ALREADY COMMITTED TO AN ARTERIAL ROAD FUNCTION, EXISTS IN A RELATIVELY WIDE RESERVATION OFTEN WITH ADDITIONAL CLEAR MARGINS ASSOCIATED WITH POCKETS OF PUBLIC OPEN SPACE AND LARGER COMMERCIAL SITES. LANDUSE ON EITHER SIDE COVERS A RANGE FROM LOW DENSITY SINGLE LOT HOUSING, THROUGH TO MEDIUM HIGHRISE RESIDENTIAL AND OTHER COMMERCIAL AND INDUSTRIAL ACTIVITIES. SPORTS AND INSTITUTIONAL USES ADD FURTHER LARGE-SITE FUNCTIONS, SO THAT A PREDOMINANCE OF LARGER SITE LANDUSES OCCURS. SIMILARLY, ONLY IN A FEW LIMITED SITUATIONS IS SMALL SCALE DOMESTIC DEVELOPMENT CLOSE TO THE ROAD EDGE.

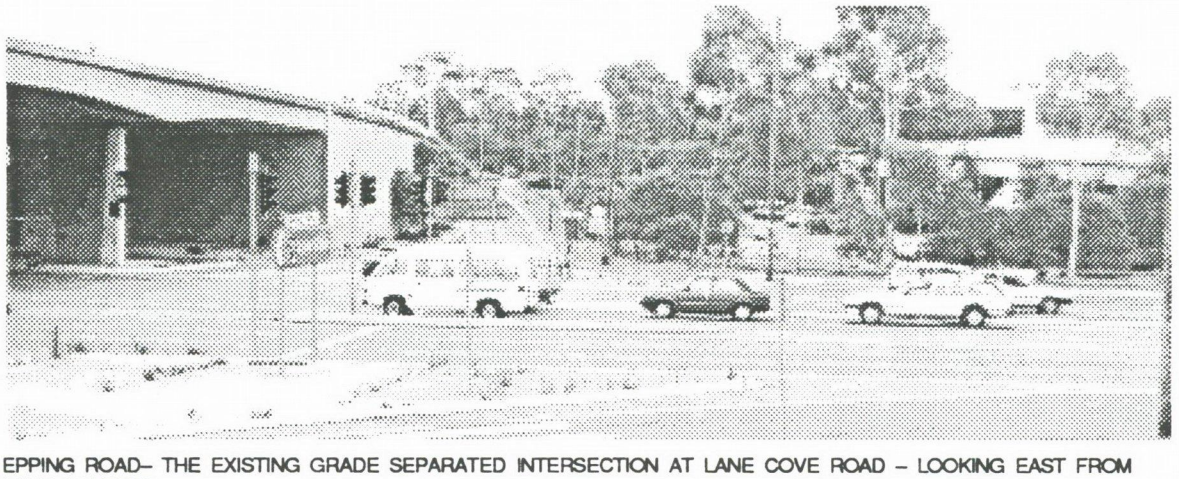
Epping Road from Terrys Creek through to the Lane Cover River exists as a mostly six lane already upgraded road in a broad corridor. Much of the formation includes a median of five–six metres width. Commercial and institutional uses comprise most of the adjoining landuses

on the northern margin in conjunction with medium density residential development. Low density housing borders the northern edge to the west of Terrys Creek and near the corner of Delhi Road. The southern margin typically contains low density residential and parkland open space. On either side of the road, buildings (with some exceptions) tend to be set well back from the edge and in some cases, separate service roads are already in use.



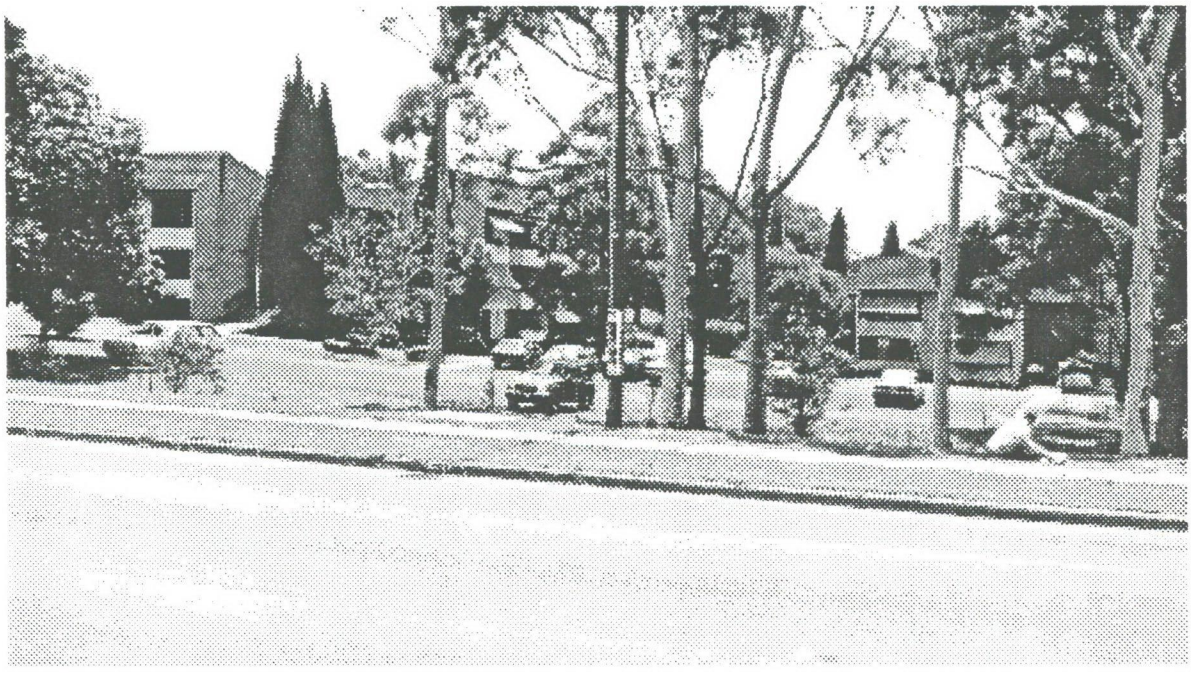
EPPING ROAD : A CLEAR GRASSED MEDIAN STRIP UP TO 6 METRES WIDE IS INCLUDED IN MUCH OF THE ROAD FORMATION.

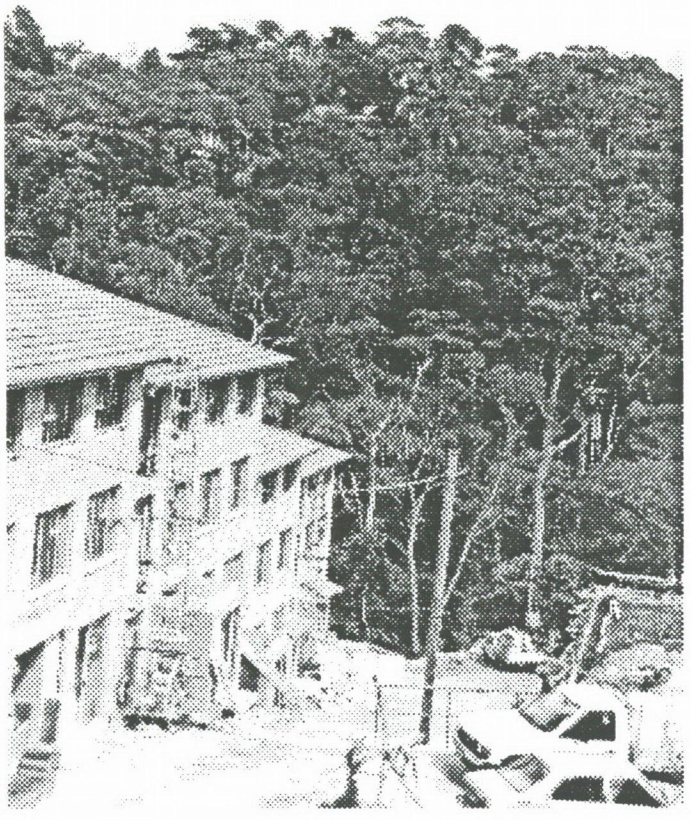
There are no significant stands of trees or vegetation likely to be badly affected by a major upgrading of Epping Road – some edge losses may occur. Generally, the existing circumstances indicate that a new road formation with service roads as may be required could be accommodated to a large extent within the existing reservation.



EPPING ROAD– THE EXISTING GRADE SEPARATED INTERSECTION AT LANE COVE ROAD – LOOKING EAST FROM LANE COVE RD.

A RESORT DEVELOPMENT (ABOVE) AND MEDIUM DENSITY HOUSING (BELOW) SET BACK FROM THE NORTH SIDE OF EPPING ROAD.





NEW MEDIUM DENSITY RESIDENTIAL DEVELOPMENT IS OCCURRING ON THE EASTERN MARGIN OF TERRYS CREEK ON THE NORTHERN SIDE OF EPPING ROAD. THIS DEVELOPMENT IS QUITE EXTENSIVE AND CREATES A BARRIER TO ROUTE OPTIONS IMMEDIATELY NORTH OF EPPING ROAD AT THIS POINT.

THE BACKGROUND VIEW ILLUSTRATES THE ROBUST VISUAL QUALITY OF THE VEGETATION IN THE TERRYS CREEK VALLEY ON ITS WESTERN SLOPE BELOW THE EPPING TOWN CENTRE. THE NATIVE VEGETATION MERGES WITH THE OLDER AND ATTRACTIVE RESIDENTIAL SITES OF THE EPPING RIDGE AND WITH MATURE GARDEN PLANTINGS.

3.2.3 North Rocks Road – Plympton Road

The two roads form a route by connecting at a slight twist in their alignments near Coverdale Street. This option was investigated because of its connection to an arterial road option being examined on North Rocks Road to the west of Pennant Hills Road by the consultants for the western study area. Its ultimate extension to the east could be to a connection with a route development in the F2 reservation beyond the eastern end of Plympton Road.

The existing route attracts some traffic off Pennant Hills and Carlingford Roads, but tends to be quieter over its Plympton Road segment. Much of the time outside peak periods the two roads form a relatively quiet residential environment bordered by individual houses. A small local shopping centre exists where North Rocks and Plympton Roads come together.

Three schools are situated along the northern boundary including the large site complex of Carlingford High School with its extensive open space and sportsfields.

Plympton Road reduces to approximately 8 metres width with two traffic lanes. Three small parks adjoin the road and at Magnolia Avenue a small tributary of Devlins Creek is bridged. In this area there is a dense stand of tall native trees and understorey which are quite luxuriant and representative of the Devlins Creek environment. A strong line of semi-mature planted tallowwood trees (Eucalyptus microcorys) forms a grand avenue on the northern margin of Plympton Road. Good stands of tall mature Eucalypts characterise the street and in conjunction with established older gardens, create a visually pleasing street scene.

The topography would be suited to a major road development, but the increased width that would be required, would have a profound effect. Neither side of the two roads offers an obvious choice given the distribution of homes, mature vegetation, schools and reserves. The losses would be severe.

ROSELEA PUBLIC SCHOOL (ONE OF THREE ON THE NORTH SIDE OF NORTH ROCKS ROAD) AND MATURE NATIVE TREES ON THE FOOTPATH MARGIN.

THE TWO ROADS, NORTH ROCKS AND PLYMPTON, TOGETHER OFFER AN OPTIONAL INFORMAL PASSAGE TO TRAFFIC FILTERING OFF THE MAIN ROADS. EVEN SO, THROUGHOUT MOST OF THE DAY, TRAFFIC IS LIGHT AND ESPECIALLY IN PLYMPTON ROAD THE ATMOSPHERE IS QUIET. A VARIETY OF LANDUSES OCCURS INCLUDING A PREDOMINANCE OF OLDER HOUSES AND GARDENS TYPICAL OF THE AREA, PLUS THREE SCHOOLS, A SMALL LOCAL SHOPPING CENTRE AND SMALL LOCAL PARKS. ONE OF THE SCHOOLS IS CARLINGFORD HIGH SCHOOL, A LARGE INSTITUTION ON A LARGE SITE. SMALL PARKS INCLUDE MATURE VEGETATION AND NEAR MAGNOLIA CRESCENT A LUXURIANT STAND OF NATIVE VEGETATION RELATED TO DEVLINS CREEK BORDERS THE ROAD. AN AVENUE OF TALL PLANTED EUCALYPTS (E. MICROCORYS) LINES THE NORTHERN FOOTPATH OF PLYMPTON ROAD (BELOW).

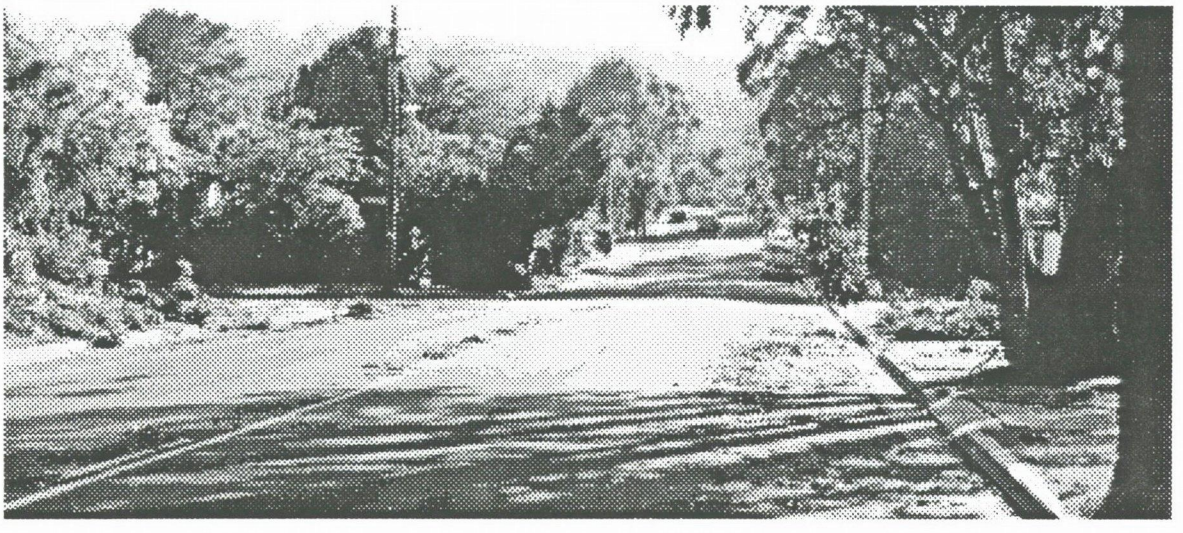
PLYMPTON ROAD

3.2.4 Murray Farm Road

The interest in Murray Farm Road stemmed from its mostly straight and reasonably even vertical alignment which on plan connected the eastern section of Devlins Creek with the expressway reservation in the Cumberland State Forest to the west of Pennant Hills Road.

Other benefits that might have been derived from this alignment were the opportunities to miss entirely the more distinctive natural environmental qualities in Devlins Creek and those associated with the western end of Mahers Road in the western study area.

An alignment option in this case would follow the straight path of existing Murray Farm Road from the west to cross Pennant Hills Road and connect with the expressway reservation at Cheltenham Park.



MURRAY FARM ROAD : VIEW EAST FROM MARWOOD DRIVE.

Housing stock tends to be older towards the eastern and older development zone of Beecroft/ Epping. The roadway enjoys a peaceful and pleasing environment with established houses and gardens, and occasional large specimens of native trees. Towards Devlins Creek, off the eastern end of Murray Farm Road, good quality native vegetation would be encountered across the path of a road development.

Some traffic pressure has developed between a roundabout at Oakes Road and Pennant Hills Road to the west; however, a road closure on the eastern edge of Pennant Hills Road has established calm traffic conditions in the eastern section of Murray Farm Road.

An arterial road development in these circumstances would have a severe impact not only on existing development along the road edges where a continuous strip of housing would be lost, but also over a much broader margin distant from construction; between the alignment of Murray Farm Road and Devlins Creek, a large segment of residential development would be effectively cut off from its present surroundings.

MURRAY FARM ROAD : VIEW EAST FROM THE RIDGELINE OF PENNANT HILLS ROAD SHOWING THE WELL-VEGETATED MARGINS AND MATURE GARDENS WHICH BORDER THE ROAD.

3.2.5 Copeland Road – Main Northern Line

An alignment following Copeland Road from the Main Northern Line at Beecroft and cutting down to the western end of Mahers Road has been investigated. On plan the alignment demonstrated an option path which bypassed the Devlins Creek environment and passed through the western section of Mahers Road. The option, to be successful, relied upon the feasibility of a complex development being considered for a segment between Beecroft Station and Somerset Road. This latter proposal would involve the construction of an elevated roadway over the railway line.

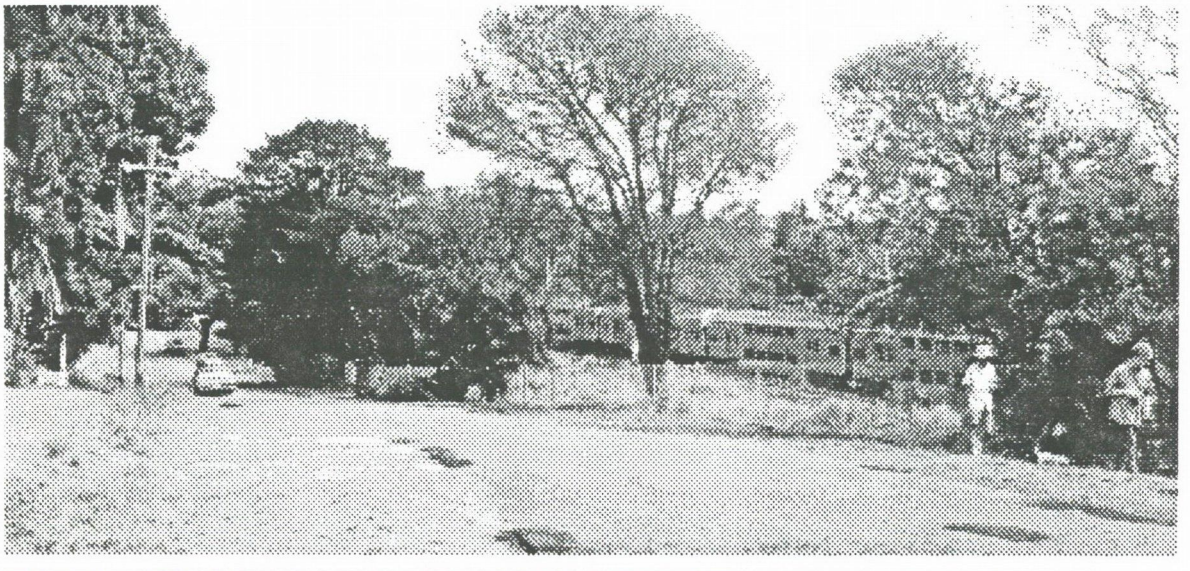
Copeland Road has typically a 10–12 metre wide pavement, bounded on both sides by single storey housing, the exception being a pocket of recently constructed townhousing on both sides of the road between Hull Road and Burns Road. Good stands of Eucalypts and well-established gardens embellish the road's edges and, in conjunction with relatively light traffic flows, an attractive street scene has been created. The arterial road construction would destroy all housing facing the northern edge of Copeland Road. Housing of a similar character facing Rorke Street, Burns Road North, Cardinal Avenue and Penrhyn Avenue, would also be lost.

The impact on housing at and near the Pennant Hills Road intersection would be severe because of the intersection pattern that would be required. The terrain is steeply undulating and the effect of cuts and fills would be significant, expanding the physical and visual impact of the new large road, especially across the open space of Pennant Hills Golf Course which lies immediately south.

The extension of the alignment which would connect Copeland Road and the western section of the expressway reservation near Mahers Road (west), traverses an area of relatively new residential housing. This extension is discussed briefly in the report for the western study area.

COPELAND ROAD : VIEW EAST FROM NEAR YORK STREET TOWARDS BEECROFT ROAD.

The connection between Beecroft and Somerset Road via the railway corridor was examined as an option. In principle it was attractive given that it may have shared an existing transport corridor in a multi-purpose function. Its detail aspects proved to be fairly formidable because of the associated connections required through existing development, particularly at its northern end, ie. at Cheltenham or Beecroft, dependent upon the route taken between the railway and Pennant Hills Road. To the south, this alignment would involve major structures to carry it across the valley of Devlins Creek on the eastern side of the railway to connect with Somerset Road. Following the railway, the elevated structure would be exposed across the dips in the undulating topography to houses fronting The Crescent which borders the line.



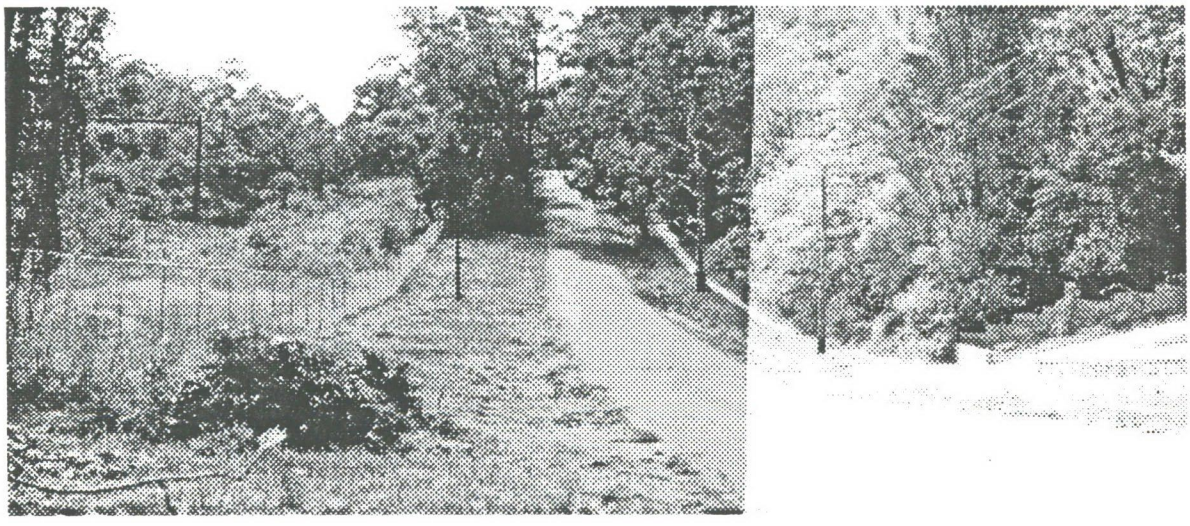
THE RAILWAY CORRIDOR DIPS INTO AND OUT OF SIGHT IN CONJUNCTION WITH THE STEEPLY UNDULATING TOPOGRAPHY OF THE EASTERN SIDE OF THE CHELTENHAM RIDGELINE. THE CRESCENT IS IN THE FOREGROUND.

On the eastern side the road viaduct would tend to form a skyline view for areas on the eastern slopes of the Beecroft-Cheltenham ridgeline and across the valley in the vicinity of Norfolk Road. With appropriate design this view need not be unacceptable and on the western side, land space would be available to screen and soften the outlook from The Crescent.

Apart from the difficulties known to be associated with its engineering design, the proposal fails to be an attractive option mainly because of the impact it would have in making a connection with a route to the west. Whether along Copeland Road, or on an angle between Cheltenham and Mahers Road, a transport route would be costly in visual and landscape terms, cutting through existing street patterns, houses, mature gardens and many remnant native trees.

Because of the steep and folding landform of the eastern face of the ridge, it is difficult to envisage a suitable road construction which could be designed to parallel the railway on that side.

The easier solution might be to make an alignment along The Crescent which borders the western side of the railway and then to cross over or tunnel under the railway closer to Devlins Creek. This option, of course, would destroy the existing line of older houses and gardens fronting The Crescent.



THE CRESCENT SHELTERED BY THE RAILWAY RESERVATION HAS A QUIET RETREAT QUALITY WITH MINIMAL PASSING TRAFFIC AND A WELL-TREED ENVIRONMENT. A LARGE ROAD DEVELOPMENT OVER OR ALONGSIDE THE RAILWAY WOULD HAVE A STARTLING IMPACT.

3.2.6 Expressway Reservation

Pennant Hills Road Intersection

Heavy persistent traffic activity dominates the north-south corridor of Pennant Hills Road and creates a formidable visual presence. The margins of Pennant Hills Road reveal an older traditional suburban character, visually, but this character suffers the impact of the heavy traffic and a traffic presence which continues to increase in volume.

TYPICAL VIEW OF PENNANT HILLS ROAD DURING A NORMAL WEEKDAY BETWEEN PENNANT HILLS AND WAHROONGA.

The reservation corridor follows Mahers Road to the west and east of Pennant Hills Road. Mahers Road, in spite of the altered conditions of Pennant Hills Road, is still a relatively peaceful suburban corridor and on the eastern side its houses look onto the Pennant Hills Golf Course opposite.

Immediately adjacent to the northern edge of the reservation bordering Mahers Road and mostly to the east of Glenwood Street, is a band of mature native trees (mostly Eucalyptus spp.) approximately 10–20 metres wide. Beyond these trees is a golf course fairway and a generally treed backdrop.

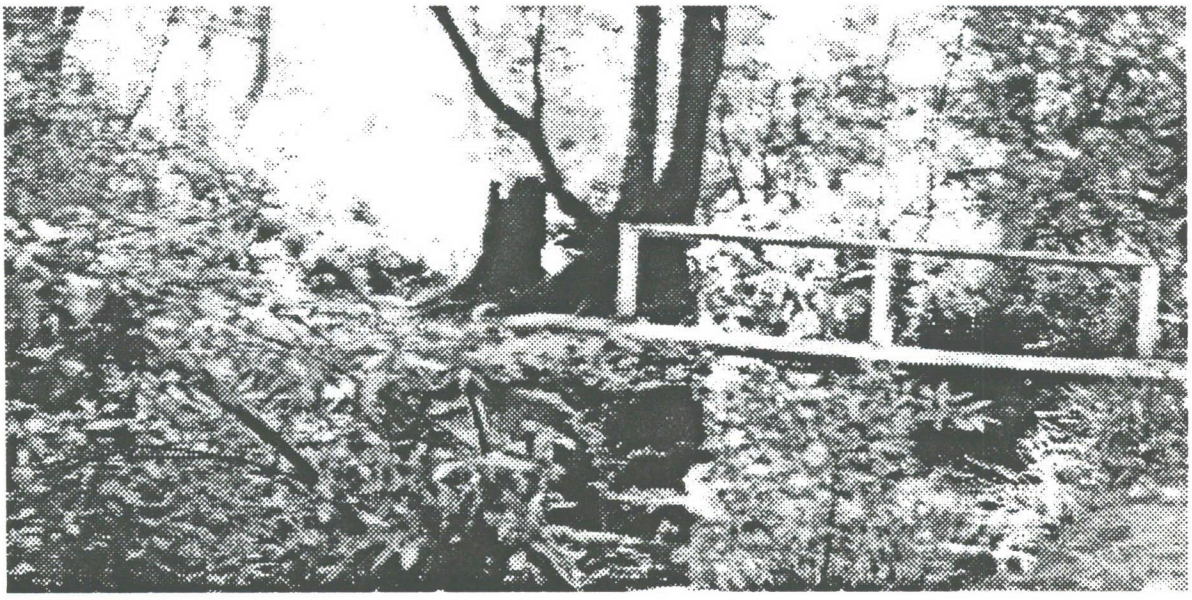
Larger trees, including exotic and indigenous specimens, occur in gardens and the road verge on the southern side of Mahers Road generally to the east of Glenwood Street. Where Mahers Road terminates against the public reserve of Devlins Creek, dense forest conditions begin in a mix with a weedy understorey

Devlins Creek : Mahers Road to the Northern Railway

The Devlins Creek valley from the end of Mahers Road at the southeast corner of the golf course through to the Main Northern Railway, represents a mix of environmental qualities. Overall, it is a greened open space, accessible to the public and of value for both active and passive recreation. It is also a stormwater drainage corridor and a resource for wildlife. (Refer to Section 4 where bushland qualities are discussed.

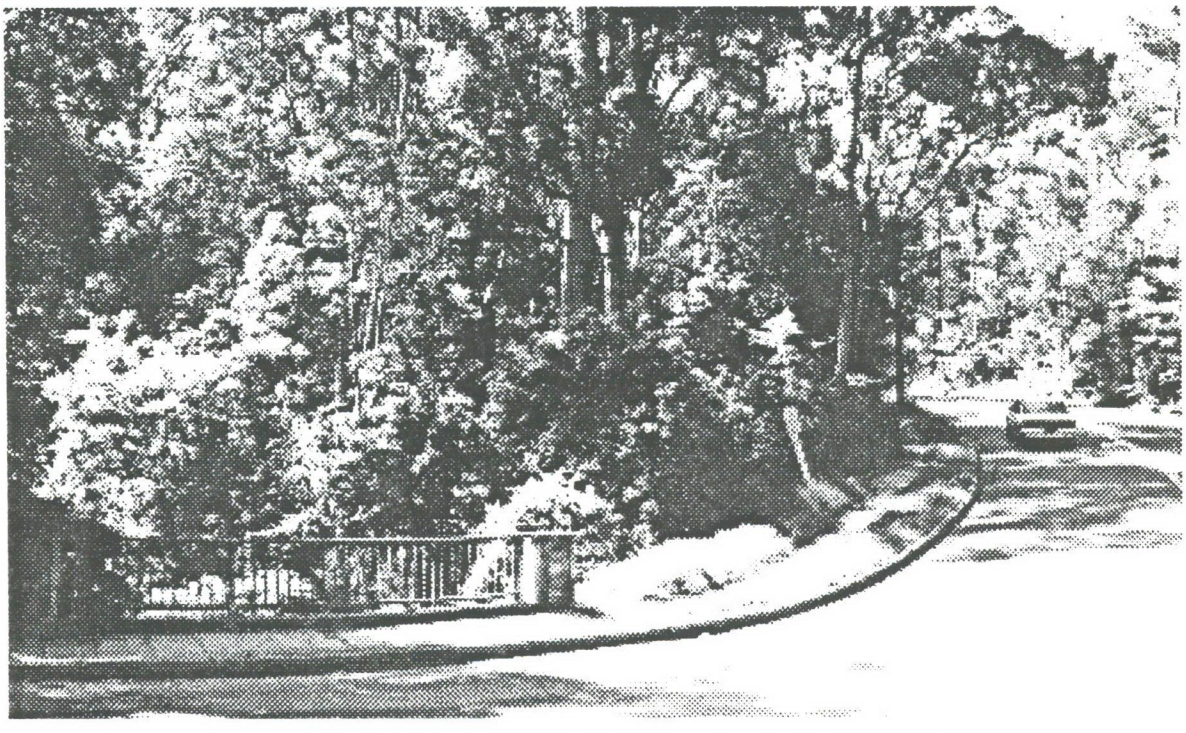
Where creek crossings occur, casual pedestrian access is made available from the northern and southern residential edges. Two specific crossing points are used by school children between Allerton Road and Welham Street and Kent Street and Castle Howard Road. A scout hall is

situated in a forest location below Welham Street. Cheltenham Park includes a sports oval and other sports uses in a cleared, grassed expanse bordering Castle Howard Road in the vicinity of the Kent Street pedestrian bridge.



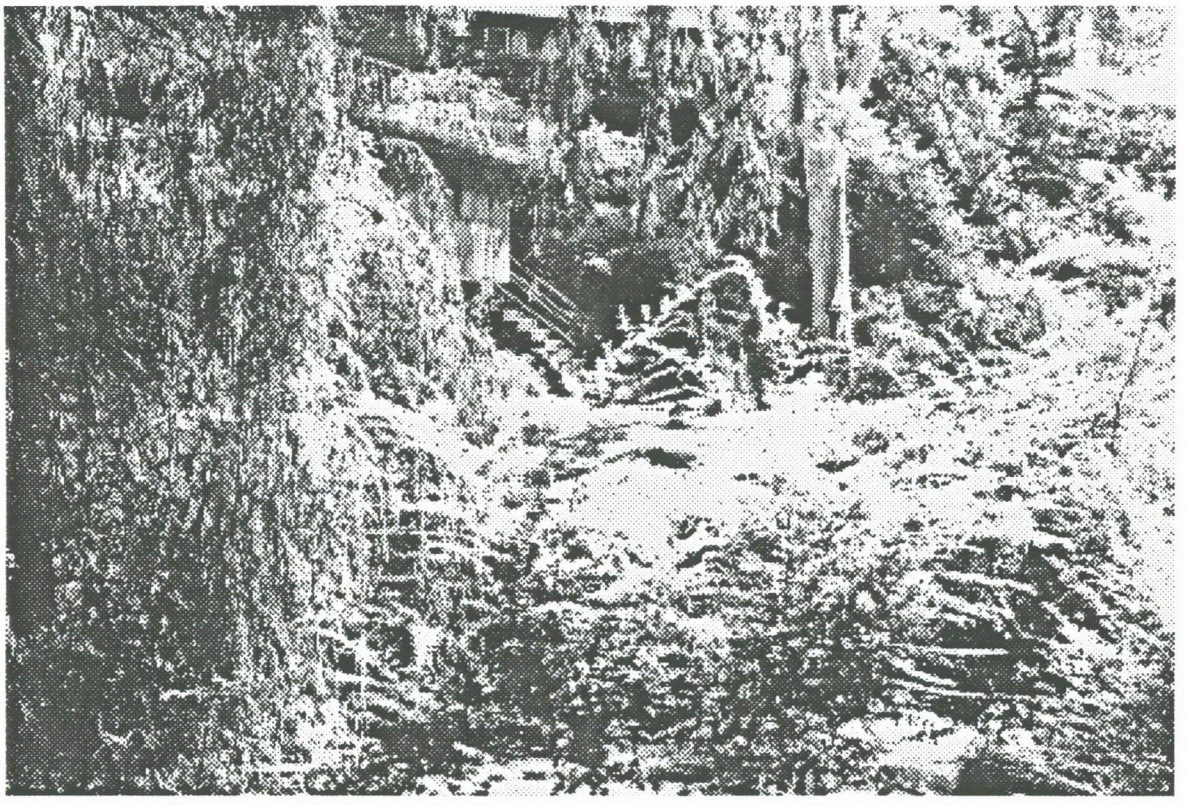
PEDESTRIAN PATHWAY AND BRIDGE OVER DEVLINS CREEK IN FOREST CONDITIONS BELOW ALLERTON AVENUE.

Murray Farm Road crosses the stream on a low level bridge. Dense bushland of good quality borders Murray Farm Road on each side to the north of the creek. Vegetative qualities range from excellent in the examples of particular remnant bushland areas through to degraded as represented by weed-infested creeklines, stream banks and much of the peripheral edges adjoining residential development. The creek and the creek profile either side of the Murray Farm Road bridge are heavily weed-infested. The low level bridge provides another crossing point for pedestrians.

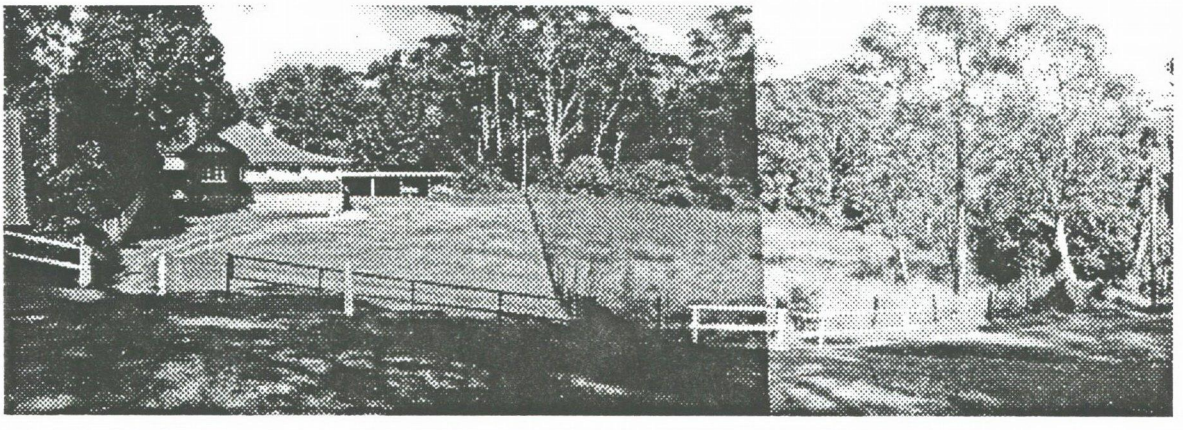


LOW LEVEL BRIDGE (MURRAY FARM ROAD) OVER DEVLINS CREEK. RAMPANT WEED-GROWTH ON THE STREAM BANKS – FOREST CONDITIONS OF EXCELLENT VISUAL QUALITY IN THE BACKGROUND.

Housing edges look onto the valley zone for most of its length, in some places through densely treed margins and at others directly onto cleared land. While natural circumstances still persist in some locations, other situations offer mature and attractive tree stands over a weed-ridden floor.



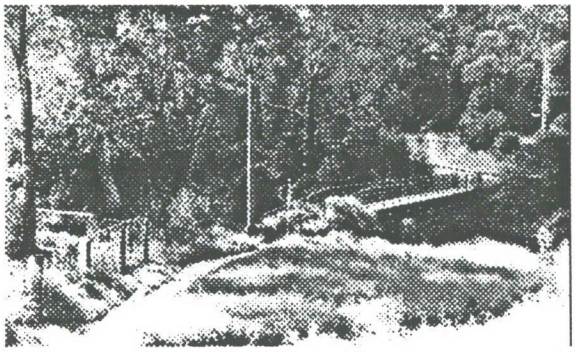
HOUSES CLOSE TO THE RESERVATION ON THE SLOPES BELOW FERNDALE ROAD – CREEK BANKS OVERRUN WITH WEEDS.



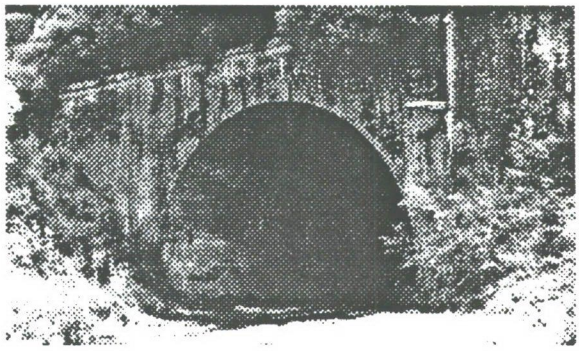
AT THE END OF KENT STREET LOOKING WEST OVER DEVLINS CREEK VALLEY. TALL DENSE TREE GROWTH OVER WEEDY GROUNDCOVER BORDERS THE CREEK. MUCH OF THE TREE GROWTH IN THIS VIEW IS IN THE RESERVATION ALONGSIDE THE CREEK.

Even in its more environmentally degraded situations, the valley environment is visually pleasing and in certain specific places is quite beautiful. In the better locations, natural qualities are such that opportunities occur for serious field studies to be undertaken.

At the end of Kent Street where it terminates at the edge of the creek corridor, West Epping Public School is sited immediately against the reservation boundary.

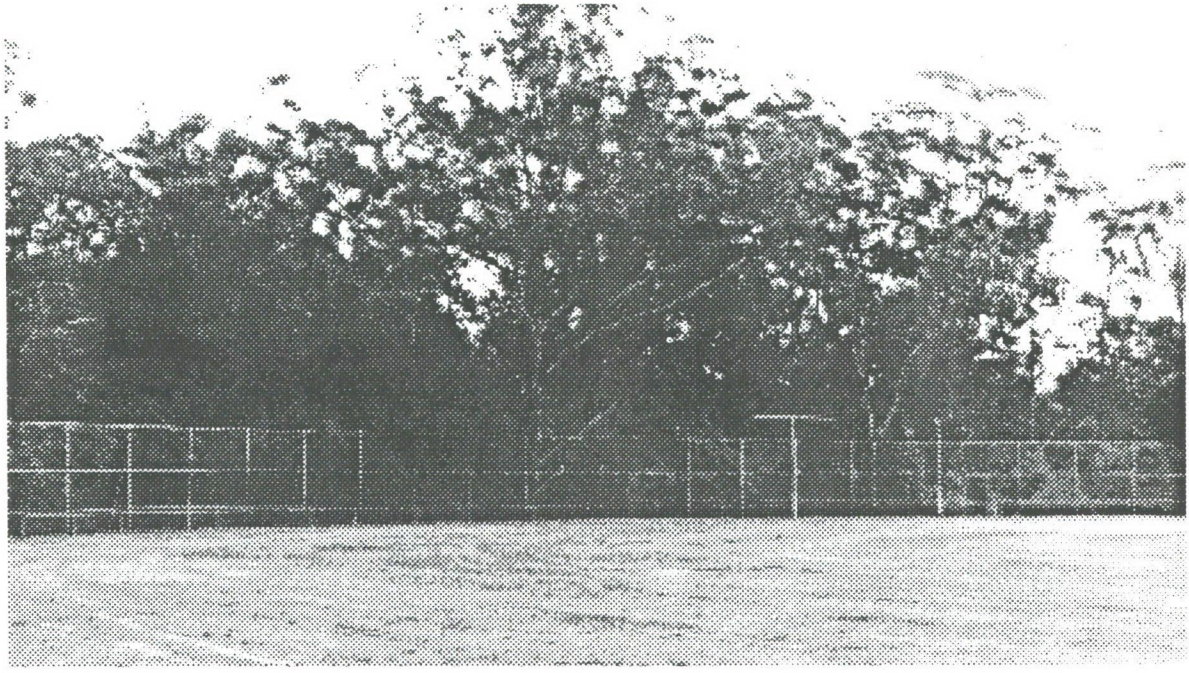


PEDESTRIAN BRIDGE OVER THE CREEK AT THE END OF KENT STREET.



AN INTERESTING BRICK CULVERT WHERE DEVLINS CREEK PASSES UNDER THE RAILWAY. THIS IS OUTSIDE THE RESERVATION CORRIDOR.

The reservation follows the creek corridor to the Main Northern Line passing the busy thoroughfare of Beecroft Road. Large native trees feature along the creek margins, and consequently in the reservation, in groups and dense stands. Some native species occur as understorey plants but exotic weeds tend to dominate the ground cover. A good patch of native bush on a sandstone outcrop exists towards the eastern end of Castle Howard Road on the north slope.



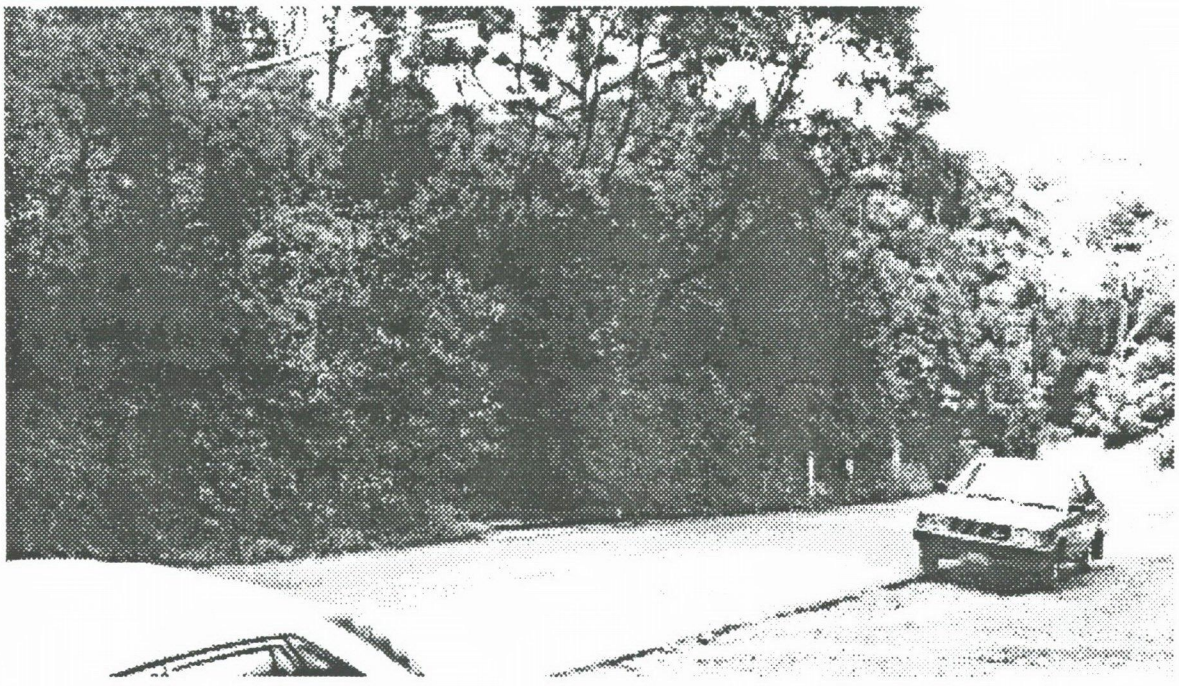
CHELTENHAM OVAL BORDERING THE EXPRESSWAY RESERVATION.

Main Northern Railway to Terrys Creek

On the eastern side of the railway, the reservation runs parallel to and on the northern side of Somerset Road through residential development and the southern edge of Epping Park.

The eastern end of Somerset Road terminates against the bush covered slope above Terrys Creek. A narrow corridor of bushland follows a small creekline between Somerset Road and the slopes below Woodvale Avenue. The reservation passes between Somerset Road and Woodvale Avenue on its approach to the Terrys Creek Valley.

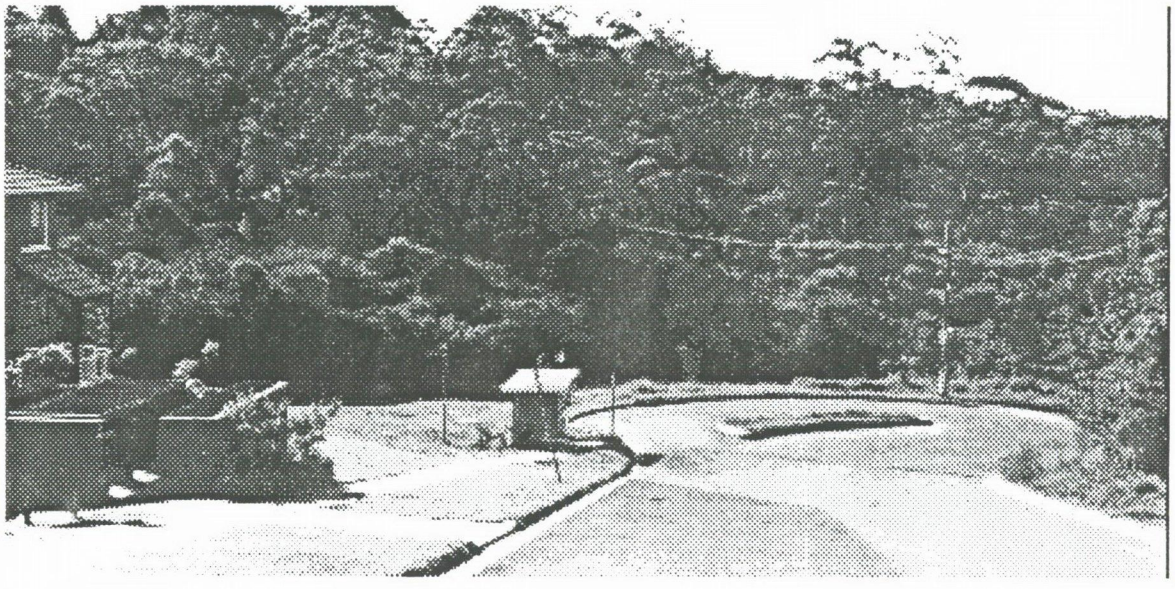
Distant views of the road reservation would be obtained from positions across the valley in the vicinity of Crimea and Epping Roads.



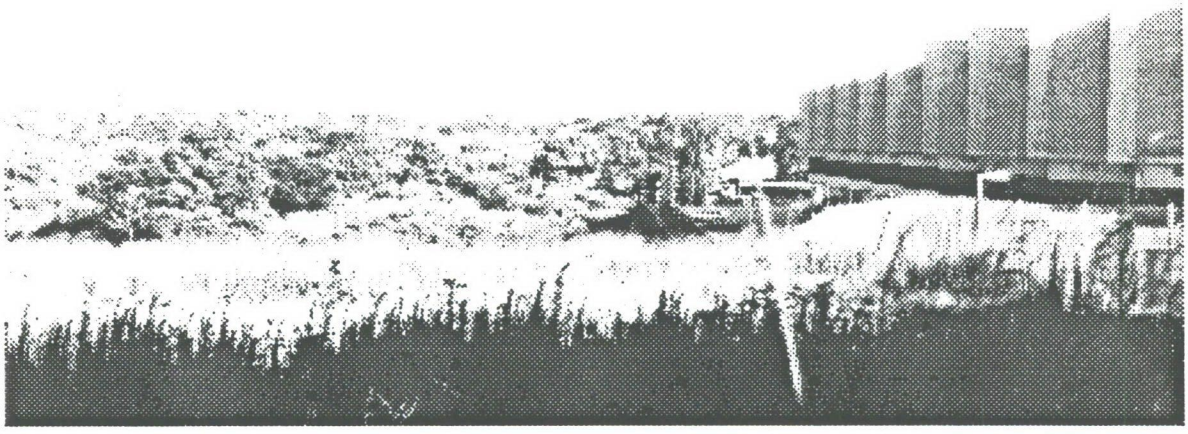
SOMERSET ROAD AT ITS EASTERN END WHERE IT TERMINATES AGAINST THE WESTERN SLOPE OF TERRYS CREEK. THE RESERVATION BORDERS THE NORTHERN MARGIN OF SOMERSET ROAD.

Terrys Creek to Lane Cove Road

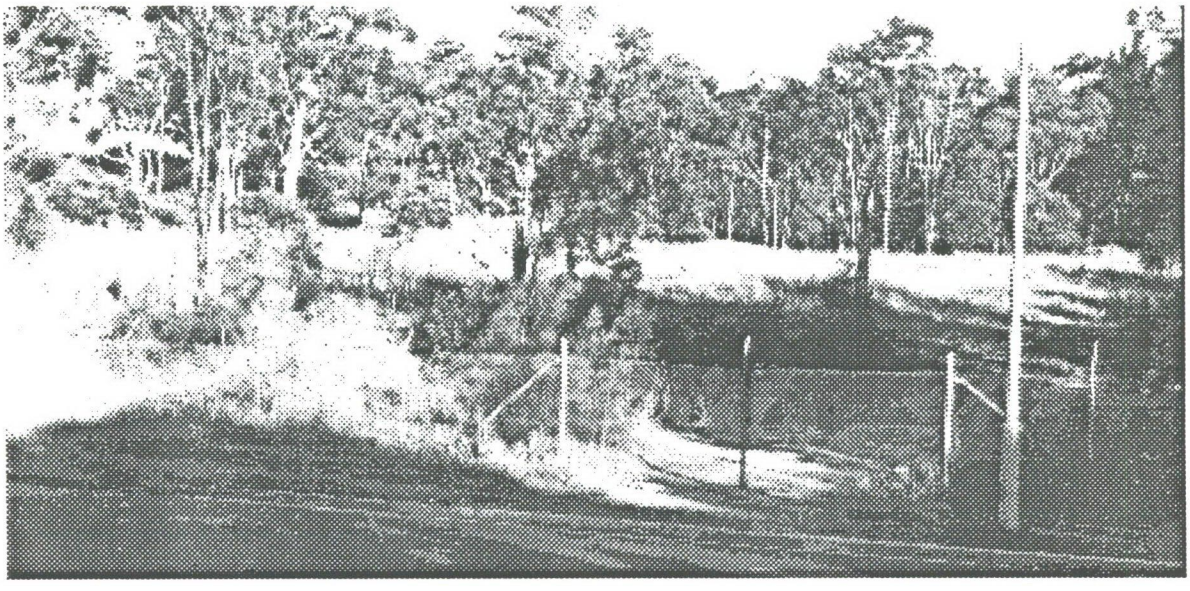
The deep valley profile of Terrys Creek is densely vegetated in typical Hawkesbury Sandstone character and presents a grand vista as it winds towards the Lane Cove River. Between Terrys Creek and the Lane Cove Road the reservation traverses a series of broad ridgelines which slope towards the Lane Cove River State Recreation Area. Intervening creeklines and small gullies cut across its path. Dense bush comes up the gully profiles from the river environmentwhile development and cleared land mixes with remnant bush on the ridgetops.



THE WESTERN END OF TALAVERA ROAD – BUSACO ROAD TURNS OFF TO THE RIGHT. A NARROW VALLEY FORMATION CUTS ACROSS THE VIEW IN THE MIDDLE DISTANCE – MEDIUM DENSITY HOUSING TO THE LEFT. IN THE BACKGROUND IS A RIDGELINE SLOPING TOWARDS THE LANE COVE RIVER. THE RESERVATION PASSES ACROSS THE RIDGELINE ON THE RIGHT OF THE PHOTO AND ACROSS THE VALLEY PROFILE.



ON LINE WITH THE RESERVATION LOOKING TOWARDS ALMA ROAD – INDUSTRIAL BUILDINGS TO THE RIGHT.

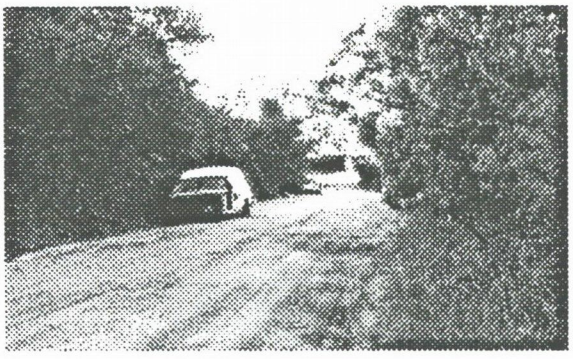


TYPICAL MIX OF CLEARED LAND AND REMNANT NATIVE SPECIES IN THE RESERVATION – VIEW EAST FROM KHARTOUM ROAD.

Housing development, much of it new medium density, tends to overlook the corridor in places and particularly in the valley zones. A caravan park is sited to the north of the reservation near Lane Cove Road.

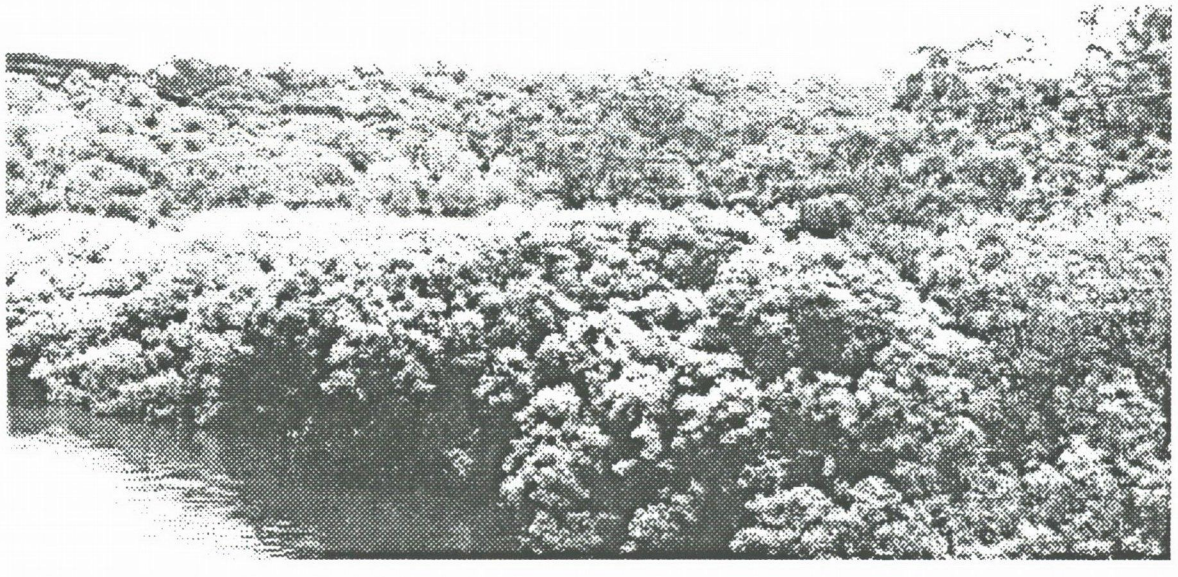
Lane Cove Road to Epping Road

Between Lane Cove Road and Epping Road, flat to undulating land accommodates some larger industrial and commercial sites and to the north is a municipal tip site. The natural quality of this area is degraded except for particular sites such as the small reserves of Porters and Wicks Parks, and Kywung Reserve around the intersection of Wicks and Pittwater Roads. The reservation cuts through the south western corner of Delhi Park to meet Epping Road at the intersection with Delhi Road.



DEGRADED CONDITIONS ALONG PITTWATER ROAD BETWEEN LANE COVE ROAD AND WICKS ROAD. THE RESERVATION COINCIDES WITHTHE ALIGNMENT OF PITTWATER ROAD IN THIS SECTION.

THE EASTERN END OF PITTWATER ROAD WITH DELHI ROAD PASSING ACROSS IN THE FOREGROUND. GOOD GROUPS OF NATIVE TREES OCCUR AND ALSO SOME POCKETS OF HOUSING IN THIS AREA.



WHERE THE RESERVATION MEETS EPPING ROAD, TALL NATIVE TREES FEATURE ON THE SOUTHERN MARGIN. THESE TREES ARE PART OF THE INTERESTING BUSHLAND ENVIRONMENT OF PAGES CREEK. THE PHOTOGRAPH SHOWS PART OF THE MARSHLAND SITUATION OF PAGES CREEK AND THE LANE COVE RIVER.

3.2.7 Pennant Hills Road

The section of Pennant Hills Road from Pennant Hills Golf Course to Carlingford Road could be subject to upgrading, as a transport corridor, in varying degrees dependent upon the transport link option which would be adopted.

Each option under consideration would affect Pennant Hills Road in terms of widening, major intersection construction and construction of noise walls. These changes would involve loss of property and established trees (both mature native species and exotic garden species) on one side or the other, but mostly on the western edge.

At Mahers Road an interchange construction would be required if the expressway is built in the reservation. This interchange construction would be extensive and require large sweeping ramp lines to connect the expressway and Pennant Hills Road in all four directions. The north-south alignment of Pennant Hills Road in the intersection zone would take a smoother curve moving to the west and leaving a segment of road separated. Access to homes in this separated segment would be provided via a new access road from Lamorna Avenue.

If the expressway (or an arterial road) from the west (developed by SMEC) is to be built in the reservation and it is to be terminated at Pennant Hills Road, the extent of intersection construction would be slightly reduced though still of substantial size. Connections to the north and south would still be needed. In this case the new transport route would continue south on Pennant Hills Road to connect with Carlingford Road. To accommodate both the north-south traffic of Pennant Hills Road and that of the new east-west link, the construction corridor would be broader than the arterial road standard described elsewhere in this report, and would typically require continuous lines of houses to be acquired.

Where road widening would not occur on parts of the eastern margin, existing houses would face the increasing traffic loads created by an arterial road upgrading. This would raise the need for noise abatement measures. In these cases wall construction would have to occur at or inside property lines. Driveway access to properties would be direct from the arterial road.

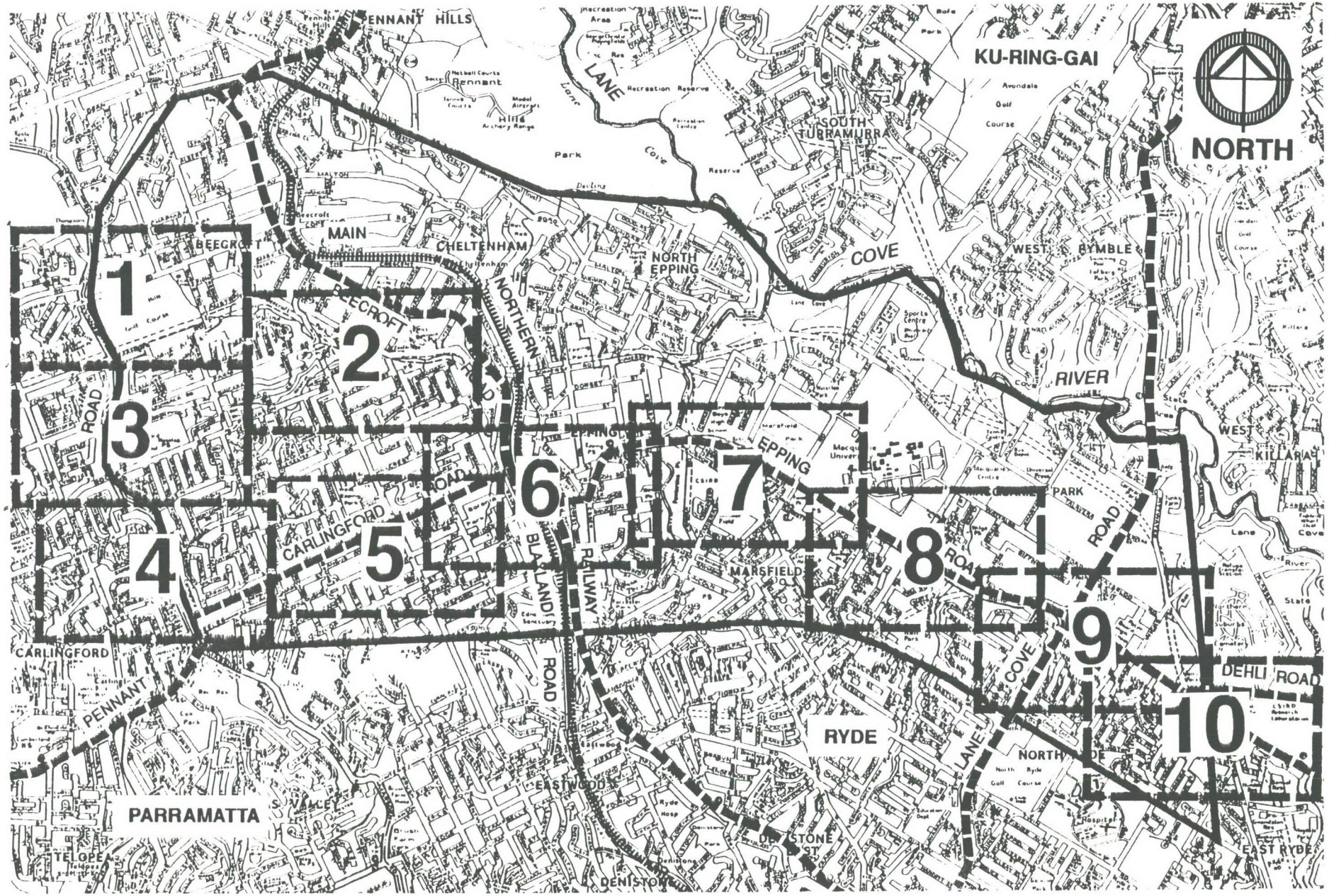
PENNANT HILLS ROAD LOOKING NORTH FROM ALAMEIN AVENUE.

On both the eastern and western sides additional widening would occur at intersections with North Rocks Road and Alamein Avenue, causing reduction of front yard spaces or removal of houses.

Where properties would be lost, residual spaces would in places be of a size capable of supporting heavy planting and sometimes earth mounds. In these situations, noise walls and new road formation would be well screened. The more difficult visual impacts would be felt where properties remain close to the road edge (typically on the eastern side) and particularly where front yards would be foreshortened.

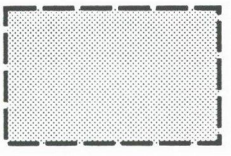
Pennant Hills Road is located on a distinct natural ridgeline and its visual effects as a major transport route – traffic streams and noise walls, would be largely confined to the immediate margins as the road would not be overviewed.

The arterial road development of Pennant Hills Road would connect to the Carlingford Road arterial proposal. On the western margin of Pennant Hills Road near the intersection with Carlingford Road, the grounds of Buckland House and the Church of Jesus Christ would be affected by the widening causing loss of trees and reduced expanse of lawns.

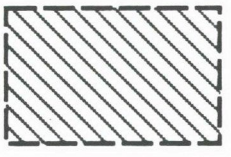


ARTERIAL ROAD
LANDUSE PLANS: LOCATION MAP

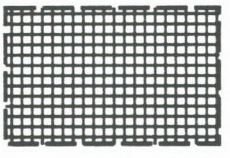
FIGURE
3.1



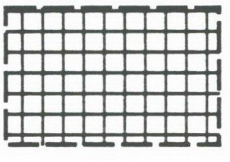
RESIDENTIAL



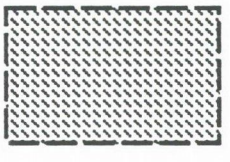
SPECIAL USES



BUSINESS



INDUSTRY



OPEN SPACE

NOTE: Cross-sectional diagrams used in the Report Sections 6 & 7 are shown on the relevant landuse maps thus 2

ROAD RESERVATION

MAUNSELL PTY LTD
BRUCE MACKENZIE AND ASSOCIATES PTY LTY LANDSCAPE ARCHITECTS

LEGEND: LANDUSE

FIGURE 3.2

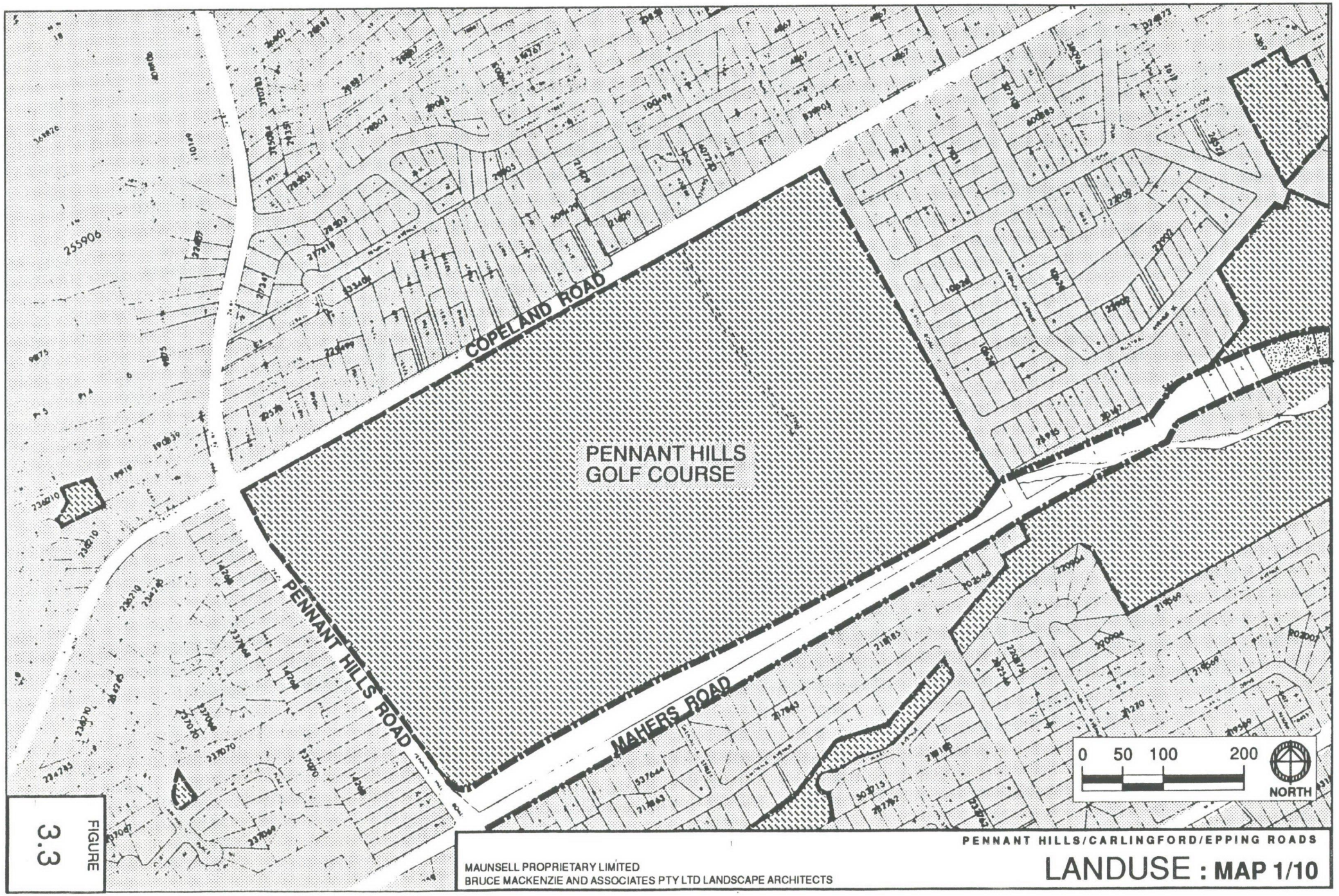


FIGURE 3.3

PENNANT HILLS/CARLINGFORD/EPPING ROADS

LANDUSE : MAP 1/10

MAUNSELL PROPRIETARY LIMITED
BRUCE MACKENZIE AND ASSOCIATES PTY LTD LANDSCAPE ARCHITECTS

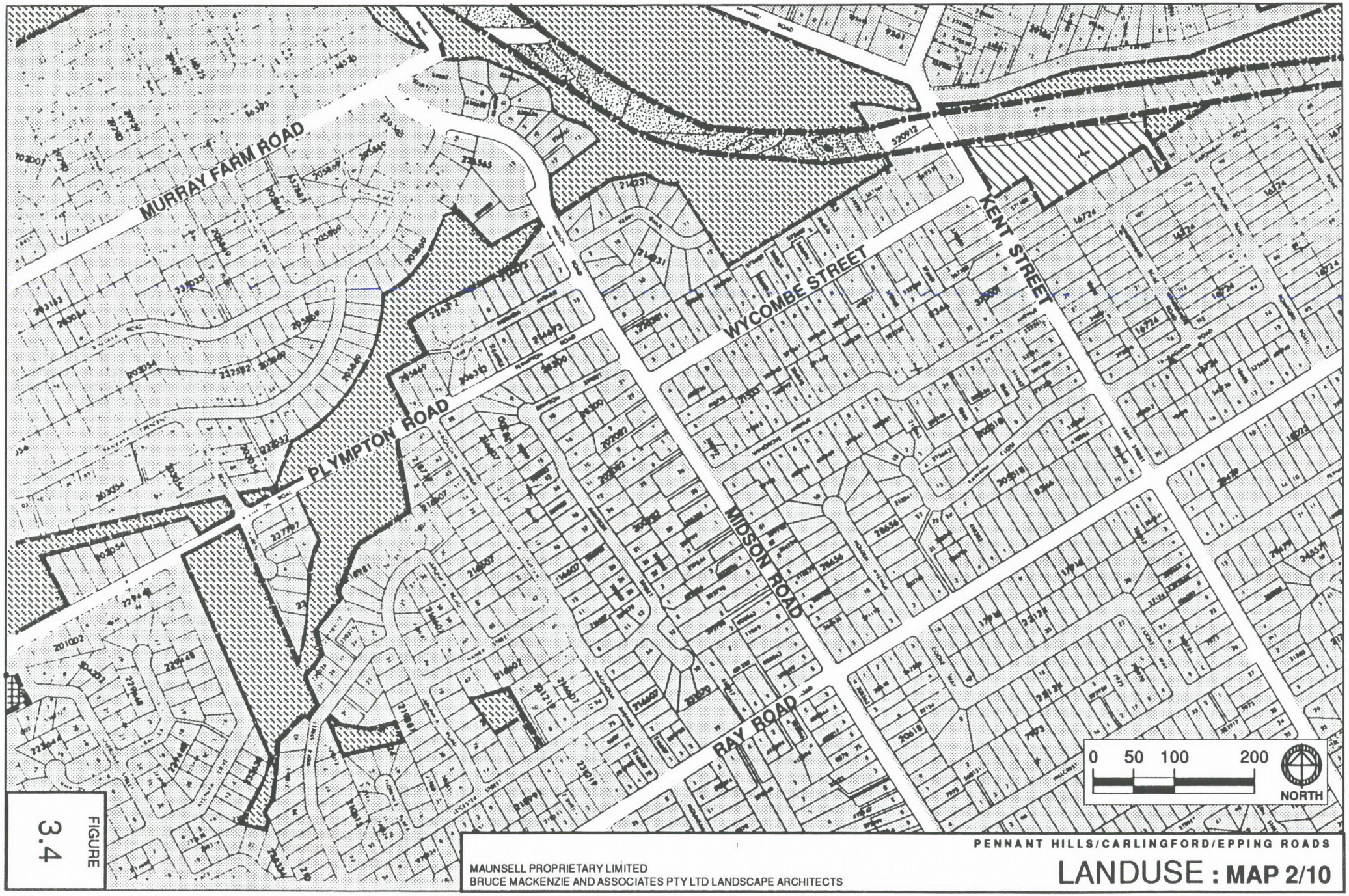


FIGURE 3.4

PENNANT HILLS/CARLINGFORD/EPPING ROADS

MAUNSELL PROPRIETARY LIMITED
BRUCE MACKENZIE AND ASSOCIATES PTY LTD LANDSCAPE ARCHITECTS

LANDUSE : MAP 2/10

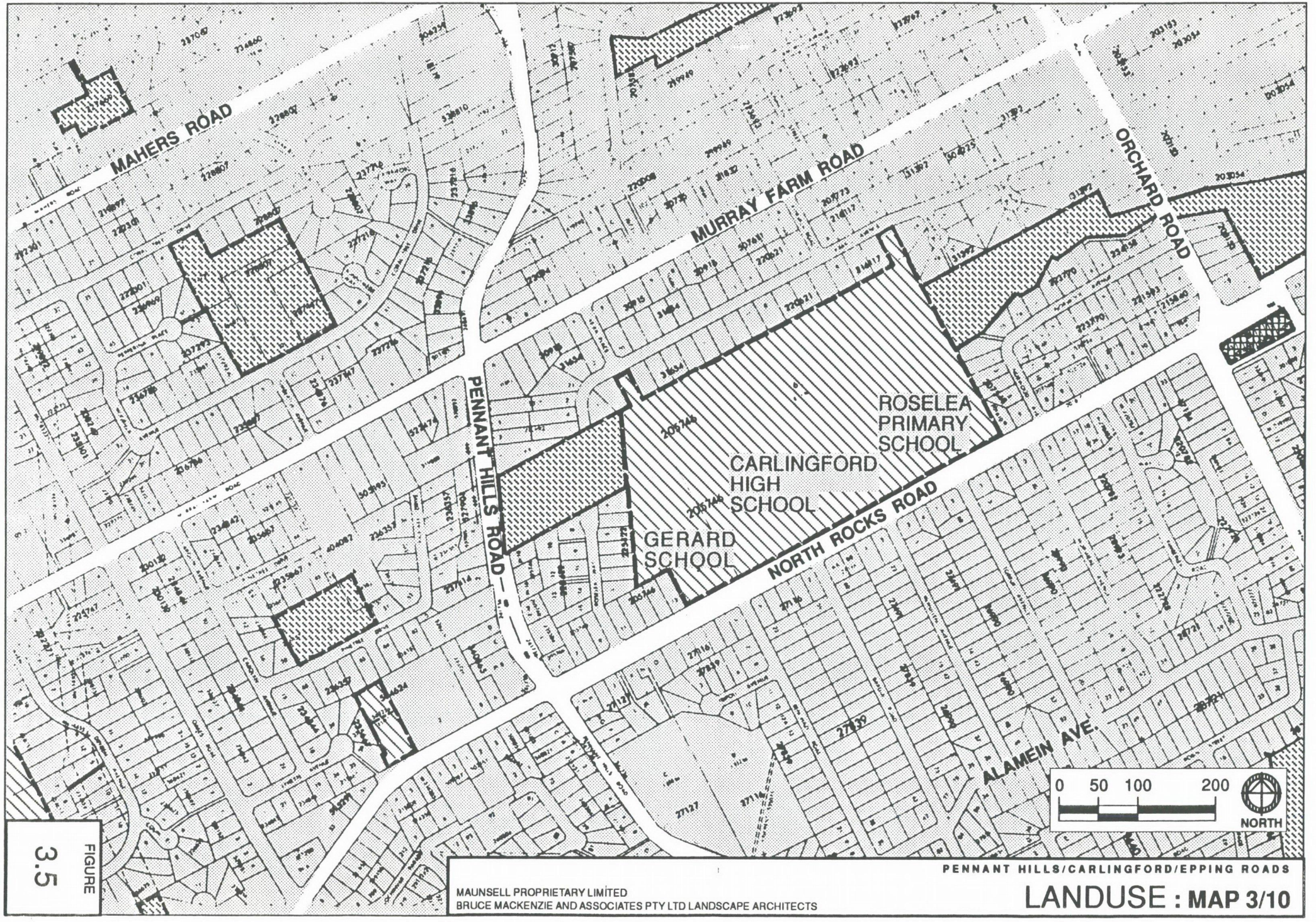


FIGURE 3.5

PENNANT HILLS/CARLINGFORD/EPPING ROADS

LANDUSE : MAP 3/10

MAUNSELL PROPRIETARY LIMITED
BRUCE MACKENZIE AND ASSOCIATES PTY LTD LANDSCAPE ARCHITECTS

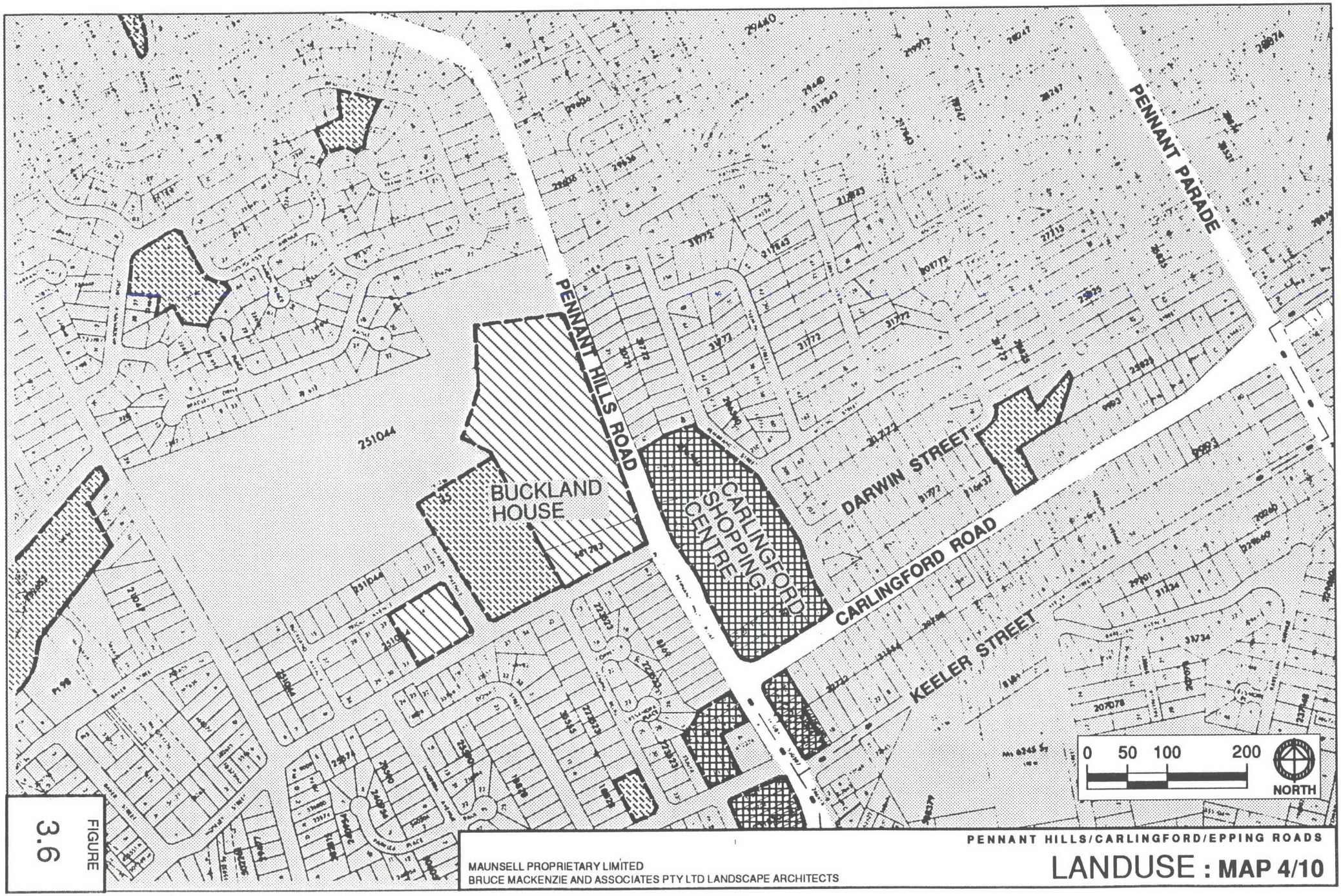


FIGURE 3.6

PENNANT HILLS/CARLINGFORD/EPPING ROADS

LANDUSE : **MAP 4/10**

MAUNSELL PROPRIETARY LIMITED
BRUCE MACKENZIE AND ASSOCIATES PTY LTD LANDSCAPE ARCHITECTS

FIGURE 3.7

PENNANT HILLS/CARLINGFORD/EPPING ROADS

MAUNSELL PROPRIETARY LIMITED
BRUCE MACKENZIE AND ASSOCIATES PTY LTD LANDSCAPE ARCHITECTS

LANDUSE : MAP 5/10

FIGURE 3.8

PENNANT HILLS/CARLINGFORD/EPPING ROADS

MAUNSELL PROPRIETARY LIMITED
BRUCE MACKENZIE AND ASSOCIATES PTY LTD LANDSCAPE ARCHITECTS

LANDUSE : MAP 6/10

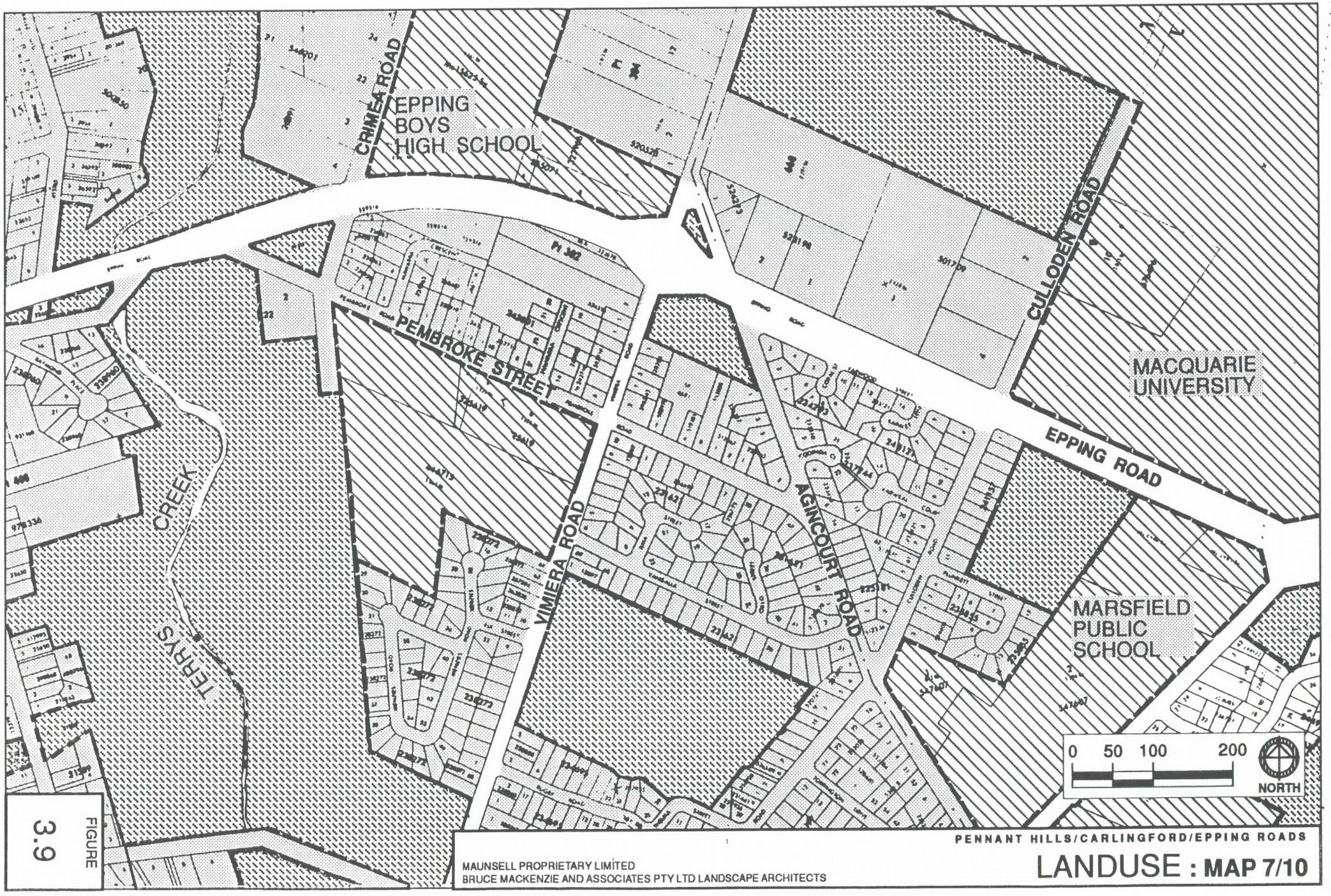


FIGURE 3.9

PENNANT HILLS/CARLINGFORD/EPPING ROADS

LANDUSE : **MAP 7/10**

MAUNSELL PROPRIETARY LIMITED
BRUCE MACKENZIE AND ASSOCIATES PTY LTD LANDSCAPE ARCHITECTS

FIGURE 3.10

PENNANT HILLS/CARLINGFORD/EPPING ROADS

LANDUSE : MAP 8/10

MAUNSELL PROPRIETARY LIMITED
BRUCE MACKENZIE AND ASSOCIATES PTY LTD LANDSCAPE ARCHITECTS

FIGURE 3.11

PENNANT HILLS/CARLINGFORD/EPPING ROADS

LANDUSE : **MAP 9/10**

MAUNSELL PROPRIETARY LIMITED
BRUCE MACKENZIE AND ASSOCIATES PTY LTD LANDSCAPE ARCHITECTS

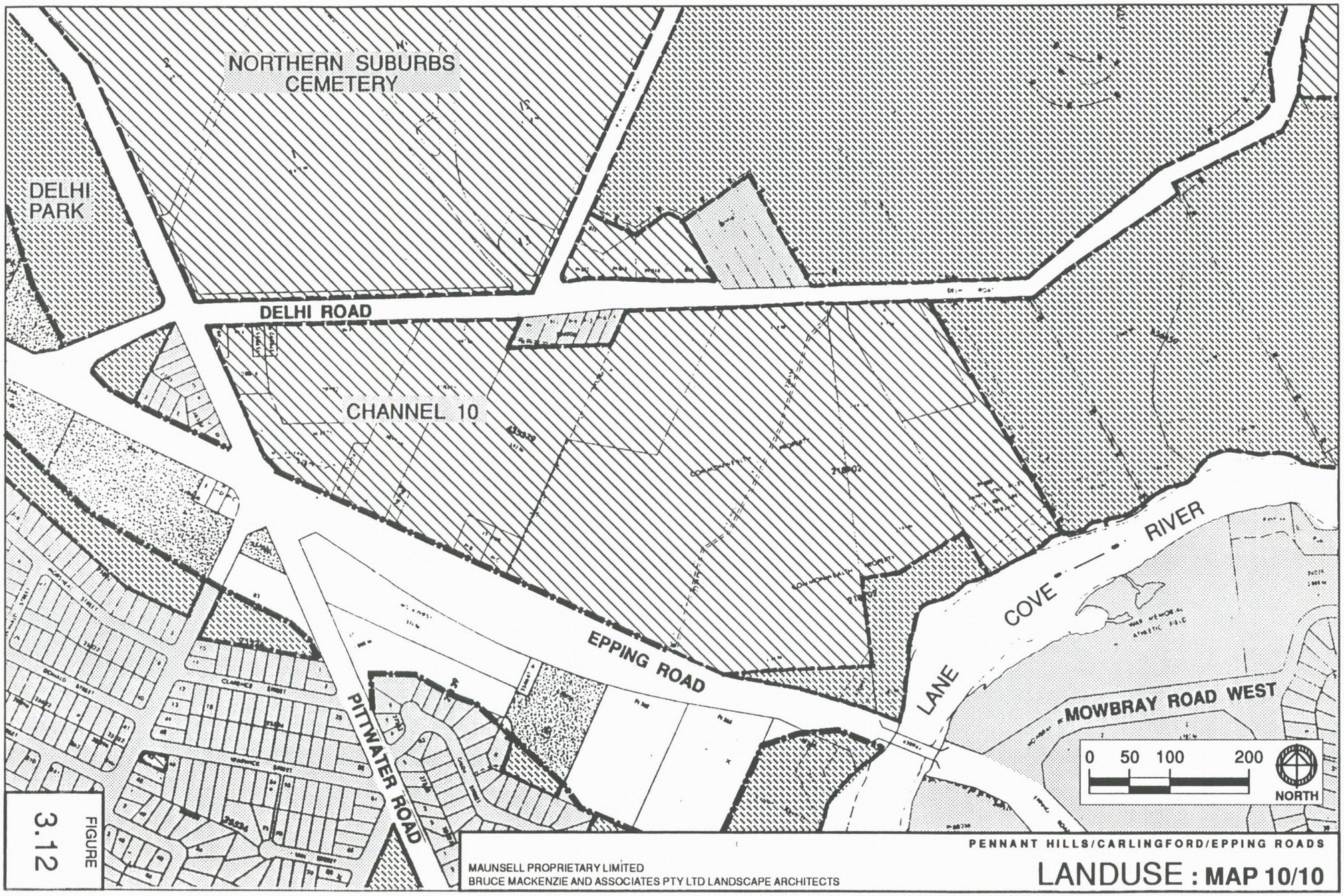


FIGURE 3.12

PENNANT HILLS/CARLINGFORD/EPPING ROADS

MAUNSELL PROPRIETARY LIMITED
BRUCE MACKENZIE AND ASSOCIATES PTY LTD LANDSCAPE ARCHITECTS

LANDUSE : **MAP 10/10**

4. BUSHLAND QUALITIES

4.1 GENERALLY

The discussion of bushland qualities in this section is presented for the following purposes:

a. The example of surviving more or less natural bushland as represented in Devlins Creek and Terrys Creek demonstrates to a large extent the nature of the original environment of the entire study area. The remnant examples of surviving nature become biological museums in the urban environment.

b. The questions ... bushland or homes? ... homes or bushland? are raised to try to focus on issues of quality and importance. It is too simple to classify any example of bushland as a unique commodity when proper examination might reveal that such a status may already have been lost. Conversely, where unique and genuine bushland qualities are at stake, it may be that the loss of other replaceable assets (including homes) should be considered.

Refer also to the report section 1.3.12 'Geometric Principles for the Design of Natural Reserves. (Refer also to Section 5.4 'Vegetation'.)

4.2 DEVLINS CREEK

The bushland takes a linear form 100 to 300 metres in width and approximately 1.5 km in length, following the south-easterly course of Devlins Creek. A continuous corridor links downstream with the more extensive reserves of the Lane Cove River valley. Residential development in some cases closely abuts and overlooks the site on both sides.

Devlins Creek Valley is relatively shallow with gentle to moderate side slopes. Elevational variation does not exceed 20 metres on any section and typical gradients range from 5% to 10%.

By the time it reaches Cheltenham Oval, Devlins Creek drains 7 square kilometres of largely residential land with consequent significant contamination of water quality and interference to flood-banks by urban runoff.

The area lies in a transition zone between the Wianamatta shales of the adjoining plateau and the Hawkesbury Sandstone of the Lane Cove River Valley.

Soils of the site have been mapped as Hammondville Association by Walker (Soil Survey of the County of Cumberland). Derived from mixed parent material, Hammondville Association soils generally maintain a continuous soil mantle over geologic beds. This characteristic is evident with sandstone outcropping only on steeper areas and in sections of the stream bed. Shale derived material including ferruginous stones is present.

4.2.1 Natural Vegetation

Tall open forest of approx 15 or 25 or more metres height dominated by Eucalyptus pilularis, Angophora costata, Syncarpia glomulifera and Eucalyptus gummifera extends throughout. Eucalyptus piperita becomes an important canopy species in the south-eastern downstream end. Casuarina torulosa and Pittosporum undulatum are common sub-canopy species.

Composition of canopy and understorey varies with Syncarpia glomulifera being more plentiful in the upper valley, while an association of Eucalyptus pilularis, E.gummifera, E.piperita and Angophora costata occurs towards the southeastern end. Here, understorey species of the Hawkesbury Sandstone flora are common.

In this distinctive environment, substantial areas of forest remain in a viable condition despite past timber getting, construction of roads and tracks, installation of sewers and power lines and disturbance to forest edges by construction works and residents. Invasion by exotic plant species has followed each form of disturbance.

4.2.2 Exotic Plant Invasion

The general distribution of exotic plant species is shown on plan (Fig. 4.1). The pattern revealed has much in common with other areas of remnant bushland in the Sydney region. Peripheral margins of the bushland abutting roads and urban development, ground surfaces under breaks in the canopy resulting from construction works, and all watercourses receiving urban runoff have been affected by invasion of exotic species. Invasion follows disturbance of vegetative cover and ground surfaces, increased exposure to light, increased soil moisture or nutrient enrichment.

Exotic plant growth in these conditions tends to suppress regeneration of indigenous species in the absence of appropriate management. In the long term a tall canopy of Eucalpts and associated tree species, currently coexisting with an exotic understorey, can be expected to be gradually replaced by a low dense canopy of Privet (Ligustrum lucidum and L. sinsense) and Lantana (Lantana camara), unless new management processes are employed to arrest the pattern of change.

Broad areas of forest in drier situations containing few or no exotic species have the best prospects for survival.

4.2.3 Conservation Values

As A Remnant Plant Association

The value of the Devlins Creek forest lies in part with its status as a remnant of an association once common in the Sydney Region. This significance is enhanced by the presence of the Hammondville soils association. Much of the land around Sydney on Hammondville soils has been developed for agriculture or urban uses and consequently the indigenous vegetation is not as well represented in the reserve system, as is the vegetation on soils derived solely from Hawkesbury Sandstone.

Comparison of Values Within Site

Comparative assessment of definable areas within the forest zones of Devlins Creek can be based on their freedom from invasive exotic species and hence their prospects for long term survival in the absence of skilled management.

Broad areas, with few or no weeds, intact canopy and not subject to the effects of urban runoff or seepage from urban areas would therefore be of greatest value for retention. Areas where the understorey has been replaced with exotic species and subjected to deleterious effects would conversely have a low value.

Also, the importance of the size and shape of areas needs to be stressed in relation to existing and future potential to remain viable. Bushland in narrow strips or small areas cannot survive in the long term without continuous attention by skilled personnel, and such attention in most cases, would be an unrealistic expectation.

4.2.4 Environmental Qualities

In summary, bushland environments with reasonably viable natural characteristics, such as those of the Devlins Creek environment represents the following values:

1. As part of Sydney's diminishing resource of remnant bushland they can be more valued now than ever before. They lend support to the habitat resource of wildlife still able to survive in urban circumstances, particularly birdlife. In this respect, size and general health are relevant factors, but importantly they contribute as parts of a chain of biological 'islands' and corridors which help sustain Sydney's distinctive associations with natural environments.

2. The area suffers intrusions of weed species typical of bushland exposed to urban drainage and urban edges. However, it is possible to identify three zones of relatively fine forest quality in regard to species composition and appearance, even though edge margins and creeklines are degraded to various degrees. The forest locations are identified on Fig. 4.1 as Forest Areas A, B & C.

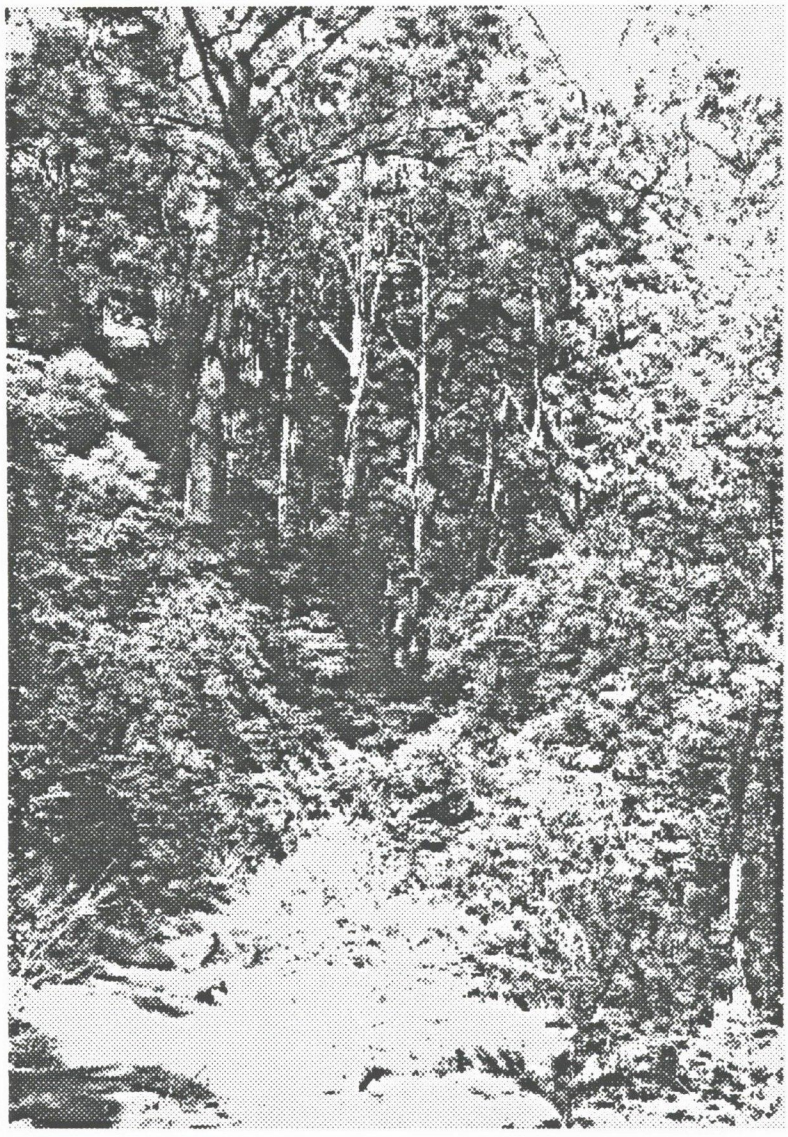
3. In the report by Mt King Ecological Surveys : Flora and Fauna Evaluation – Bushland Effect & Management (4.1.5), the species present in Devlins Creek are not identified as endangered species, although some are considered to be of regional significance. In landscape and visual terms the forest areas have intrinsic qualities which include a sense of grandeur in the tall canopy, an intimate shaded forest floor and a rich understorey of diverse character.

FOREST AREA A

THIS VIEW FOLLOWS A TRAIL OFF MURRAY FARM ROAD INTO THE MOIST FOREST ENVIRONMENT. A TALL CANOPY AND A LUXURIANT FERNY FLOOR ARE FEATURES OF THIS SPECIAL AREA.

FOREST AREA B

THIS AREA OF CLOSE-STEMMED TREES IN A DRIER SITUATION OCCURS OVER THE ROCKY BLUFF TO THE EAST OF MURRAY FARM ROAD BETWEEN CASTLE HOWARD ROAD AND DEVLINS CREEK. THE AREA IS LARGE AND HAS A DIVERSITY OF SPECIES. THE RESERVATION CORRIDOR PASSES THROUGH THIS SECTION.



FOREST AREA C

ON THE SOUTHERN SLOPES OF DEVLINS CREEK, THIS AREA OCCUPIES THE LAND BETWEEN PROPERTIES ON FINLAY AVENUE AND THE CREEKLINE. THE SLOPE IS ORIENTED NORTH WITH A MORE OPEN FOREST CANOPY. VERY TALL TREES OCCUR NEAR THE CREEK AND CANOPY HEIGHTS REDUCE WITH A DISTINCT CHANGE IN BUSHLAND CHARACTER TOWARDS THE UPPER SECTION. ALL THREE FOREST AREAS REVEAL DIFFERENT BUSHLAND/FOREST CHARACTERISTICS AND THE VARIATION IN TYPE ADDS FURTHER INTEREST TO THE RECREATIONAL VALUE OF THE GENERAL CREEK ENVIRONMENT.

4.3 TERRYS CREEK AND OTHER BUSHLAND AREAS

Terrys Creek, particularly, and other bushland in fingers extending up from the Lane Cove River valley are similarly important and much of the discussion of circumstances affecting the better Devlins Creek areas also applies to these other bushland examples. However, in a situation where new transport options are being considered, an important difference is the fact that a new transport route of whatever form could further subdivide the existing cohesive but small plant communities of Devlins Creek adding to the edge vulnerability that already exists.

In the case of the Terrys Creek bushland, a road formation could bridge the valley with an efficient structure which could have no more than limited and temporary impact on the bush environment.

Elsewhere, to the east of Terrys Creek, a road construction in the reservation could be made to form a crisp edge against bushland and establish a satisfactory division between bushland and urban development.

Of further relevance is the distinctive quality of the Devlins Creek forest community based on the soils of the Hammondville Association.

4.4 BUSHLAND OR HOMES

Bushland in urban areas has many qualities which refer to aesthetic, scientific, recreational and visual values. Bushland can be indirectly valuable by being a part of a widespread network of parts which provides a resource of additional benefits, such as urban birdlife which can affect the quality of life in the city, quite remotely from the bushland itself.

Bushland can be, in varying degrees, still representative of nature with species diversity and self-definitive regimes of interacting components. These sometimes less-obvious attributes can provide a special sense of spectacle and intrigue quite distinct from the more commonplace aspect of visual beauty.

The survival of such qualities in urban areas gives Sydney a certain distinction in a world of cities where the evidence of natural regimes and natural dynamics of this sort are rare.

It can be reasonable then to identify the better examples of Sydney's bushland as being parts of the cultural, as well as natural heritage of the city.

However, under a common heading of 'bushland' a great variety of qualities prevail which cover wild nature in an urban compromise through to totally despoiled nature in a still-vegetated form. For example, surviving native trees in small or large stands, while perhaps spectacular in size and visual detail, need not necessarily be, because of their degraded species community structure, true representations of nature. In many instances, left to their own resources, in urban circumstances, they would not persist; without proper management, rampant weedgrowth would inhibit satisfactory regeneration of the native species present.

Other examples include remnant trees and groups of trees, standing over a generally alien floor say of grass and weeds, where little distinguishes the native trees from others of the same species which may have been actually planted. In these cases the value of the trees relates to their size and maturity as well as visual qualities. In effect, the time needed to replace them, in the event of loss, is the critical factor rather than uniqueness.

Whereas, natural habitats which exhibit authentic ecological integrity, though varying in degrees of uniqueness, are irreplaceable. Only with care and competent management will they survive at all, but if lost, they remain lost forever.

When the simple question, homes or bushland? is contemplated, these matters warrant serious consideration.

4.5 HOMES OR BUSHLAND

Residential environments, to be functional and supportive of urban lifestyle in the sense of being socialogically healthy, like healthy tracts of nature, need to enjoy structural integrity and cohesiveness. Fragmentation of living environments, whether those of nature or those of the city, can lead to deterioration of the original resource.

What follows can be either a progression towards wasteland or a change leading to renewal and a different environment. Matters of this sort need to be considered in the context of resolving transport options in the study area.

While some 'bush' is dispensable and replaceable, other bush is unique and irreplaceable. Whether or not actually 'in view', bushland can be of significant value to people in the region. In some ways all homes and their inhabitants can have a potentially beneficial association with the better qualities of bushland.

4.6 REPRESENTATIVE PLANT SPECIES OF THE STUDY AREA

* For detail information on the flora of the study area, refer to the report by Mt King Ecological Surveys : Flora and Fauna Evaluation (Bushland Effect and Management).

4.6.1 Indigenous

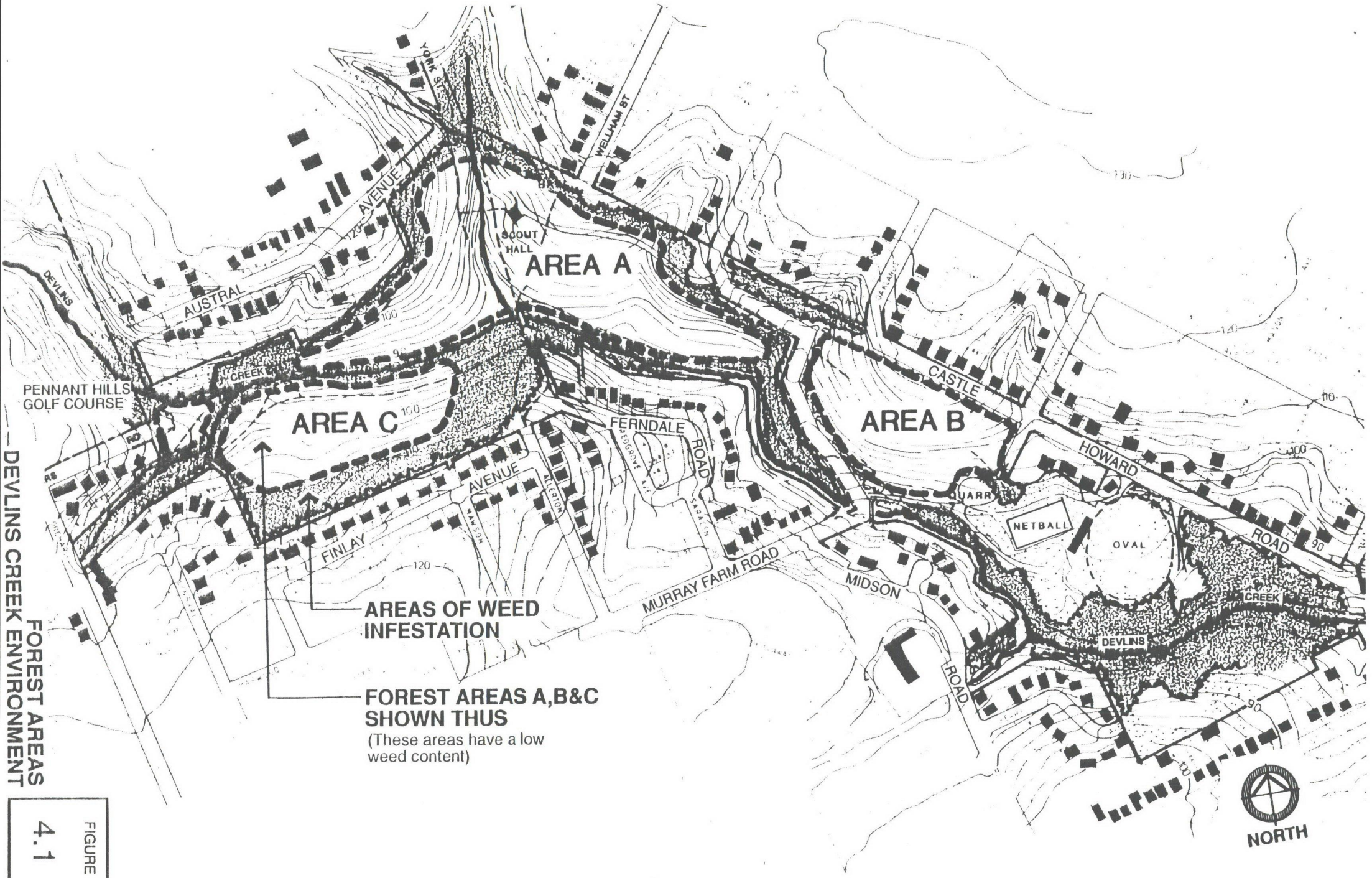
BOTANIC NAME	COMMON NAME
Acacia falcata	Wattle
Acacia floribunda	Wattle
Acacia linifolia	Wattle
Acacia longifolia	Wattle
Acacia ulicifolia	Wattle
Acacia suaveolens	Wattle
Actinotus minor	Lesser Flannel Flower
Allocasuarina littoralis	Black She-oak
Allocasuarina torulosa	Forest Oak
Angophora bakeri	Narrow-leaved Apple
Angophora costata	Smooth-barked Apple
Austromyrtus tenuifolia	
Banksia ericifolia	Heath-leaved Banksia
Banksia serrata	Old Man Banksia
Banksia spinulosa	Spine-leaved Banksia
Callicoma serratifolia	Black 'Wattle'
Ceratopetalum apetalum	Coachwood
Ceratopetalum gummiferum	Christmas Bush
Conospermum sp.	
Culcita dubia	False Bracken
Cyathea cooperi	Treefern
Dillwynia retorta	

Dodonaea sp.	
Echinopogon ovatus	Hedgehog Grass
Elaeocarpus reticulatus	Blueberry Ash
Eucalyptus globoidea	White Stringybark
Eucalyptus gummifera	Red Bloodwood
Eucalyptus haemastoma	Scribbly Gum
Eucalyptus oblonga	Narrow-leaved Stringybark
Eucalyptus paniculata	Grey Ironbark
Eucalyptus pilularis	Blackbutt
Eucalyptus piperita	Sydney Peppermint
Eucalyptus resinifera	Red Mahogany
Eucalyptus saligna	Sydney Blue Gum
Eustrephus latifolius	Wombat Berry
Exocarpus cupressiformis	
Ficus coronata	
Glycine clandestina	
Grevillea buxifolia	
Grevillea linifolia	
Grevillea sericea	
Hakea sericea	Needlebush
Helichrysum diosmifolium	Everlasting
Hibbertia empetrifolia	
Hibbertia dentata	
Hibiscus heterophyllus	
Imperata cylindrica	Blady Grass
Kunzea ambigua	Tick Bush
Lambertia formosa	Mountain Devil
Leptospermum attentuatum	Teatree
Leptospermum flavescens	Swamp Teatree
Leptospermum amplexicaulis	
Leucopogon ericifolium	
Leucopogon ericoides	
Leucopogon lanceolatus	
Logania albiflora	
Lomatia silaifolia	
Pandorea pandorana	Wonga Vine
Platylobium formosum	
Platysace lanceolata	
Persoonia linearis	Geebung
Persoonia pinifolia	Geebung
Persoonia levis	Geebung
Persoonia laurina	Geebung
Polyscias sambucifolia	
Pomanderris sp.	
Pittosporum revolutum	
Pittosporum undulatum	Mock Orange
Pseuderanthemum variabile	
Pultenaea elliptica	
Pultenaea flexilis	

Rapanea variabilis	
Scaevola ramosissima	
Smilax glyciphylla	
Syncarpia glomulifera	Turpentine
Themeda australis	Kangaroo Grass
Tristaniopsis laurina	Water Gum
Woollsia pungens	
Xanthorrhoea sp.	Grasstree
Xanthosia pilosa	Grasstree
Zieria smithii	

4.6.2 Exotic Species (Invasive)

Ageratian adenophora
Ageratian riparia
Asparagus sprengeri
Cardiospermum grandiflorum
Chlorophytum comosum
Cotoneaster glaucophylla
Erythrina hybrida
Hedychium gardneranum
Ipomoea indica
Lantana camara
Ligustrum lucidum
Ligustrum sinense
Lonicera japonica
Morus alba
Ochna atropurpurea
Olea africana
Passiflora edulis
Pyracantha angustifolia
Rhus succedanea
Ricinus communis
Rubus vulgaris
Salix babylonica
Senecio mikanioides
Solanum mauritianum
Thunbergia alata
Tradescantia albiflora



FOREST AREAS — DEVLINS CREEK ENVIRONMENT

FIGURE 4.1

5. POTENTIAL IMPACTS

5.1 GENERALLY

The assessment of impacts upon visual and landscape values, covers many issues and consequences which are equally applicable to an expressway development in the reservation and to arterial road options over the study areas to the west and east of Pennant Hills Road. In the short term the transport option that involves a major road being constructed through existing developed areas must have a significant impact. In some locations, the impact could be severe.

In the longer term it is conceivable that changes, either planned or simply those resulting from natural responses to new conditions, could bring about effects which would be moulded to the reality of the new road function. These changes would relate to existing landuses being modified, new landuses being introduced and adjustments being made in existing situations to the way that properties are used. In time, new and different land development types could be promoted by a changed set of circumstances and opportunities.

Where important and irreplaceable qualities are reduced in value or destroyed, such as in the case of rare or high quality natural environments, the long term negative effect will be irreversible. (Refer to Section 5.4 Vegetation.)

In other cases, initial impacts can be progressively modified as time passes, allowing added design measures, such as planted screens and replacement vegetation, to develop. Beyond repair works and screening, further measures may be taken with the compliance and participation of other management authorities, such as local Councils, to expand new vegetation into a larger corridor than just that of the roadway; in effect making significant contributions to a future period as compensation for existing qualities being compromised.

The discussion of potential impacts is presented here without compromise so that the matters of scale and magnitude can be brought to the attention of people with an interest. Hopefully, the dilemma of designers can be also understood, given that they must work with and resolve these sometimes difficult issues.

Relevant to the consideration of potential impacts is the relatively unplanned and dynamic change process taking place within the study area in the form of an expanding growth of random traffic pressure; a process that has its own physically and socially debilitating problems.

5.2 MECHANICAL FACTORS

The discussion and assessment of impacts makes important the consideration of the physical scale of an expressway or major arterial development and their various component parts and added devices, for example:

5.2.1 Widths

The mechanics of the expressway as described herein would involve the building of a new carriageway in the order of 30 metres wide from the western study area through to Beecroft Road, varying from place to place according to local design conditions or constraints. This width is equal to one and a half times the width of an average suburban road reservation of 20 metres between front fencelines. East of Beecroft Road the expressway proposal would reduce to 20 metres width. Arterial road options as proposed can be of varying widths including a possible overall width of 34 metres and sometimes more where particular design functions must be satisfied such as additional turning, exiting and entering lanes being incorporated.

5.2.2 Cuts and Fills

To gain desirable functional and safety standards, the expressway option must, to some extent, be cut through ridges and be built on fill over low areas. These factors have an important impact on how the road might be observed from its margins. For example, a typical house can be 5 metres high at the ridgeline of its conventional gable roof. The expressway can be on fills of up to 10 metres and more out of the ground.

In excavated cut sections, the expressway could be either completely or partially out of sight dependent upon the depth of the cut and the orientation of slopes on either side. The expressway as proposed would have variable cut section depths of up to 10 metres or more.

An arterial road construction at intersections would be designed to meet other roads at a common level and would be constructed over its length to a large extent at or close to existing grades and so avoid major cuts and fills. However, each intersection zone would be comparatively consuming of land space and existing properties. Where the arterial might be designed to provide grade-separated intersections, like the expressway, it would be involved in large cuts and/or fills, embankments, retaining walls and elevated structures.

5.2.3 Noise Walls ... Heights and Scale

Whether on fill or in cut, the major road, expressway or arterial, would have noise attenuating walls constructed along much of its edge zones. These walls to be effective as sound absorbing or sound-deflecting structures, can be as high (in places) as 5–6 metres (ie. again as high as or higher than the ridgeline of a typical house). A suburban paling fence is typically about 1.6 metres high and at 1.8 metres most people cannot see over it.

Noise barriers also, in many circumstances, need to be more or less continuous as linear formations, to be successful. And, although transparent screens are a possibility, they are

functionally less efficient, more expensive to build and because they attract grime can look dirty and require regular maintenance. Therefore, noise barriers are typically opaque and consequently will screen views, wholly or partly, to whatever may have previously been seen beyond them; they also would screen, in many situations, the view of the road and its streams of traffic.

While they are designed to be beneficial, the benefits of noise walls are provided only at a cost, including construction cost, maintenance cost, interference with outlook, and the inclusion, in a human domain, of elements which are very large and seemingly out-of-scale with the accustomed human living environment.

Where space can be made available, other measures can be introduced, involving landscape design of earth mounding, robust planting and sometimes a combination of elements, to either delete the view of noise walls or to visually soften their impact or simply to reduce their apparent physical size.

Where appropriate space is not available, very little can be done and in some situations where severe space constraints demand the use of edge walls to retain the road on fill, noise barriers would add further height at the tops of retaining walls. The subsequent overall height of retaining walls and noise walls in combination can be substantial and encompass heights of 15 metres or more.

5.2.4 Space Requirements Generally

The expressway or major arterial road in any case would need significant space for their basic functional purposes and basic formations; any added measures designed to mitigate visual impact are themselves typically space consuming; all of which places stress on the means of conserving space and minimising interference to properties and people.

5.3 VISUAL LINKAGE

The expressway pavement construction width of 30 metres or more, including traffic lanes, bus lanes and shoulders, can create a visual sense of division in the broad landscape and within the existing neighbourhood. Basic aims of landscape design would include the desire to preserve existing visual linkages or establish new linkages across the expressway. This typically would involve protection of existing vegetation and establishing new plantings to conform with either the existing character of the margins or with an overall design theme developed for the new roadway.

An expressway, as proposed, with public transport lanes occupying the median zone, offers little opportunity for planting within its paved corridor.

Any further provisions of space for planting, say between bus lanes and traffic lanes, would occur at the expense of more land being taken and further encroachment upon built urban margins taking place. Planting within the corridor of the expressway or major arterial, often contained as it would be between high noise walls, unless of significant scale, would only offer

decorative value to the road user. Any plantings to be effective as visual linkages would need to be of trees of some stature which would relate to the tree species either preserved on the margins or introduced as new plantings.

Endeavours would be made to confine the constructed edges of the expressway, where it passes through treed or forested sections, as precisely as possible to its minimum dimensions so that a maximum retention of existing trees can be made close to the pavement edges.

The use of steel guard fence or new jersey kerb would be recommended where existing trees or new tree planting can be included at the edges of the carriageway. Any other large residual land surfaces within the road formation such as traffic islands and localised medians (bus stops, intersection zones) would be tree planted and protected from conflict with vehicles using appropriate edge constructions such as non-mountable kerbs.

Similar constraints to maintaining or replacing visual linkages apply to the concept of a major arterial road development. High noise walls can impede views across the road carriageways and the constructed width can be in excess of 30 metres.

5.4 VEGETATION

5.4.1 A Range of Values

Existing vegetation covers a range of values from excellent examples of natural or aesthetically impressive community structure through to commonplace but significant domestic, institutional and commercial plantings on developed sites. The degree of impact would vary accordingly so that in some instances losses would be permanent and irreplaceable and in others, losses would be severe in the short term but capable of reinstatement over a longer time span.

Therefore, different criteria may be adopted in relation to vegetation of various types in differing circumstances to determine its value to the community. A rough descending order of importance follows:

1. Vegetation that is part of a contiguous and still relatively natural community of species complexity ...
   a. having minimal weed impact,
   b. slight to moderate weed impact, or
   c. capable of reinstatement with good bushland management.

2. Vegetation as in 1a, 1b, and 1c, dependent on location in relation to a broader vegetative community and/or habitat resource as ...
   a. part of a core area, or
   b. part of an edge zone.

3. Vegetation as above, points 1 and 2, exposed to a variable zone of overview.

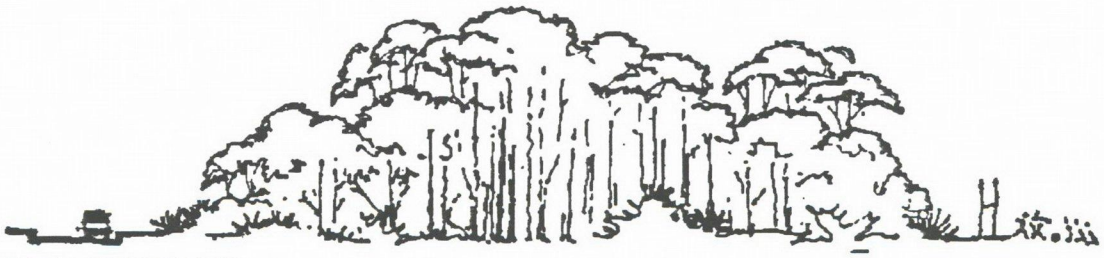
4. Vegetation which constitutes part of an overall recreational resource which to a large extent is reliant for its success, upon being apparently complete and cohesive (particularly when its natural qualities are still well preserved and when those qualities are significant aspects of its value as a recreational resource).

5. Vegetation which forms a particular niche in a structure of plant associations which are reliant upon each other for protection eg. a canopy protecting an understorey, an understorey resisting weed intrusions, an edge buffer sheltering interior zones, a marshland community controlling and protecting a process of water retention or distribution, or a fringe population which protects and reinforces the functions of say, the marshland. Habitat quality, as a resource of wildlife, is affected by the impacts upon vegetation as described above.

6. Vegetation which is mature, healthy and substantial, and whether or not able to be classified as 'natural remnants', is nevertheless valuable as visual elements in the community environment. Examples of this sort are found along the expressway reservation corridor where tall mature trees stand over a mix of native and exotic species and where the size of the stands is too small or too narrow to be capable of genuine reinstatement as natural elements. Other examples occur in random locations associated with arterial road options for instance on North Rocks Road near Baden Powell Place.
7. Mature trees as groups or individual specimens of indigenous, introduced native or exotic species which are valuable as visual elements or which together with similar examples, can distinguish a site or local area.

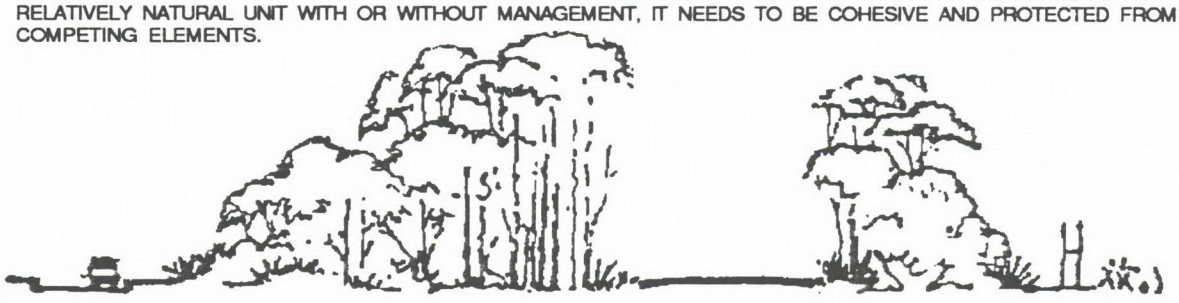
8. Vegetation generally, typically that which represents domestic gardens, which in conjunction with like examples, demonstrates or contributes to a visual character which represents the cultural existence of the local community.

* Items 1 to 5 above refer to resource material (ie. of genuine natural composition) which once lost, is not recoverable, at least not within urban circumstances. Naturally-inspired plantings can be undertaken with success, simulating a superficial character which can resemble natural circumstances, but genuine intrinsic nature, as a phenomenon, cannot be re-invented. Any losses of this sort are permanent losses.



NATURAL REMNANTS

BUSHLAND CAN HAVE QUALITIES BEYOND VISUAL AND RECREATIONAL VALUES AND OFFER A DEMONSTRATION OF NATURE AS IN SPECIES DIVERSITY AND NATURAL FORCES IN A SELF-DEFINING SYSTEM. TO SURVIVE AS A RELATIVELY NATURAL UNIT WITH OR WITHOUT MANAGEMENT, IT NEEDS TO BE COHESIVE AND PROTECTED FROM COMPETING ELEMENTS.

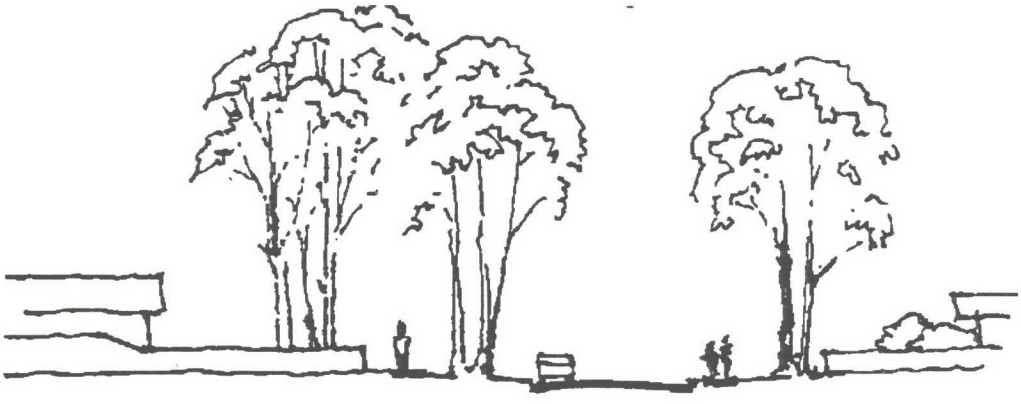


FRAGMENTATION

CONSTRUCTION CORRIDORS FOR ROADS, SEWERS, POWERLINES, WATERMAINS AND STORM-WATER DRAINS CAN FRAGMENT SMALL NATURAL EXAMPLES TO THE EXTENT THAT THEY CANNOT CONTINUE TO SURVIVE.

BUSHLAND REDUCED TO TREES AND WEEDY UNDERSTOREY

IN THESE CASES VALUE RELATES TO THE SIZE AND MATURITY OF THE STANDS OF SURVIVING TREES WHERE TRULY NATURAL CONDITIONS HAVE BEEN LOST.



REMNANT NATIVE TREES AND GROUPS IN BUILT ENVIRONMENTS

TREES IN THESE SITUATIONS ARE SUBJECT TO MANAGEMENT AS PARTS OF URBAN CIRCUMSTANCES – WHILE THEY DEMONSTRATE EVIDENCE OF ORIGINAL NATURE, THEY NOW CONTRIBUTE AS MATURE SPECIMENS AND IMPORTANT VISUAL ELEMENTS.

MATURE VEGETATION IN RESIDENTIAL AND COMMERCIAL AREAS.

MATURE DOMESTIC VEGETATION IS TYPICALLY ATTRACTIVE AND PROVIDES A COHESIVE VISUAL QUALITY IN THE RESIDENTIAL ENVIRONMENT.

5.5 SEVERE IMPACTS

The more severe landscape and visual impacts of the expressway proposal would fall into the following categories and be subject to individual assessment of severity at each specific location. Therefore the list does not represent a precise order of impact or priority.

1. Division of built and natural environments.
2. Division created between built and natural environments.
3. Physical destruction and loss of natural bushland.
4. Changes to the quality of the community environment as a consequence of the effects of division and destruction.

5.6 LESSER IMPACTS

Lesser impacts are those that are capable of being reduced as a result of applied mitigative measures. These lesser impacts can still range in degree from minor to severe dependent upon specific circumstances involving the extent of change and the success of new measures designed to modify the changes. (The passing of time, in some instances, would allow mitigative measures to become more effective in reducing impact.) These categories are as follows:

1. Partial loss of property and consequent loss of landuse values.
2. Introduction of new and undesirable activity in the immediate neighbourhood as a replacement of familiar existing circumstances.
3. Loss of trees/vegetation.
4. Loss of views.
5. Introduction of new and undesirable views.
6. Loss of amenity through the introduction of visual effects and noise which are disagreeable or discomforting.

6. EXPRESSWAY : EFFECTS & PROPOSED LANDSCAPE TREATMENT

6.1 GENERALLY

6.1.1 An expressway proposal has been developed, using the reservation corridor, to connect at Pennant Hills Road with a similar proposal developed for the western study area.

6.1.2 This report Section 6 discusses the alignment and formation of the expressway in relation to its margins, the corridor environment and housing edges. Cross-sectional diagrams are used to show indicative relationships and proposed landscape treatment.

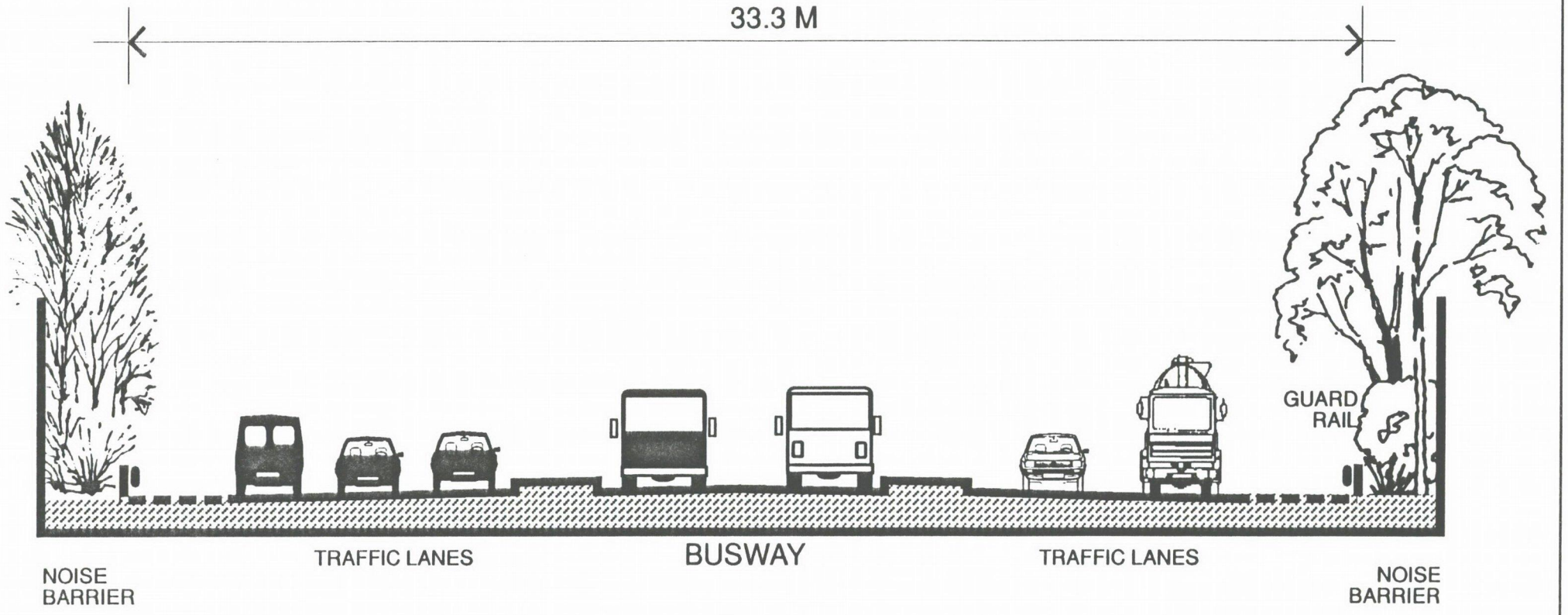
6.1.3 The proposal includes an alignment variation referred to as the Southern Option which is located in the Devlins Creek valley between Pennant Hills Golf Course and Murray Farm Road.

6.1.4 Planting policy is discussed under Section 8.

6.2 TYPICAL CROSS-SECTION – FIG. 6.1.

This section shows the basic layout of the expressway proposal which would be subject to variation in specific locations related to intersection geometry and other design factors.

- Two dedicated public transport lanes would be in the centre of the road separated from general traffic by 2.0 m wide medians.
- Two traffic lanes would occur on each side for private and commercial vehicles and the shoulders would serve as vehicle breakdown lanes.
- Where space allows, a margin would be provided for planting adjacent to the road shoulders additional to planting space which may be provided beyond the noise wall lines.
- Trees in the margins adjacent to the cycleways would be of species, of moderate size because of their proximity to the edges of pavement construction, such as Casuarinas, Melaleucas and smaller Eucalypts.
- Design speeds for traffic on the expressway would require steel guardrail or new jersey kerb to safeguard against tree and vehicle conflicts.
- Planting would not otherwise be possible across the width of the carriageways except where traffic islands provide suitable spaces.



The diagram shows a basic cross-section that the expressway would follow subject to lane variations and, where space allows, 2.0 m wide margins for planting inside noise barriers.

PENNANT HILLS ROAD TO MURRAY FARM ROAD

A TYPICAL CROSS-SECTION EXPRESSWAY IN THE RESERVATION

FIGURE 6.1

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6.3 PENNANT HILLS ROAD TO MURRAY FARM ROAD

6.3.1 Intersection Zone : Pennant Hills Road

The expressway from the west passing under Pennant Hills Road would be involved in a major intersection function dispersing traffic north and south. The proposed bus transit corridor occupying the centre lanes would add complexity to the intersection. The physical impact and visual outcome would include ramps on sweeping curves, retaining walls and earth embankments, and noise walls constructed typically at pavement edges and sometimes on top of retaining walls.

The expressway would be in deep cut and ramp gradients, curvatures and lengths required to connect to Pennant Hills Road would constitute a pattern of construction occupying a significant area of land.

The expressway formation, from the point where entry and exit ramps converge, part way between Glenwood Street and Orchard Road, would be on fill until it enters the Devlins Creek valley at the eastern end of Mahers Road. The proposed alignment located over Mahers Road would require the demolition of the first row of houses.

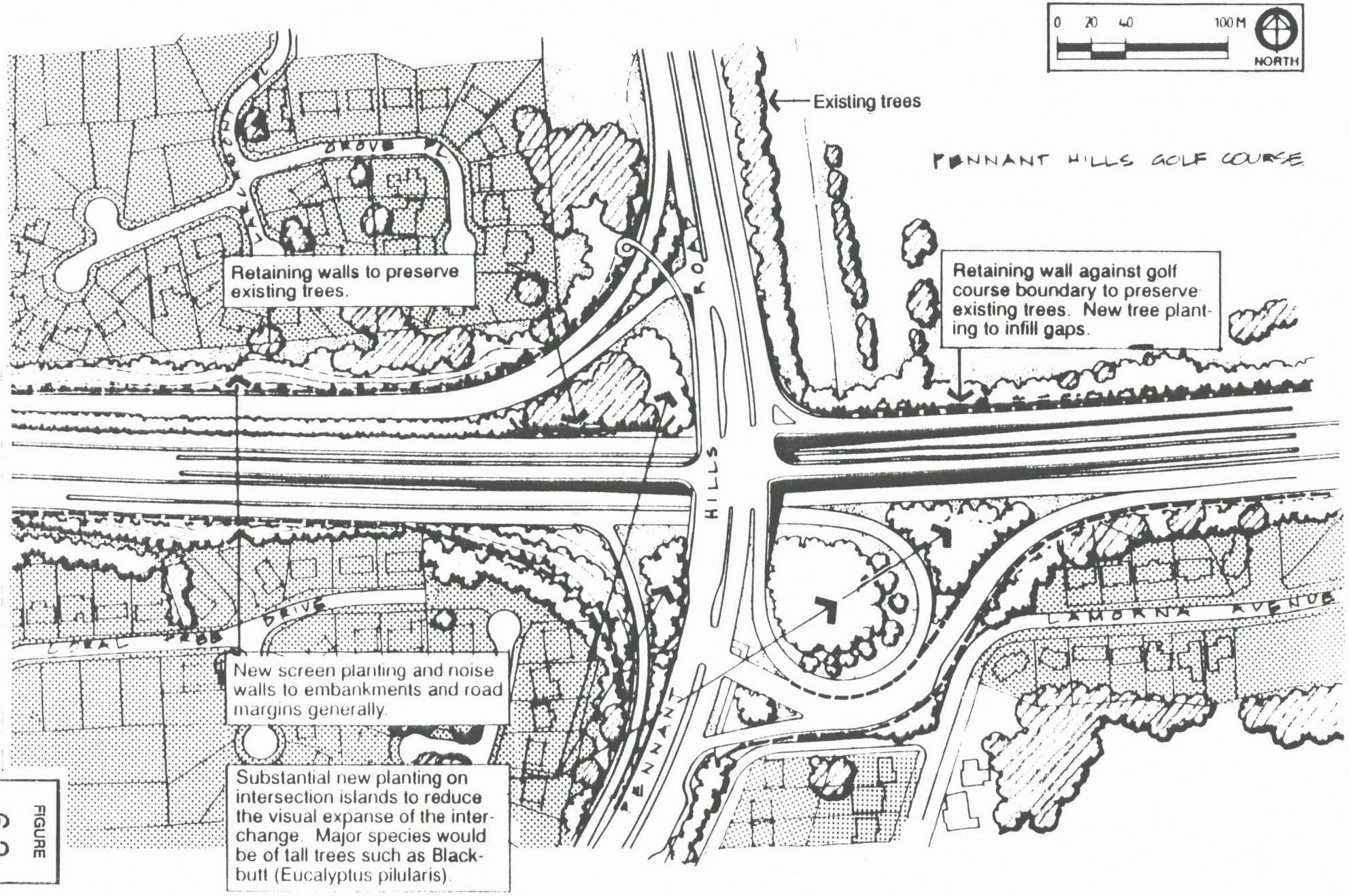
The ramp connection from Pennant Hills Road going east would cut into the south-west corner of the golfcourse, removing some established planted trees and possibly some native trees which border Mahers Road near the corner. A replanting of trees would be undertaken to connect the existing tree avenues of Pennant Hills Road with the native trees alongside Mahers Road. Screen planting would follow the ramp in conjunction with a low noise wall so that the new view from the golfcourse would be onto a planted edge under trees.

The south-eastern quarter of the intersection would involve demolition of properties on Pennant Hills Road, Lamorna Avenue and Mahers Road between Pennant Hills Road and a point to the east of Glenwood Street. Remaining properties around the curve in Lamorna Avenue would look onto edgewall construction and earth embankments supporting the long curving ramp which would connect westbound traffic on the expressway to southbound lanes on Pennant Hills Road.

Dense screen planting would be installed on the embankments to obscure or soften the effects of construction which would include a noise wall following the edge of the ramp. Where space is restricted on the curve of Lamorna Avenue, only limited effect from planting could be obtained.

Adjacent to the ramp, a new access road would connect Lamorna Avenue with houses on a short section of Pennant Hills Road which would be separated from the new north-south alignment. The separated segment would be reduced in width to function as a residential service road. Residual space between the service road and the new alignment of Pennant Hills Road would be densely planted to provide suitable screening.

Houses on either side of the curve in Lamorna Avenue would experience a significant change in outlook which would include construction elements as well as extensive screen planting and background tree canopies.



PENNANT HILLS ROAD INTERSECTION
LANDSCAPE PROPOSAL

FIGURE 6.2

The large traffic islands and wide medians which would be formed as isolated areas within the intersection zone would be planted intensively using the tall native tree species of the planting theme. These plantings would develop into large tree stands with high canopies and on the ridgeline be very visible from many viewpoints. In time they would provide a valuable visual impact.

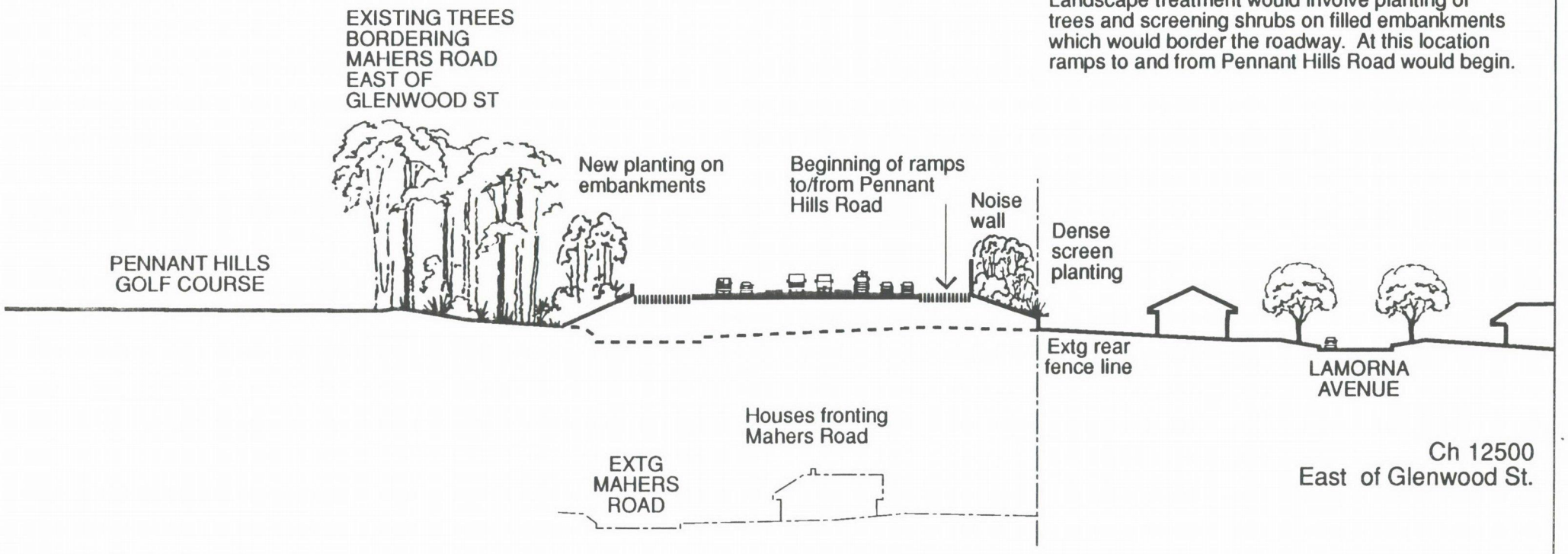
6.3.2 Cross-section E1 (East of Glenwood Street adjacent to golfcourse at Ch. 12500 – Fig. 6.3)

The section shows the effect of planting on embankments bordering each side of the expressway to the east of Glenwood Street. On the southern edge the embankment would be formed on residual land which would result from demolition of the first row of houses. Given sufficient width, as illustrated, the planting would successfully screen the road edge and its noise walls (up to 4.0 metres high at this point), so that the view from the rear of houses in Lamorna Avenue would, in many instances, be at least equal to the outlook that presently exists. The planting width along the edge would vary, sometimes being greater, and in other places reducing.

On the golfcourse side a low noise wall would provide an acoustic screen easily contained within edge planting. Tree planting on the embankments would be of the native species bordering the north side of Mahers Road and as they develop would expand the visual impact of the narrow corridor of trees.

The alignment would retain the eastern end of the tree stand bordering the golfcourse – the first line of houses in Mahers Road would be demolished.

Landscape treatment would involve planting of trees and screening shrubs on filled embankments which would border the roadway. At this location ramps to and from Pennant Hills Road would begin.



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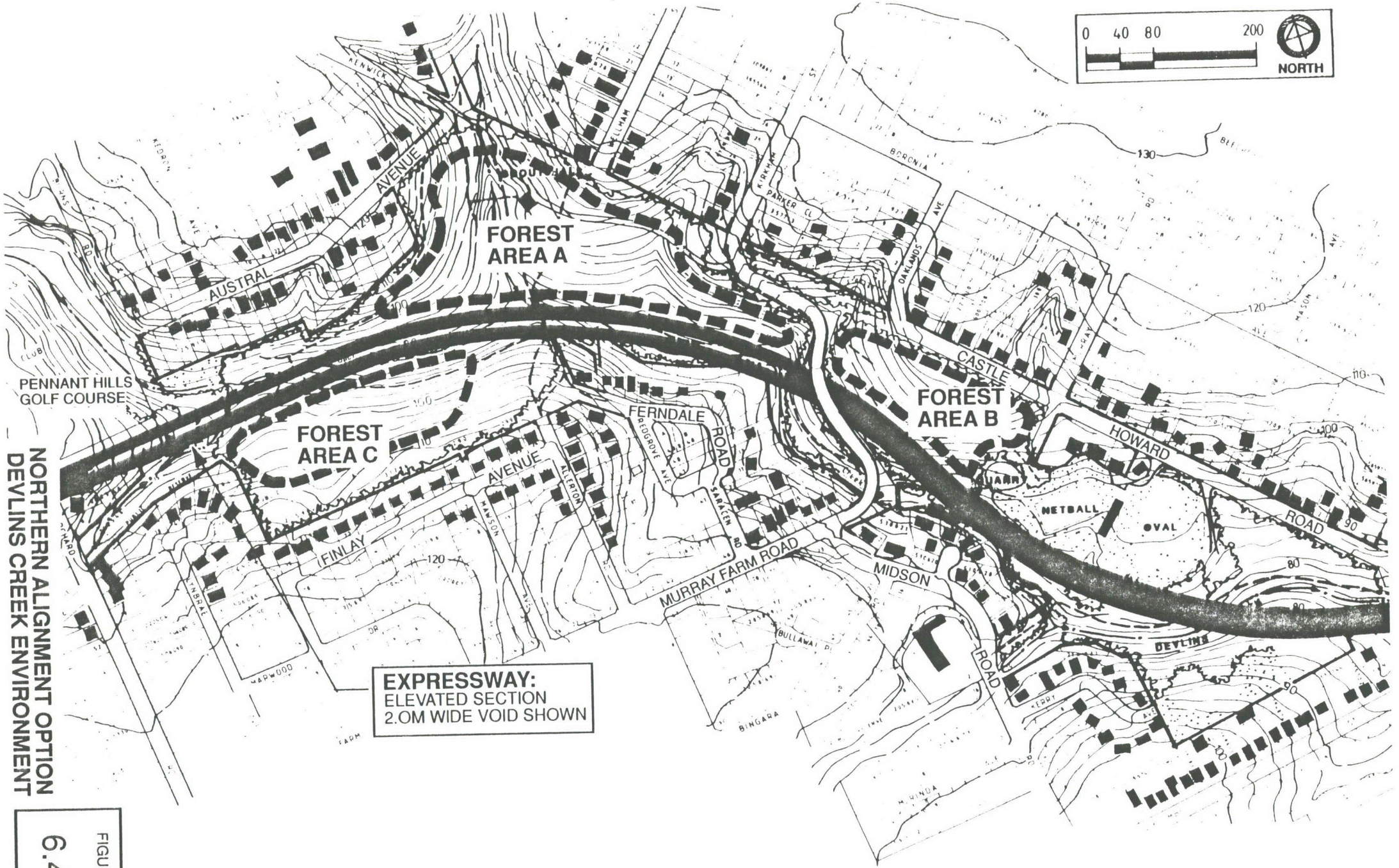
CROSS-SECTION E1
EXPRESSWAY IN THE RESERVATION

FIGURE
6.3



NORTHERN ALIGNMENT OPTION
DEVLINS CREEK ENVIRONMENT

FIGURE 6.4

6.3.3 Cross-section E2 (Between Austral & Finlay Avenues over Devlins Creek at Ch. 12900 – Fig. 6.5)

The cross-section diagram E2 describes the profile just beyond the corner of the golfcourse at a high point over the creek.

There would be no satisfactory way of taking the expressway or any substantial construction corridor through the Devlins Creek forest environment so that it is well clear of houses and without causing significant effect within the forest areas (refer to discussion in report Section 4). The essential geometry of a transport system of whatever form could never be made to fit, in an environmental sense, whether through the body of the forest or around its edges.

Two options have been investigated, one contained within the open space reserve and avoiding houses, and the other, the southern option, moved to the south between Mahers Road and Murray Farm Road to avoid the best forest areas but at the expense of removing a row of houses below Ferndale Road.

The southern option is discussed in Report Section 6.4.

Following the northern alignment the expressway would be on a continuous bridge structure from the south-east corner of the golfcourse to Murray Farm Road on the north side of the creek. It would coincide partly with the creekline meanders to take advantage of some of the existing clear space that falls over the creek. A corridor of forest including some of its tallest trees would be cleared along this line.

Some of the understorey to be cleared closer to the creek banks would include weed species thereby reducing slightly the overall loss of natural understorey that would occur.

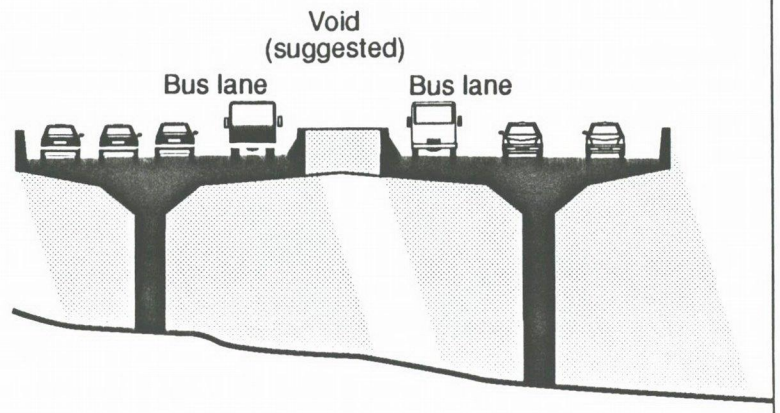
The bridge structure would be supported on columns located on the sandstone base stratum and be high enough to provide continuous pedestrian access across the reserve and retain views at ground level under the structure. A void 2.0 metres wide is shown in the centre of the structure to provide more light and allow some natural rainfall onto the over-shadowed corridor space below. This overshadowed space would be a difficult management zone. Including the void would widen the structure and the corridor of clearing and cause the loss of more trees. It would also add to the cost of the structure.

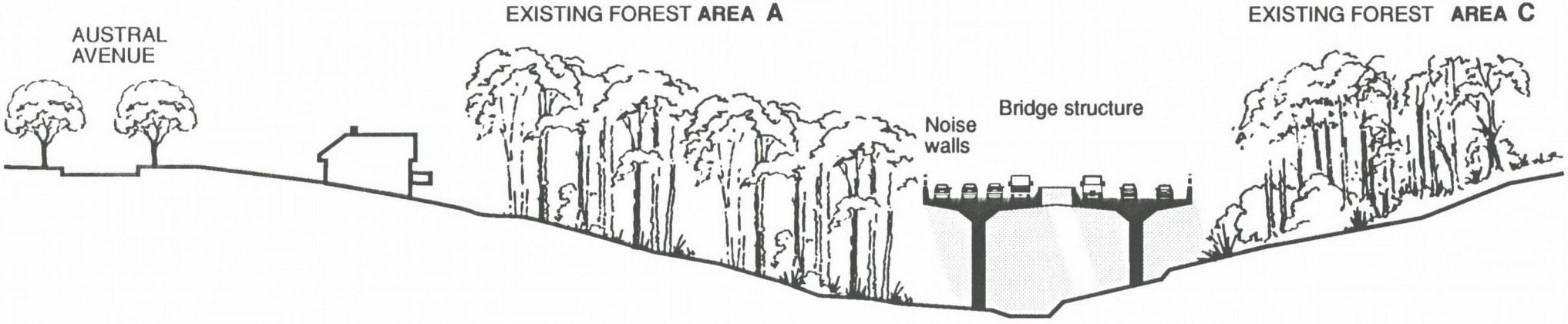
In its favour, the effect of the void would be to provide a more sympathetic space for pedestrians passing under the road in better light conditions and with a sense of sky views appearing above. Regeneration of plant material under the bridge would be assisted and management of the overshadowed space would also be assisted as a result.

The bridge structure is an expensive proposal with continuing management problems, but the prospect of construction on a high filled embankment would seem to be a completely unacceptable alternative.

The bridge, passing through the forest environment, would be large and be visible to homes on each side even when seen through trees. Noise walls would be required, adding to the visible obstruction. Despite its shortcomings, the bridge proposal is recommended for the northern option mainly because it helps to maintain the recreational value of the reserve.

The expressway would be on a high bridge structure as it crosses and partly follows Devlins Creek. The elevated road provides pedestrian access across the bushland reserve and along the creek, and avoids the need for a high fill embankment. The ground overshadowed by the road would be difficult to maintain. Trees bordering the creek would be lost. From Austral Avenue the structure would be visible through trees.





The suggested void offers benefits such as natural light and rainfall reaching the undercroft area. It has disbenefits as well such as greater width which would incur more tree loss and additional construction cost.

DEVLINS CREEK

Ch 12900
Devlins Creek

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CROSS-SECTION E2
EXPRESSWAY IN THE RESERVATION

FIGURE
6.5

6.3.4 Cross-section E3 (Between Ferndale Road and Welham Street – Devlins Creek at Ch. 13300 – Fig. 6.6)

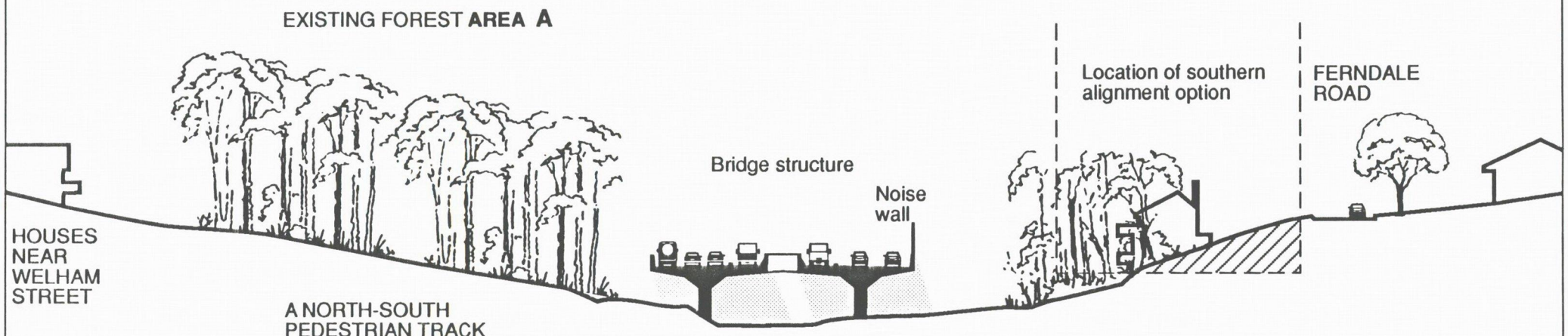
The northern option is shown here below Ferndale Road located over the creek and clear of the rear boundary line of houses on Ferndale Road. The expressway would require the removal of trees bordering the creek and widen the existing open corridor above the creek. Pedestrian access would be maintained below the structure. The roadway and noise wall would be overviewed by houses on Ferndale Road. (The location of the alternative southern alignment option is indicated on the cross-section.)

6.3.5 Cross-section E4 (Between Murray Farm Road and Ferndale Road at Ch. 13500 – Fig. 6.7)

Towards Murray Farm Road the elevated expressway construction with a 4.0 metre high noise wall on its southern edge would be clearly on view from houses below Ferndale Road where little or no forest cover exists. Occasional tall trees and domestic gardens would not provide screening. Screen planting applied to the slope towards the creek would require around 10.0 metres of height to begin to be effective.

Views from houses near Welham Street would be screened by the dense stand of forest on the north slope and no noise wall would be installed on the north edgeline.

The expressway would cause the removal of trees bordering the creek and widen the existing open corridor above the creek. Pedestrian access maintained below structure. Roadway and noise wall would be overviewed by houses on Ferndale Road.



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CROSS-SECTION E3
EXPRESSWAY IN THE RESERVATION

FIGURE
6.6

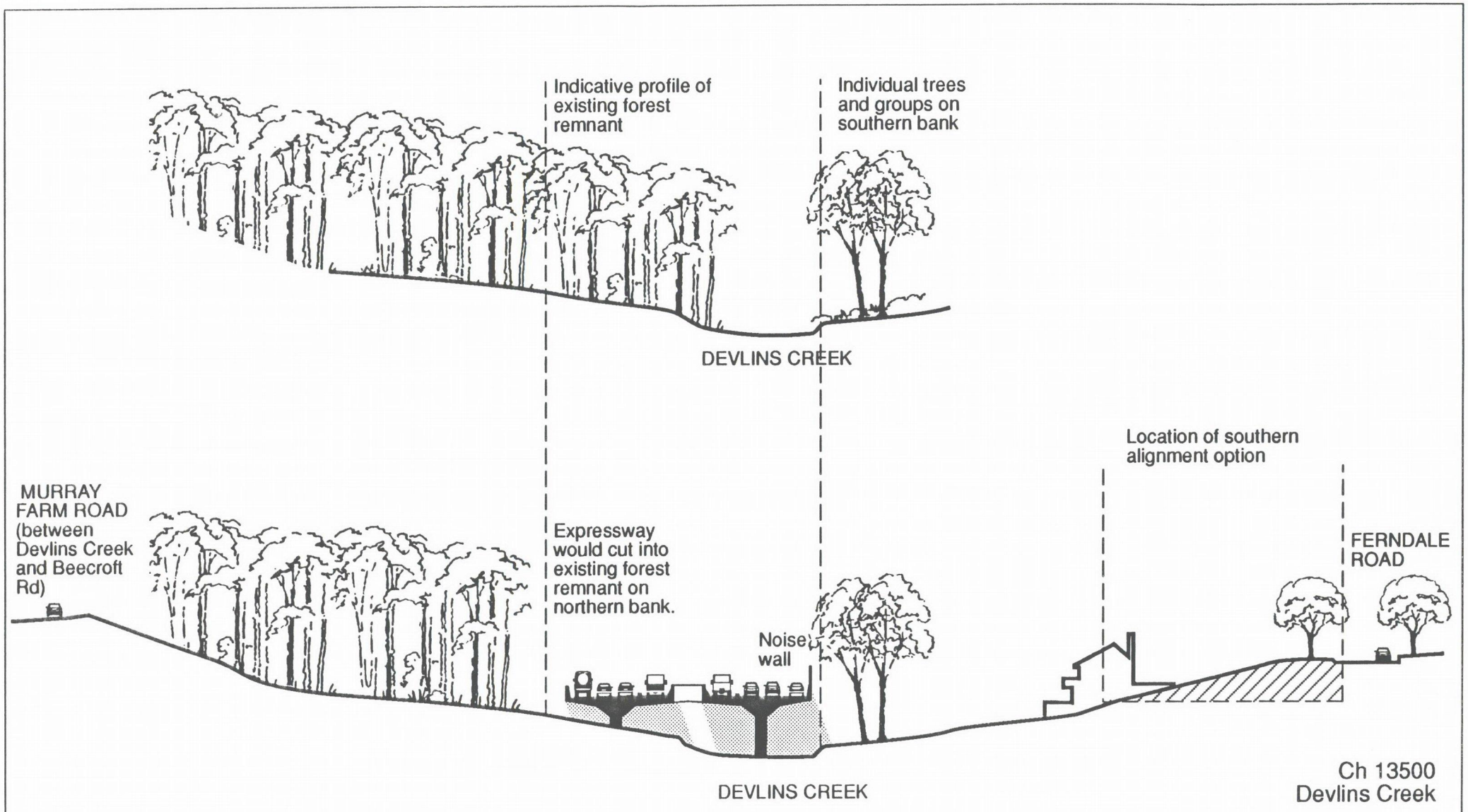

FIGURE 6.7

CROSS-SECTION E4
EXPRESSWAY IN THE RESERVATION

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6.4 SOUTHERN OPTION – DEVLINS CREEK

6.4.1 Alternative Path

Figures 6.6 to 6.9 show the path that the alternative southern option would take. It would be on a high bridge structure beginning at the edge of the golfcourse, as for the northern option, and go into excavated cut on the southern slope to the creek and pass through the curve of Ferndale Road to emerge near Murray Farm Road where it would cross to the north side of the creek. This alignment would cause the loss of houses on the north side of Ferndale Road. Forest Areas A, B and C which are referred to in the discussion are described in Report Section 4.

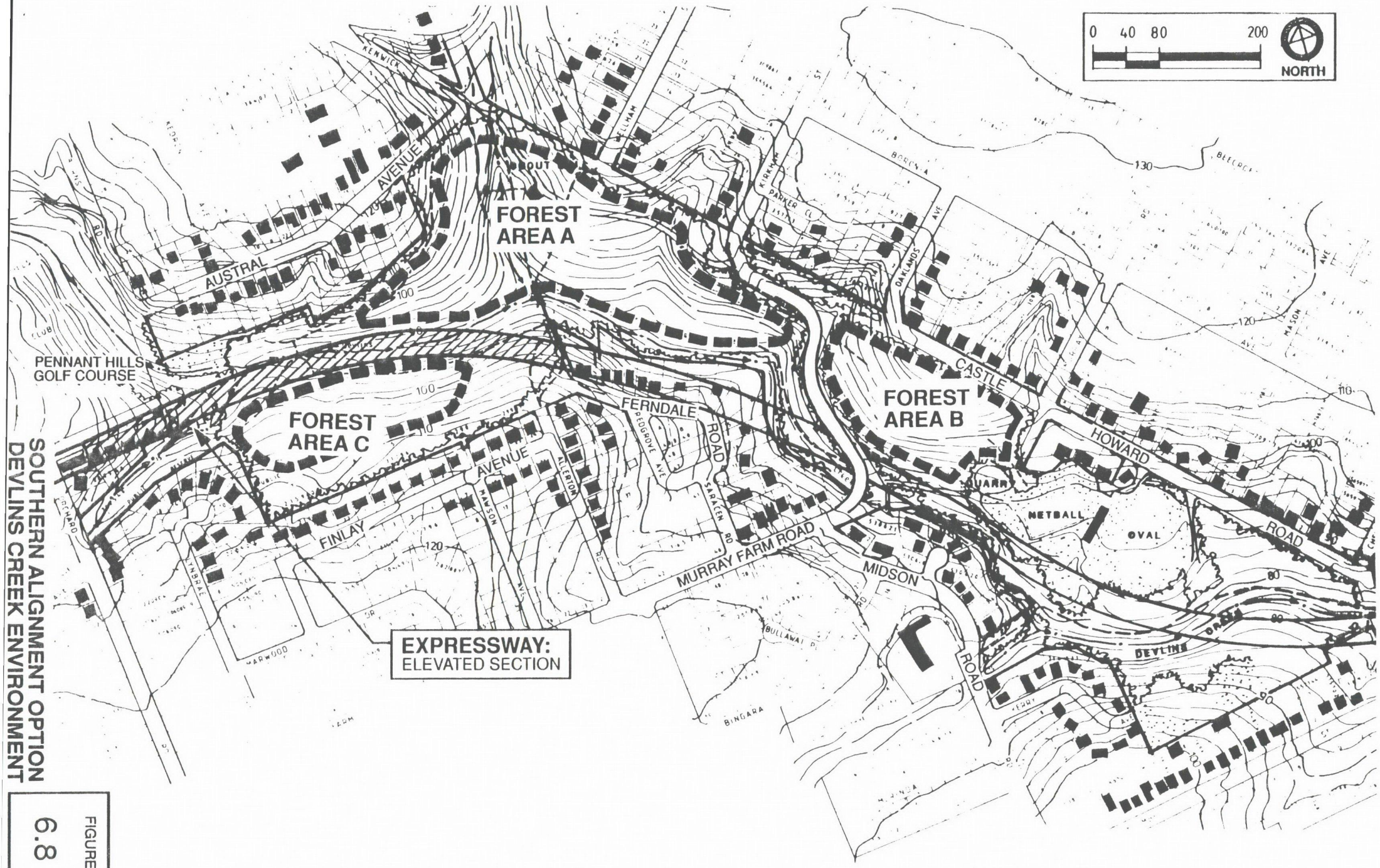
6.4.2 Comparison of The Northern and Southern Options

a. Northern Option

- The Northern Option would be more destructive of bushland qualities because of the increased quantity of clearing required and because of the reduction in the size of the prime Forest Area A.
- A long exposed edge condition would be developed along the length of Forest Area A, placing stress on its future viability as a natural environment.
- Building the expressway on a long bridge structure to avoid a total division of the reserve would incur additional cost and create a larger management problem.
- The creek environment would be compromised by the bridge structure and Forest Area B would be reduced in size and value.
- The whole of the forest reserve would be diminished in value as a recreational place (though not as severely as would be the case if the alternative earth fill formation was used). The quality of outlook from houses on exposed and semi-exposed edges would be greatly diminished.
- As significant as any other factor is the observation that houses on the low side of Ferndale Avenue, although clear of the Northern Option construction corridor, would be severely affected by their close over-viewing relationship to the elevated expressway and its recommended 5.0 metre high noise wall.

b. Southern Option

- The Southern Option would safeguard bushland qualities to a greater extent by avoiding Forest Area A completely and barely touching Forest Areas B & C. Interference with the creekline would be momentary and the deep cut through bushland to the east of Murray Farm Road would be largely avoided.



SOUTHERN ALIGNMENT OPTION
DEVLINS CREEK ENVIRONMENT

FIGURE 6.8

- The houses that would be lost in the Southern Option are the houses that would be most severely affected by the Northern Option. The shorter bridge structure would be slightly more distant from houses in Austral Avenue.

- The visual impact of the southern option upon houses on Finlay Avenue and the southern side of Ferndale Road by comparison with the northern option would be reduced as a result of the road being in cut and partly obscured. A lower noise wall on the south edge of the excavated corridor would be visible above the excavation face.

c. Recommendation

In the event of an expressway being built in the Devlins Creek environment, the southern option would be recommended for the following reasons:

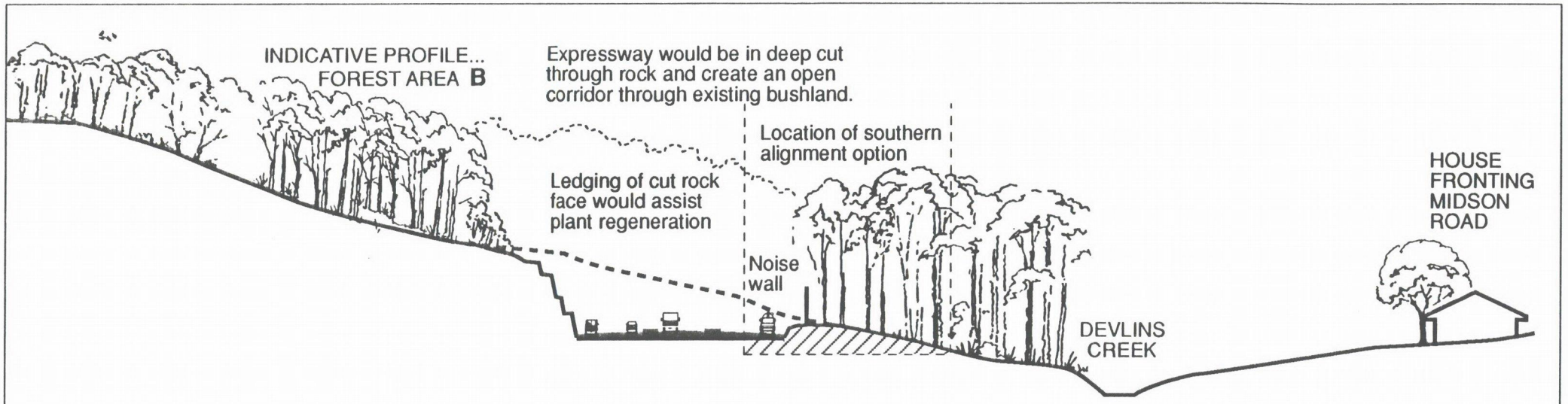
1. Reduced impact upon the forest environment.
2. Reduced impact upon recreational values.
3. Reduced visual impact on surrounding areas.
4. Houses which would be lost would otherwise be faced with a difficult relationship to the expressway in the case of the northern option being adopted.

6.5 MURRAY FARM ROAD TO EPPING ROAD

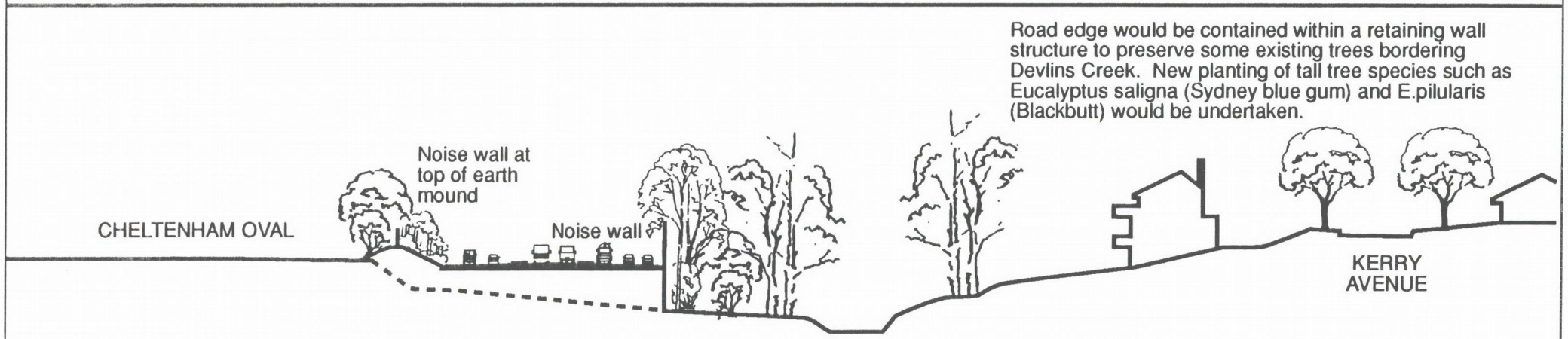
6.5.1 Cross-sections E5, E6 (East of Murray Farm Road at Ch. 13700 and adjacent to Cheltenham Oval at Ch. 14000 – Fig. 6.9)

In cross-section E5 immediately east of Murray Farm Road, the expressway (northern option) is shown leaving a deep cut face in rock on the high side. This face would be ledged and treated with in-situ native species seeding. The ledging would also encourage voluntary growth from the forest above. The southern option at this location would pass at the base of the rocky bluff leaving a lower ledged rockface. A little further on the two alignment options would come together. Existing trees alongside Devlins Creek would largely screen the proposed 4.0 metre high noise wall from houses on Midson Road. The wall, in turn, would screen the road and traffic beyond.

At Cheltenham Oval, earth mounding, screen planting and a noise wall would be installed between the oval and the expressway. On the creekside, existing native trees, typically tall Eucalypts, would be retained reasonably close to the road edge by building the fill formation within a retaining edge wall. The creek meanders would cause the expressway to cross to the south side shortly after this point. The path of construction would cut a swathe through existing tall trees on either side of the creek. Planting of native trees of the natural creek environment would be installed within the new reservation boundaries in conjunction with the retention of existing trees on the margins. Noise walls up to 5.0 metres high on the southern edge would be constructed on the road's edge walls which would be around 3–4 metres in height. Where suitable widths of retained trees and new planting occur, screening of the walls from viewpoints to the south would be satisfactory.



Ch 13700 C/S E5
East of Murray Farm Road



Ch 14000 C/S E6
Cheltenham Oval

FIGURE 6.9

CROSS-SECTIONS E5 & E6
EXPRESSWAY IN THE RESERVATION

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6.5.2 Cross-section E7 (Just east of Kent Street at Ch. 14500 – Fig. 6.10

Around Kent Street the expressway would be contained within proposed noise walls of 5.0 metres height. Views from houses in Castle Howard Road on the north side and Wycombe Street on the south would be to the high walls with little or no view of the actual road and its traffic. A 5.0 metre high wall would be built at the edge of the road alongside Epping Heights Public School. Earth embankments and screen planting would be established where possible to screen and soften the effect of the wall. The shape of soil mounding would be modified where necessary to preserve existing trees.

Views across the valley would be partly or completely blocked by screen planting and/or noise walls, dependent upon the viewpoint elevation.

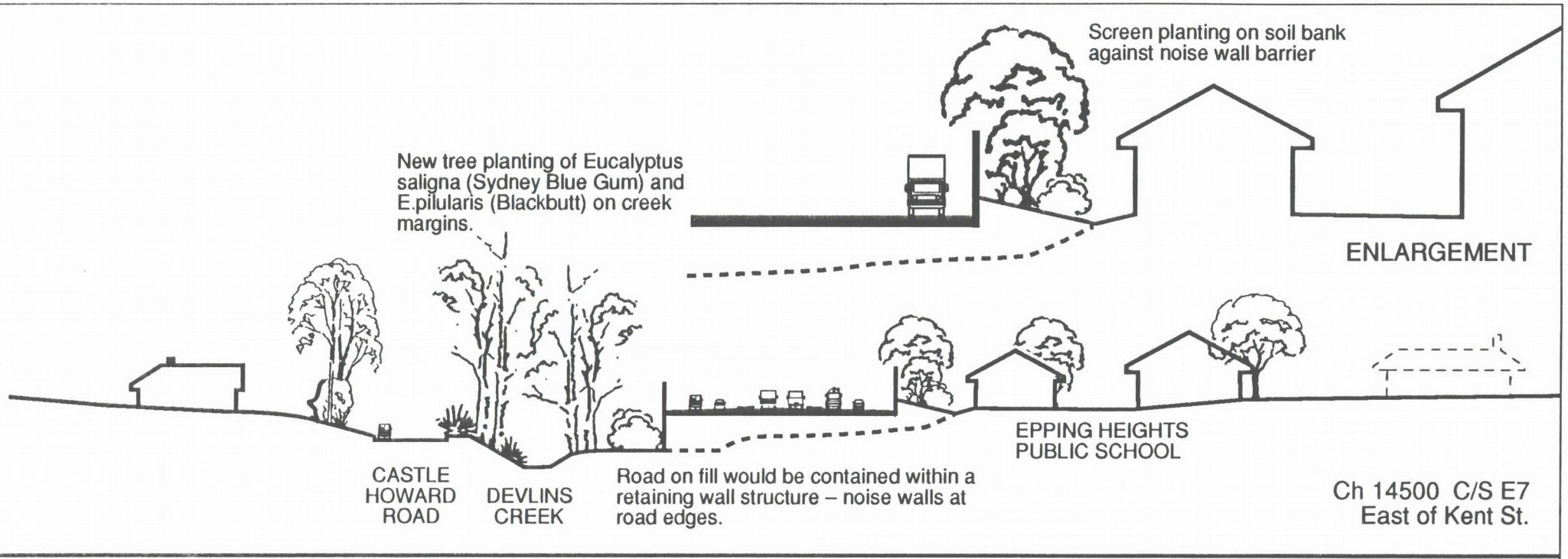
From Kent Street to the Main Northern Railway the expressway would continue on variable fill formations up to 5.0 metres high with noise walls up to 5.0 metres height on both sides creating edge wall conditions overall of up to 10.0 metres height for much of the distance. The walls would effectively obscure the road and its traffic streams from most viewpoints north and south of the alignment. Trees that would be preserved at the road edges would be of much value in the general environment but would provide little screening of the high edge walls.

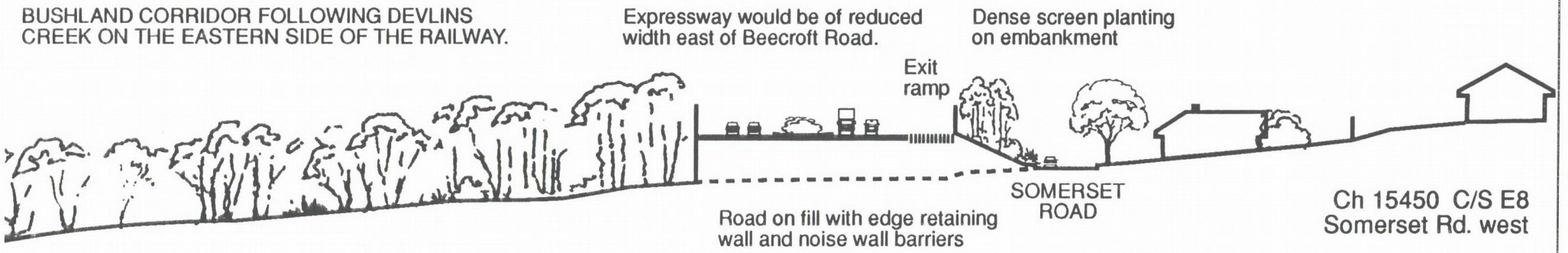
Wherever space allows, earth embankments would be built up to road level and heavily planted. This combination would in time screen most of the visual effect of the noise walls. Where space is not available, i.e. around existing mature trees and on margins close to the creekline, additional plant screening close to the road would be limited in its effect.

6.5.3 Beecroft Road Interchange

The interchange would provide Beecroft Road with a grade separated overpass of the expressway. A high ramp structure would provide connections between the central bus lanes, Beecroft Road and Epping Station. The expressway would be in deep cut into the north slope of Devlins Creek and at its southern edge, on fill over the creekline. The complex of structures would necessarily be massive and high over the valley profile. The design proposal in this respect is the best of a series of alternatives that have been investigated. The site circumstances are very difficult. Landscape treatment would take the following steps:

- Retain existing large trees bordering the creek as closely as possible to the edgelines of the structures.
- Build up earth embankments where possible against edge walls to install heavy planting including the tall tree associations of the valley.
- Terrace steep cut embankments to provide planting cover.
- Add architectural treatment to exposed wall structures to provide graphic design interest, colour and texture, and to reduce visual scale impact (refer to the artist's rendering of the Pennant Hills Road interchange).





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CROSS-SECTIONS E7 & E8
EXPRESSWAY IN THE RESERVATION

FIGURE
6.10

6.5.4 Cross-section E8 (Somerset Road just east of the Main Northern Line at Ch. 15450 – Fig. 6.10)

This cross-section illustrates the expressway on a deep fill formation graded down to the kerbline of Somerset Road to provide for dense screen planting. The planting would be effective in screening the 3.5 metre high noise walls proposed at the top of the embankment.

On the north side a vertical retaining wall would be installed in order to preserve trees in the narrow bushland corridor of Devlins Creek. On either side of the corridor of bushland, planted embankments could merge with the retained wall section. Exit and entry ramps and a wider median on the approaches to the tunnel (passing under Norfolk Road) increase the overall width of the expressway proposal in this segment. Shrub planting would be installed over the wide median.

Further along Somerset Road, noise walls would be constructed at the edges of the approach to the tunnel entrance. On the south side the wall would be 3.0 metres high at the top of the excavated edge and on the north side, 5.0 metres. Around the tunnel entrance, limited space would be available for plant screening.

The tunnel construction under Norfolk Road would preserve the pleasing suburban corridor of Norfolk Road, Epping Park and their surrounds with minimal impact from the new road.

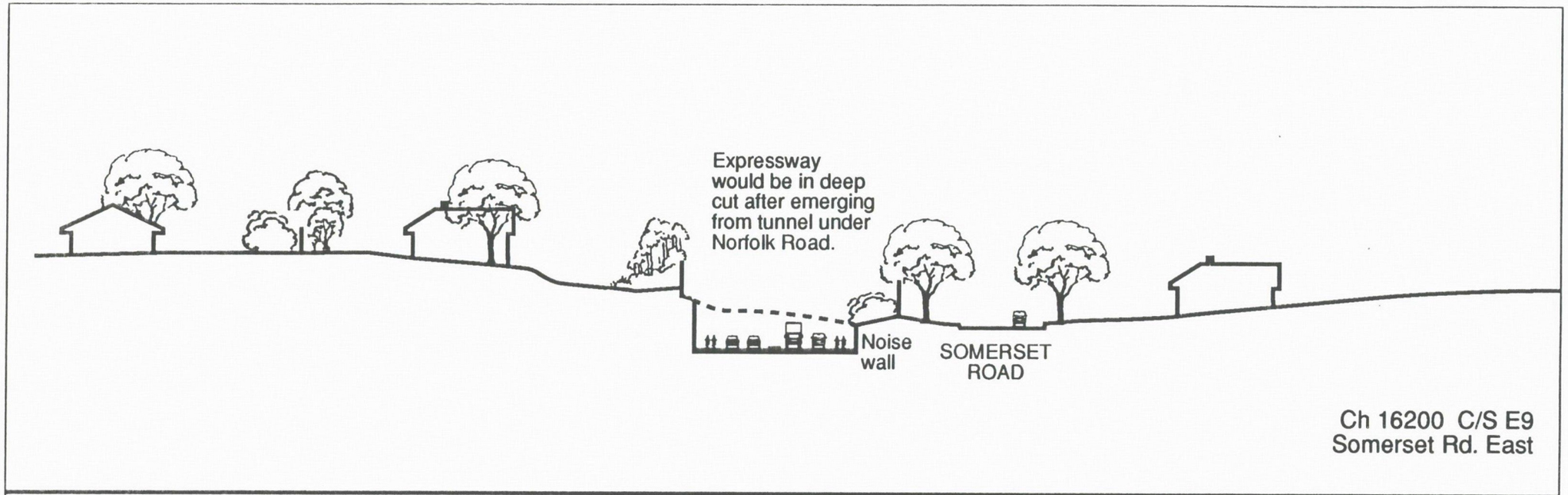
6.5.5 Cross-sections E9, E10 (Somerset Road to the east of the Norfolk Road Tunnel at Ch. 16200 and 16400 – Fig. 6.11)

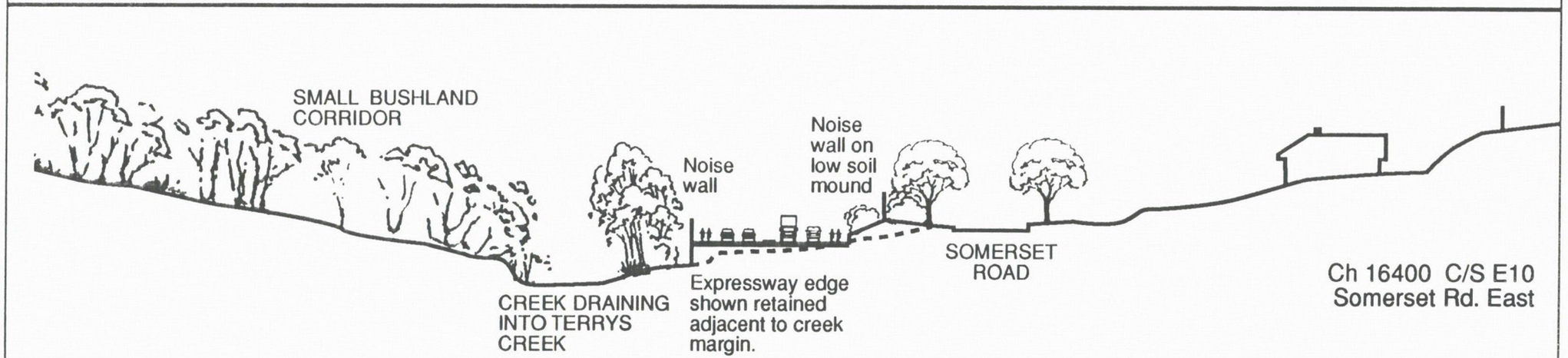
The Cross-section E9 shows the relationship of proposed noise walls (4.0 metres high) and the excavated road formation at the eastern end of the Norfolk Road tunnel. The situation is similar to that described in Cross-section E8. Space could be made available on the northside to provide screening but on the south margin, planting space is more limited.

Cross-section E10 shows the expressway as it would appear alongside the eastern end of Somerset Road. Adjacent to a small creek depression, its fill formation would be retained to preserve existing trees. On its southern side, dense and tall planting would be installed in the available margin to reduce the view of proposed 5.5 metre high noise walls. Houses to the north and south would overview the corridor, but the view would be largely of screen planting against the noise wall construction.

6.5.6 Terrys Creek

Approaching Terrys Creek the expressway on fill would cut a corridor through existing bushland. Edge construction would be 10.0–15.0 metres high on the southern side and it would be essential to retain existing bushland right up to the road edge. Even so, the noise wall would appear above the bush vegetation. The view to the wall would be softened by existing vegetation and no additional planting is practicable other than reinstatement of any damage to the bushland edge.





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CROSS-SECTION E9 & E10
EXPRESSWAY IN THE RESERVATION

FIGURE
6.11

On the northern side, very high walls would be overviewed by houses in close proximity on Woodvale Avenue. Plant screening could only be installed within the properties and would require substantial height (10.0 m) to be effective. The relationship of these houses to the road formation would be very unsatisfactory.

6.5.7 Bridge over Terrys Creek – to Busaco Road

The proposed bridge over Terrys Creek would be around 20–25 metres above the creekline and be clearly visible from viewpoints on each side of the valley and from within the bushland corridor of Terrys Creek. Given good aesthetic design qualities for the structure, the view of the bridge would be pleasing and interesting in its spectacular location.

The proposed construction method involving cantilevered segments projected from the abutments would minimise interference with the natural valley profile and keep construction access tracks to the abutment zones. The abutment constructions would also be, to a large extent, contained within their actual shapes in plan, to produce neat junctions against the bush slopes

Houses at the eastern end of Somerset Road where it terminates against the bush covered slope above Terrys Creek would look up to the road on fill, its retained downslope edge and noise wall barrier.

Distant views of the proposed road would be obtained from positions across the valley in the vicinity of Crimea and Epping Roads. The distance from viewpoints and dense vegetation in the valley should modify visual impact in this instance. Similarly, the dense bushland should obscure views to the road for people using the Terrys Creek open space reserve.

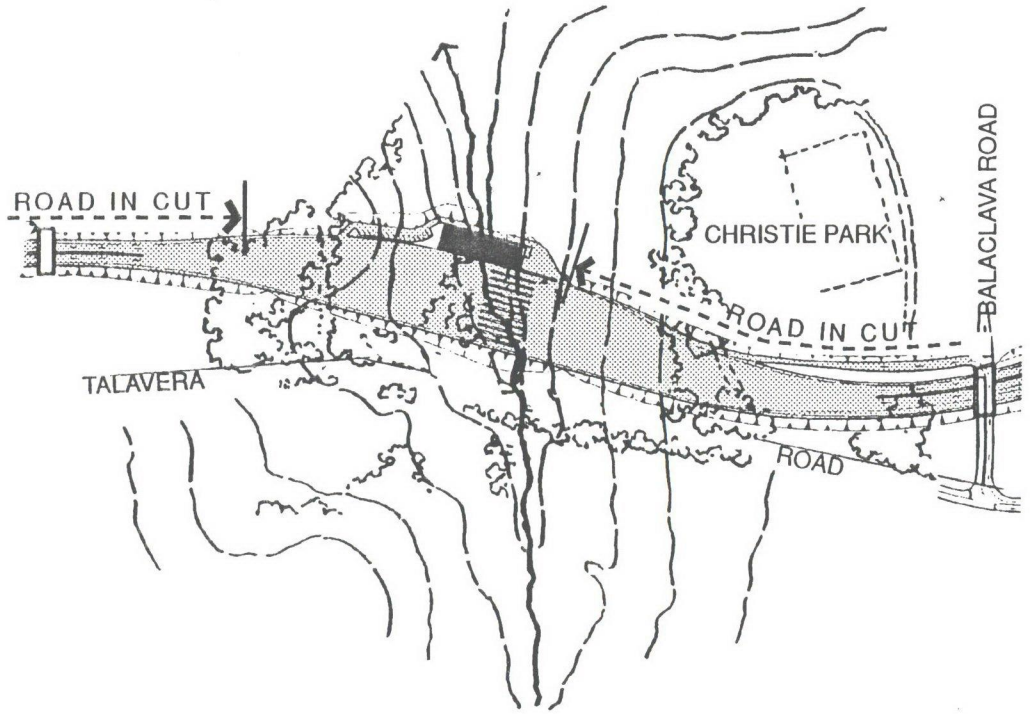
Leaving the valley of Terrys Creek, the greater part of the expressway section through to Buscao Road would be screened from view in deep excation. Landscape treatment would involve ledging of cut faces and in-situ seeding of native species. Existing bushland would be preserved as closely as possible to road edges and reinstatement carried out where damage occurs using the genetic plant material of the adjacent environment.

Near Busaco Road, the expressway would cross a small valley on fill up to 15.0 metres high and with a low wall on top, would form a skyline view from two storey dwellings along Busaco Road. Around the cul de sac that would be formed at the end of Talavera Road, fill embankments would be constructed against the expressway formation on the southern side and heavily planted.

Along this section of the reservation corridor some existing cleared areas occur in a mix with bushland and degraded bush remnants.

6.5.8 Cross-section E11 (West of Balaclava Road Ch. 18560 – Fig. 6.12)

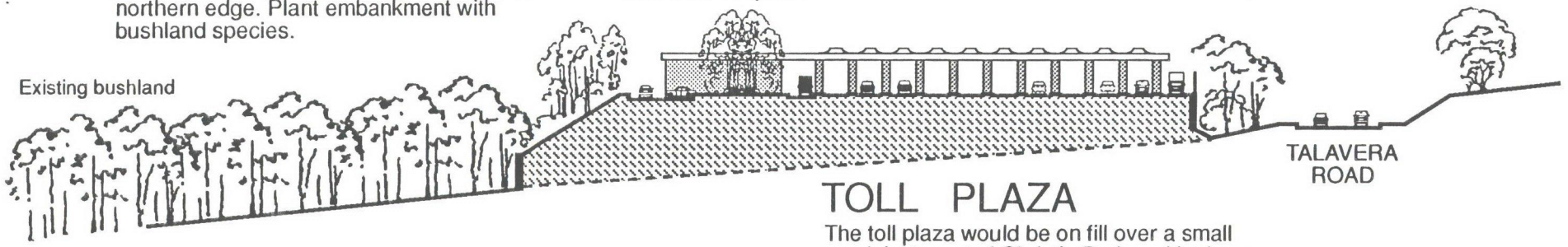
Beyond Busaco Road the expressway in cut follows Talavera Road on its northern margin to pass under Culloden Road and further east proceeds in a long deep cut section to go under Balaclava Road.



Retain southern edge of toll plaza to preserve trees bordering Talavera Road. The band of trees would provide light screening and additional screen planting would be required.

Construct retaining wall and fill embankment against existing bushland on northern edge. Plant embankment with bushland species.

Toll Plaza building and small carpark.



TOLL PLAZA

The toll plaza would be on fill over a small creek just west of Christie Park and in deep cut as it passes Christie Park.

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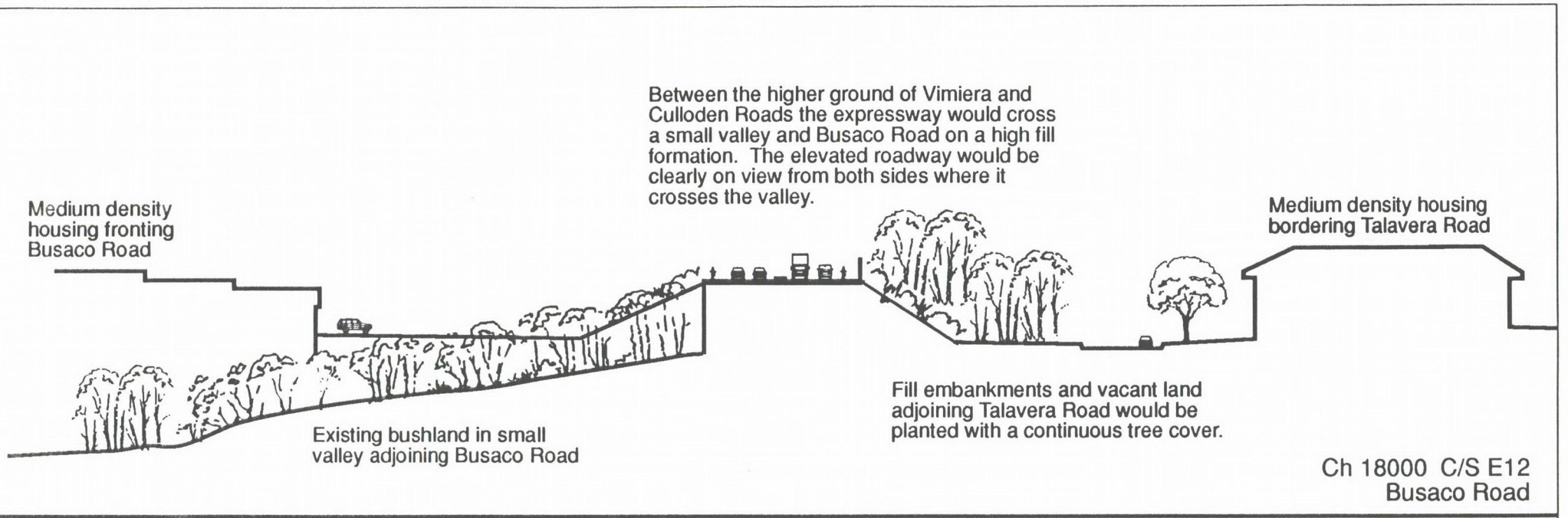
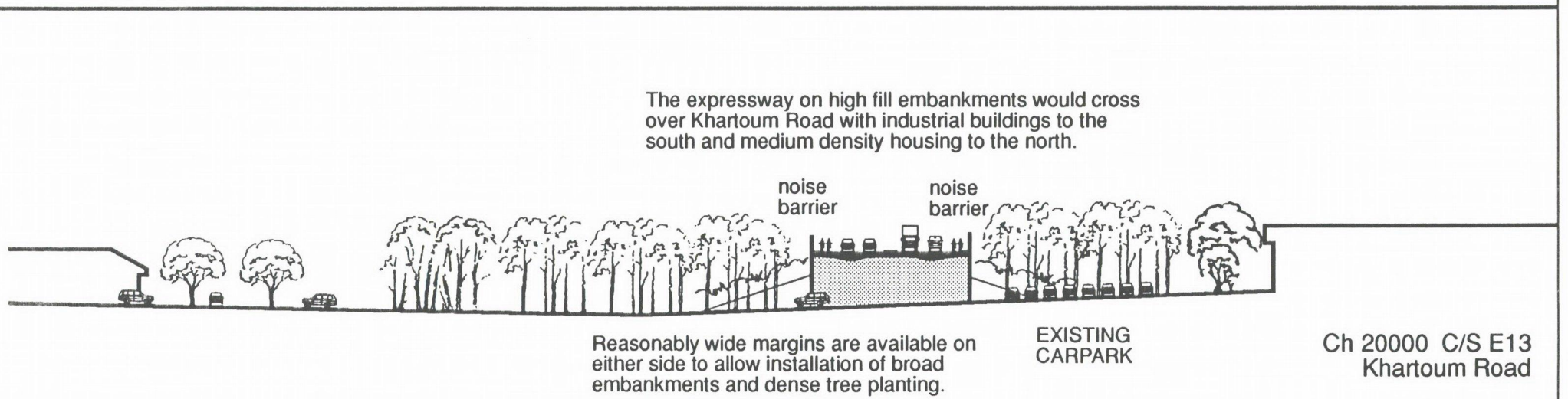
CROSS-SECTION E11
EXPRESSWAY IN THE RESERVATION

FIGURE
6.12





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CROSS-SECTION E12 & E13
EXPRESSWAY IN THE RESERVATION

FIGURE
6.13

Between the cut sections under Culloden and Balaclava Roads, a tollway plaza would be constructed on fill over a shallow creek depression. The construction involving twelve traffic lanes and associated booths plus a service building and small staff carpark, would require a major widening at this point.

The fill embankment would be retained on its southern edge to preserve some trees which presently border Talavera Road. On its northern edge the fill construction would be partly retained to limit spill into the existing bushland. Bushland species of the adjacent area would be used to densely plant the embankment and on the southern edge, as additional screening alongside Talavera Road.

Existing mature trees in a mix with weed species on the site of the toll plaza would be lost, but reasonable screening can be established along each edge. The toll plaza would also be partly screened by cut faces alongside its entry and exit zones.

Between Balaclava Road and Alma Road, a ramp on a high fill embankment would connect Herring Road with west-bound lanes on the expressway effectively bisecting the site occupied by the Australian International School.

The expressway formation would pass over Alma Road on fill and from high embankments bridge over Khartoum Road. Embankments along this section generally, i.e. from Busaco Road to east of Khartoum Road, would be eased out as space permits to form suitable grades for planting. On high embankments at Khartoum Road, the noise wall on the north side 2.0 to 4.0 metres high would form a skyline view up to 14.0 metres above adjacent ground levels. Dense planting including tree species would be applied to the embankment to provide screening, in time, from medium density housing to the north and commercial buildings to the south.

6.5.9 Lane Cove Road to Epping Road

The interchange at Lane Cove Road, like that at Pennant Hills Road, would cover a significant area forming large traffic islands and filled embankments. The difference in levels between the two roads would require long connecting ramps and the resulting new landform would present bold shapes. Landscape treatment would endeavour to distinguish the important intersection zone with a continuous blanket of a tall trees mix based on the local natural species community.

Between Lane Cove Road and the Lane Cove River the expressway would be on fill or at grade to just east of Wicks Road where it would go into deep cut until it emerged on the south side of Epping Road.

At the grade separated intersection with Wicks Road, three small parks, Porters Park, Kywung Reserve and Wicks Park, would be affected by the expressway, which would be in 10 metres of excavation. Varying proportions of land would be trimmed off the parkland edges to achieve the excavated alignment and the remaining parklands would be divided by the new road.

Embankments on filled sections and on ramp construction at major intersections (Delhi Road and Epping Road) would be exposed largely to industrial sites and other traffic corridors. Typically the embankments would be graded out where possible to create broad planted

margins using robust local tree species to form highly visible segments of the corridor. In deep cut sections, the expressway would be virtually out of sight. At Wicks Road the alignment would deviate from the designated reservation corridor to follow the line of existing Pittwater Road adjacent to the Northern Suburbs Cemetery until an intersection with Delhi Road is formed. At this point the expressway would pass under Delhi Road and then under Epping Road. At Delhi and Epping Roads connecting ramps would form complex shapes and levels entering and exiting the expressway.

The expressway segment bordering the Northern Suburbs Cemetery would be in deep cut and unsighted from the cemetery.

The variation to the reservation alignment and intersection construction would require the demolition of houses bordering Delhi and Pittwater Roads.

A stand of native trees and remnant bushland would be destroyed in the northern section of Delhi Park and part of the Channel 10 site would be encroached upon.

The intersection development at Epping Road would sweep onto the bushland and densely-treed edges of Pages Creek. Towards the Lane Cove River a large and valuable marshland occurs on Pages Creek. Earlier construction activity associated with Epping Road has created fill embankments which spill into the Pages Creek area, creating a mixed weed and native species understorey to the tall native tree stands. New construction would take account of this bushland quality and where appropriate establish retained edges to limit the extent of new fills.

The initial development of the Epping Road/expressway interchange would be very impactful upon the general area with tunnel sections, bridges, deep cuts and large fill embankments. However, the finished construction would leave large residual spaces including deck sections over road segments. The application of the landscape theme of substantial plantings of local tall tree species to create miniature urban forests would be very effective. A distinctive quality for this interchange pattern could be achieved using a massed planting of the indigenous Turpentine tree, Syncarpia glomulifera. Large decked sections would be soil covered and densely planted with native shrubs.

6.6 SUMMARY

The expressway in the reservation east of Pennant Hills Road faces similar problems of impact on natural and built environments as those which affect the expressway to the west.

The corridor is relatively narrow in a broad environment and to a large extent built development comes right to its edges. The corridor also to date has acted as a reservation of natural attributes that have been generally lost elsewhere in favour of roads, buildings, homes, factories and previously, rural activity.

It is unavoidable that conflict must occur where eventually a major construction is contemplated. Comment on potential impacts of the expressway proposal follows.

6.6.1 Severe Impacts

The more severe impacts of the expressway (Northern alignment) would be:

- The reduction of the size and quality, and potential reduction of the viability of Forest Areas identified as A and B in Figure 4.1.

- Reduction of environmental quality affecting existing residential areas from Pennant Hills Road through to Terrys Creek and recreational areas based upon Devlins Creek.

- Loss of reasonable residential amenity related to houses which lie close to the path of the expressway especially in an overviewing situation such as on the low side of Ferndale Road (Northern Option), the low side of Treeview Place and Woodvale Avenue.

- The introduction of a large bridge structure and noise walls generally along the creekline from the Pennant Hills Golf Course to Murray Farm Road.

- Actual clearing for construction in Forest Area A and through tall native tree stands alongside Devlins Creek downstream from Murray Farm Road.

- Exposure of high wall effects, where limited or no space is available for screening, to properties in close proximity such as at the Pennant Hills Road and Beecroft Road interchanges; and at particular points on the valley floor of Devlins Creek east of Murray Farm Road and also at the eastern end of Sutherland Road.

Southern Option

- The route to the south of Devlins Creek would significantly modify the severe impacts on the forest environments, and recreational quality of the upper Devlins Creek area by comparison with the Northern Option.

- The Southern Option would reduce the overall length of the proposed bridge structure and its associated management problems.

- All other impacts remain the same as for the Northern Option.

6.6.2 Lesser Impacts

Division of Built Environment

- Division of the existing built environment is not a serious factor given the separation already established (from Pennant Hills Road to the Main Northern Line) by the golf course and the Devlins Creek open space corridor.

- East of the railway the tunnel under Norfolk Road maintains continuity of the community environment above.

- East of Terrys Creek large estates to the south of the expressway corridor and the Lane Cove River State Recreation Area to the north represent an existing clear division in landuse character.

- Beyond Lane Cove Road large industrial and commercial sites would experience only slight if any impact from division caused by the expressway.

Division Between Natural and Built Environments

- Access to natural systems and open space – Devlins Creek, Terrys Creek and the Lane Cove River Valley would be restricted to designated crossings, underpasses and bridge locations (including the Devlins Creek and Terrys Creek bridges). Access opportunities would not be seriously constrained.

Introduction of New/Undesirable Activity

- The new reality of a major transport corridor operating almost anywhere within an already established suburban area would typically be an undesirable activity. However, the expressway's presence in the Devlins Creek environment, and approaching and crossing the Terrys Creek valley would represent a new activity with a moderate to severe negative impact.

7. ARTERIAL ROAD: EFFECTS AND PROPOSED LANDSCAPE TREATMENT

7.1 CARLINGFORD ROAD

7.1.1 Generally

The arterial road design form illustrated in this report (see cross-section Fig. 7.1) represents the proposal which would provide an appropriate alternative, in terms of traffic handling capacity, to the proposed expressway in the reservation.

7.1.2 Magnitude

The proposal constitutes a broad corridor to accommodate six lanes of traffic, two public transport lanes/bicycle lanes. A wide median designed to provide for turning and queuing lanes at intersections, adds further width to the overall cross-section. Therefore, the width of this option mid-block is in the order of 35 metres. The addition of noise walls, and the margins required on most edgelines to take up differences in levels, could add more width. In these circumstances, space for screen planting and earth mounding can only occur on residual margins which might result from the partial demolition of existing properties required for road construction.

The magnitude of the arterial road option, as described above, would make necessary along most of its route, the acquisition of at least one line of existing properties on one side or the other. In some places, properties on both sides would be affected. At intersection zones, the pattern of connecting lanes, even though the intersections would be established generally on existing grades, would encroach upon additional properties.

7.1.3 Noise Abatement/Visual Screening

Similar to an expressway development, the arterial road of more or less equal capacity, would carry heavy traffic loads, including large commercial vehicles; noise levels would be such that noise abatement measures would have to be taken to meet the standards required. These measures in the forms of walls and earth mounding can be typically 3.0 to 5.0 metres high and sometimes higher. Land space for earth mounding and screen planting can generally only be utilised where residual areas are left after acquisition of existing properties. Where no such land is available, noise walls would be exposed and be visually dominating

In these cases, minimal planting opportunities would sometimes be available to soften the effects of walls rather than to screen them. In some situations architectural design treatment of the wall surfaces may be appropriate to help to integrate them into the local environment. This treatment can include colour and texture or pattern effects and in some instances, transparent panelling.

7.1.4 Division/Access

Noise walls to be effective need to be constructed in unbroken lines so that, in combination with heavy traffic streams, they would forbid random crossing of the arterial road by pedestrians.

Crossing points would occur at traffic light controlled intersections. These intersections, typically, would be of some magnitude so that crossings by pedestrians would be subject to delays.

Regardless of the measures that might be taken to soften the impact of the arterial road, to reduce its apparent scale and to green its corridor, the new road would be a divisive element in the community and would constitute a new common boundary to community development which would be split into separate components.

7.1.5 Outlook

At the immediate edge margins of the finished arterial, the outlook towards the road from remaining properties would vary in quality. In the best cases the new view would be towards heavy planting on residual margins, which would provide a visually pleasing buffer, possibly equal to or better than the view which might have previously been obtained. In the poorest cases, the new views could be towards high walls perhaps with an intervening strip of roadway functioning as a service road for access to properties.

The overview of the new road corridor could, in time, be enhanced by the development of large trees located in the median, in traffic islands and on the road edges, in a fairly continuous corridor.

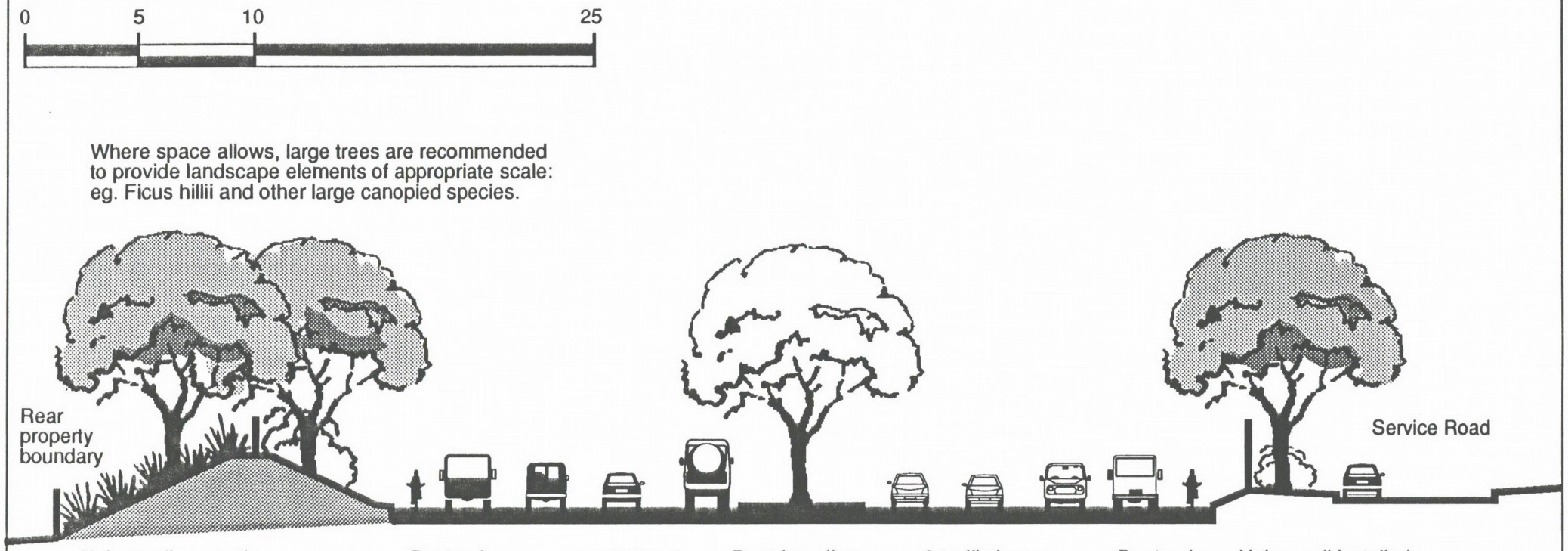
7.1.6 Planting Effect : Time Spans

Time spans involved for the development of plantings, as described above, to an initial stage of effectiveness, would be two to five years for screen planting and five to ten years for large tree planting. Development of plantings in these time periods would achieve heights and bulk capable of equalling those of noise walls and become visible as canopies across the road corridor.

Given that the arterial road construction would follow existing grades, views from houses one line or more removed from the road edge would remain much the same. Oblique views from these positions may observe the new larger road where it climbs a slope on the opposite side of a dip in the topography. However, these views would be modified by distance and at a later date, with new planting matured, the long views could be pleasing.

7.1.7 Cross-sections

Cross-sections and a plan diagram illustrating the arterial road proposal have been developed based on typical situations that can be found along Carlingford Road. The locations have been selected to demonstrate representative effects in a given segment of road if the arterial road proposal was to be developed.



TYPICAL CROSS-SECTION (ARTERIAL ROAD INCL BUS LANES) CARLINGFORD & EPPING ROADS

FIGURE 7.1

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If reductions in scale were adopted to reduce numbers of lanes and overall widths, the requirements of noise abatement and visual screening would still apply and lead to similar effects and mitigative treatments as those illustrated.

a. A Typical Cross-section – Fig. 7.1.

This cross-section is indicative of the layout of three traffic lanes in each direction with bus lanes and cycleways at the edges. In this example, space is available on one side for soil mounding and screen planting. On the other side, a service road for access to properties adjoins the arterial leaving little space between.

A noise wall is located on the mound profile and as a result the wall height, while maintaining noise abatement effectiveness, is able to be reduced. Screen planting would absorb it visually. On the opposite margin where space is limited, the noise wall would be seen at its full recommended height with planting providing a visual softening rather than a screening effect.

Tree planting of large-canopied species similar to Ficus hillii would be recommended as fairly continuous avenues and where possible, as double rows. Similar planting in the median would be very desirable, considering the broad width of the carriageways and to provide visual linkage across the corridor. However, median planting would be subject to the provisions needed for vehicle breakdowns and safety factors, and it may be limited in its application.

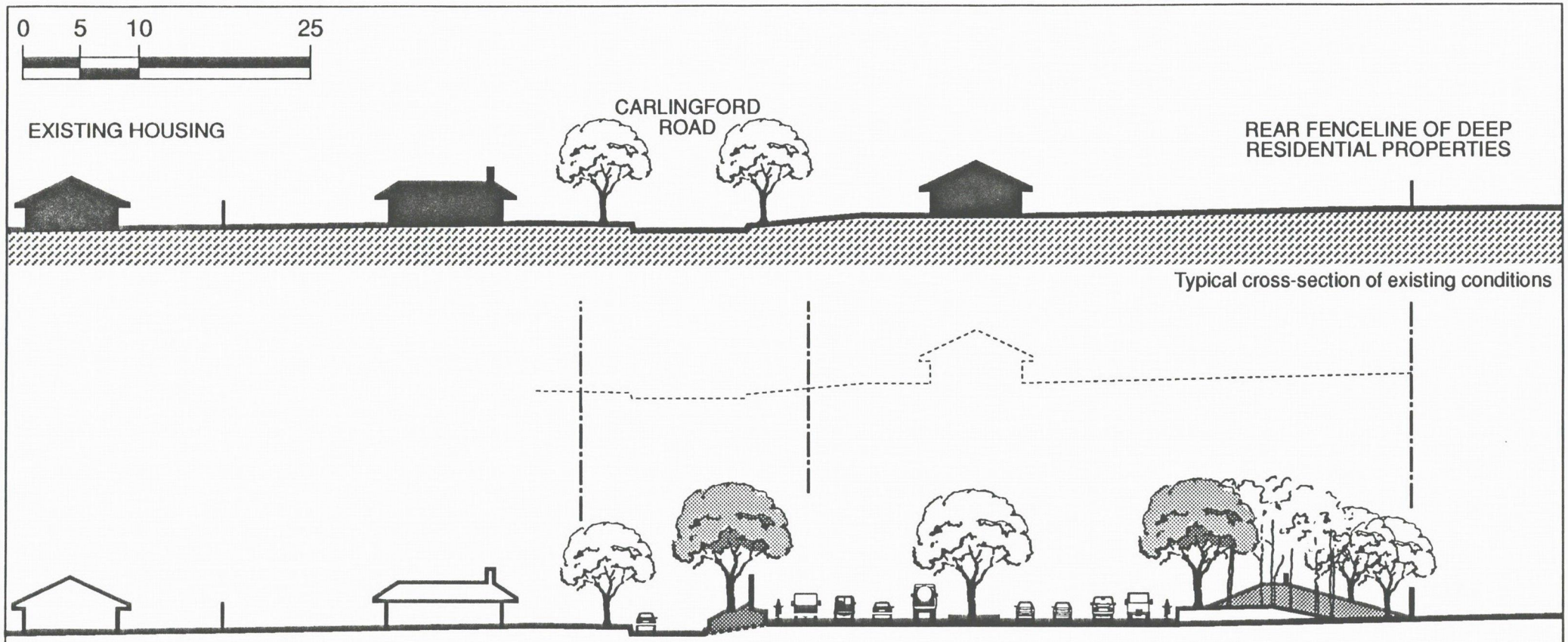
Additional substantial planting of trees would be introduced in large traffic islands and other residual spaces.

Cross-section dimensions would vary along the route in response to local conditions and design requirements. At major intersections, for example, a broadening of the pavement would occur to accommodate turning and connecting lanes. Bus stops would be installed as lay-byes creating additional width.

The 'typical cross-section' has been based on conditions which would occur in the segment of Carlingford Road to the east of Midson Road. (Refer also to Figure 7.2 .)

b. Pennant Hills Road – Pennant Parade

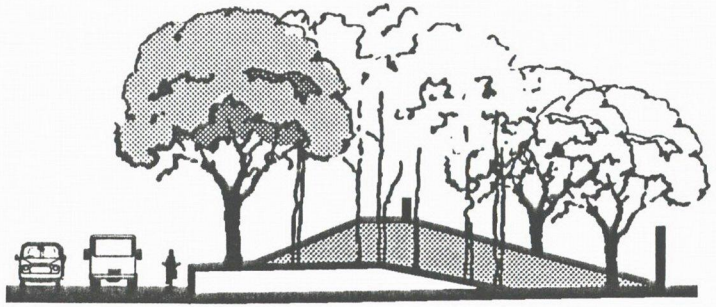
Between the complex intersection zone at Pennant Hills Road and Pennant Parade, the arterial would be partly in excavation after emerging from a tunnel connecting Pennant Hills and Carlingford Roads. On either side would be long ramping lanes with bordering noise walls up to 3.5 metres high. A church and a line of houses on the south side of Carlingford Road would be demolished leaving residual space for substantial screen planting which would obscure views of the road formation from the rear of houses in Keeler Street. Houses and Epping West Public School on the north side of Carlingford Road which would remain, would look upon a service road and a noise wall generally 3.5 metres high. Limited screen planting would be possible on this edge in conjunction with spaced tree planting.



Typical cross-section of existing conditions

Reduced width service road

Ch 13000
East of Pennant Parade



ENLARGEMENT OF RIGHTHAND MARGIN

Where space on the margin allows, soil mounds can be used as noise barriers to reduce the heights of noise walls.

On broader margins some existing trees may be retained by varying the shapes of soil mounds and the locations of noise walls.

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ARTERIAL ROAD : A TYPICAL CROSS-SECTION CARLINGFORD ROAD

FIGURE 7.2

c. Cross-section (Carlingford Road east of Pennant Parade at Ch. 13000 – Fig. 7.2)

East of Pennant Parade a similar situation continues where a margin of land would remain on the south after construction to allow effective earth profiling and screen planting (refer to cross-section) and on the north side views from houses would be onto a service road and a low noise wall beyond. Little planting space would be available on the north side.

d. Cross-section (East of Midson Road at Ch. 14100 – Fig. 7.4)

The diagram refers to the situation east of Midson Road where the arterial road would veer to the north prior to being aligned with the tunnel approach near the railway line.

A line of houses on the north side of Carlingford Road would be lost leaving Carlingford Road at a reduced width as a service road to houses remaining on the south side of the arterial road.

Houses would be affected at the intersection with Midson Road.

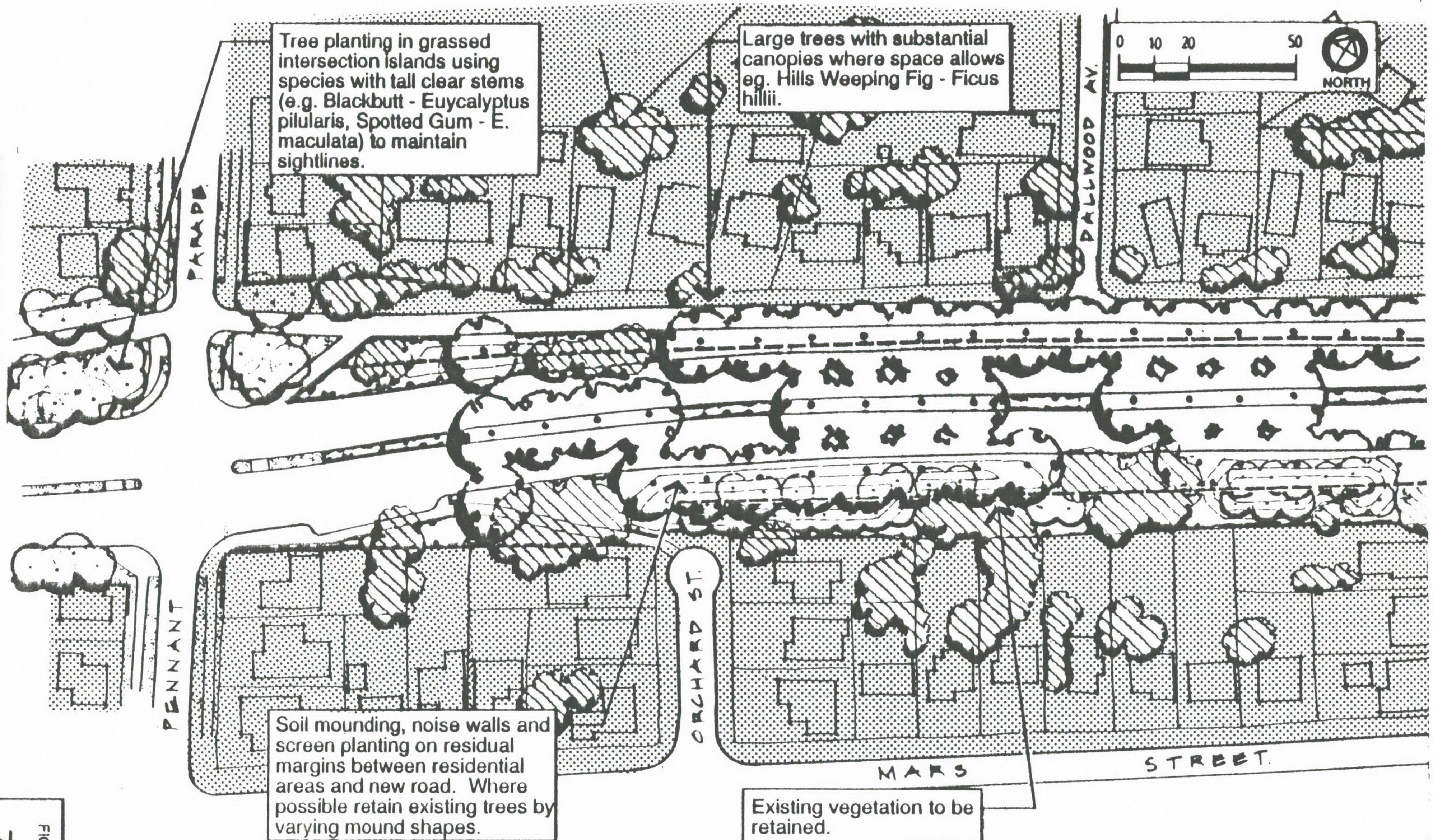
In this segment, opportunity for earth mounding and screen planting would shift to the north side so that views from the rear of houses on Cliff Street would be onto satisfactory landscape planting treatment. However, this treatment would taper away towards the intersection of Cliff Road with the arterial near the tunnel entrance. The southern edge consisting of a noise wall, service road and limited planting would be partly screened.

e. Noise Walls/Tunnel Approach

High noise walls would be exposed on most of the south edge of the arterial from Midson Road to almost Rawson Street. These walls as recommended would be generally 5.0 metres high possibly increasing to 7.0 metres between Kent and Rawson Streets against a recent development of medium density housing. In the latter case, an option exists to have an alternative barrier type installed to a height of 5.5 metres.

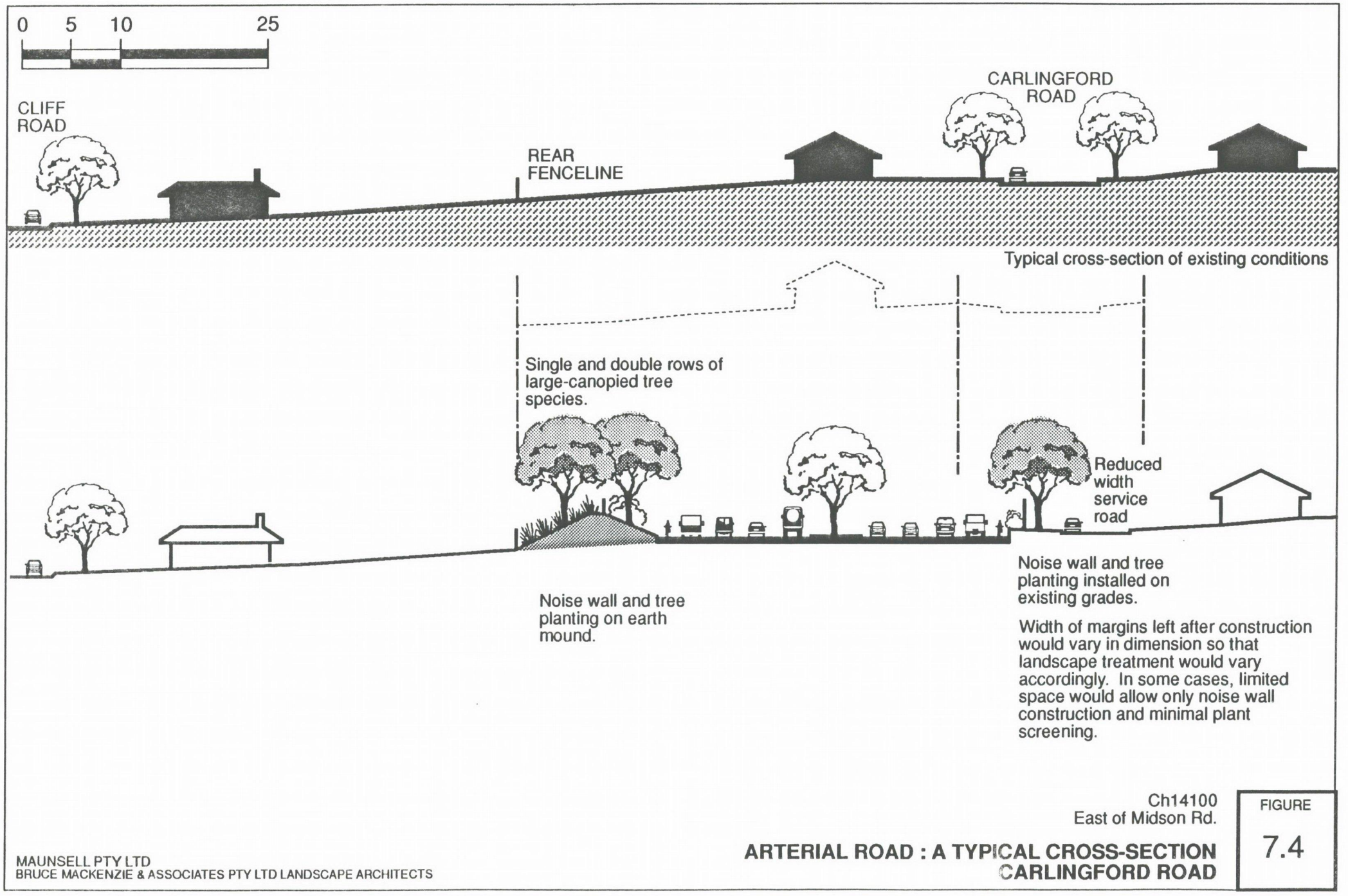
The high walls would be visible from points well distant from the edge of the road and from the opposite side of the arterial.

The alignment of the tunnel approach would cause the loss of properties between Cliff Road and Beecroft Road including the substantial buildings of the Epping Baptist Church and an old cottage with a garden of very large trees on the existing Cliff Road corner. A large service station would be demolished between Rawson Parade and Beecroft Road.



ARTERIAL ROAD: TYPICAL PLAN – CARLINGFORD ROAD LANDSCAPE PROPOSAL

FIGURE 7.3



Ch14100
East of Midson Rd.

FIGURE
7.4

ARTERIAL ROAD : A TYPICAL CROSS-SECTION
CARLINGFORD ROAD

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7.2 EPPING ROAD

7.2.1 Generally

Epping Road's present physical circumstances are markedly different from those of Carlingford Road. The magnitude of the change to its present traffic function, which would occur if the arterial road proposal was to proceed, would be only of moderate scale by comparison with the equivalent change to Carlingford Road. Some aspects of the new road proposals for Epping Road could lead to improvements for its surrounding community such as improved visual qualities from new planting, visual screening of road edges and treatment of noise impact.

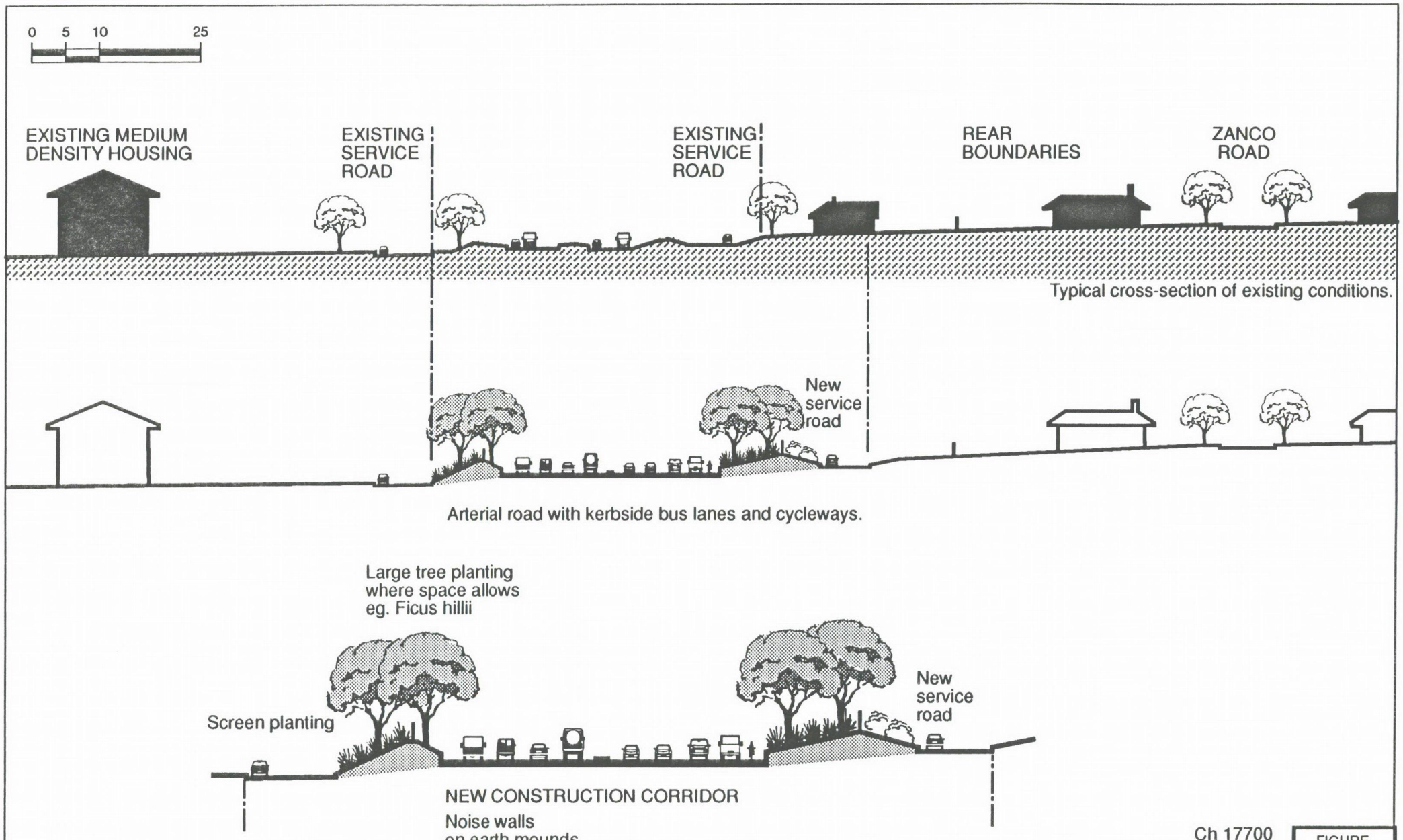
7.2.2 Epping Ridge : Tunnel

Emerging from tunnel on the east side of the Epping ridge, entrance works and connecting lanes between the arterial and the continuation of Epping Road and Pembroke Street would cause the loss and partial loss of properties on York, Pembroke and Stanley Streets, and Bartill Close. Many mature trees of native and exotic species would be lost in addition to houses and gardens.

The tunnel, however, would represent obvious benefits by passing under the Epping town centre and the surrounding good quality suburban development, virtually without impact once completed. The tunnel approach would have a minor impact by comparison with other possible alternatives designed to make a connection between Carlingford and Epping Roads.

7.2.3 Terrys Creek

The crossing of Terrys Creek on a new and wider bridge could involve recommended noise walls of up to 8.0 metres in height. However, a curved or angled profile for these high walls, including transparent panelling, would be designed given the impact that high opaque walls would have on the bushland valley environment.



Ch 17700
West of Herring Rd

FIGURE
7.5

ARTERIAL ROAD (INCL BUS LANES) :
A TYPICAL CROSS-SECTION EPPING ROAD

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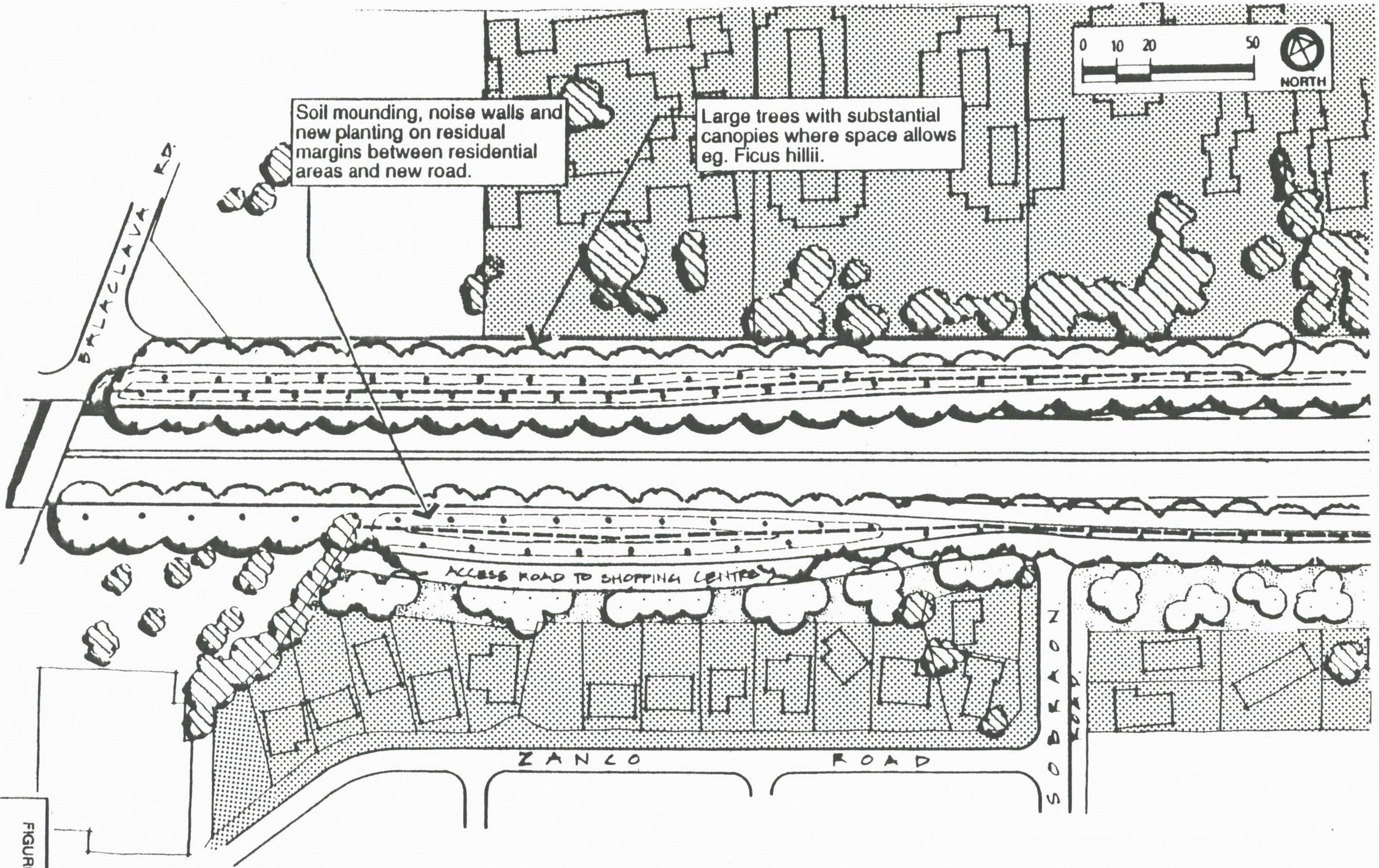


ARTERIAL ROAD (INCL. BUS LANES): TYPICAL PLAN – EPPING ROAD LANDSCAPE PROPOSAL

FIGURE 7.6

7.2.4 Terrys Creek to Lane Cove River

Between Terrys Creek and the Lane Cove River the main changes from existing circumstances would be:

- Construction of grade-separated intersections, similar to that existing at Lane Cove Road, involving new ramp and bridge structures.

- The installation of noise walls along parts of the edgelines with heights of up to 5.0 metres in specific places (eastern slopes of Terrys Creek – adjacent to Yarwood Street near Stewart Park – between Balaclava and Herring Roads mid block – and immediately east of Herring Road on each side against access ramps.

- Installation of lower noise walls 1.5 metres to 3.5 metres high on parts of the balance of road edges (elsewhere – no wall installations).

- Losses of houses (including a line of houses off Waring Street and another off Yarwood Street) and partial loss of properties (e.g. El Rancho Hotel) related to construction of intersections and the introduction of service roads in certain locations.

- The reduction of edges of Pioneer and Stuart Parks against the arterial road would cause the loss of some semi-mature to mature Eucalypts.

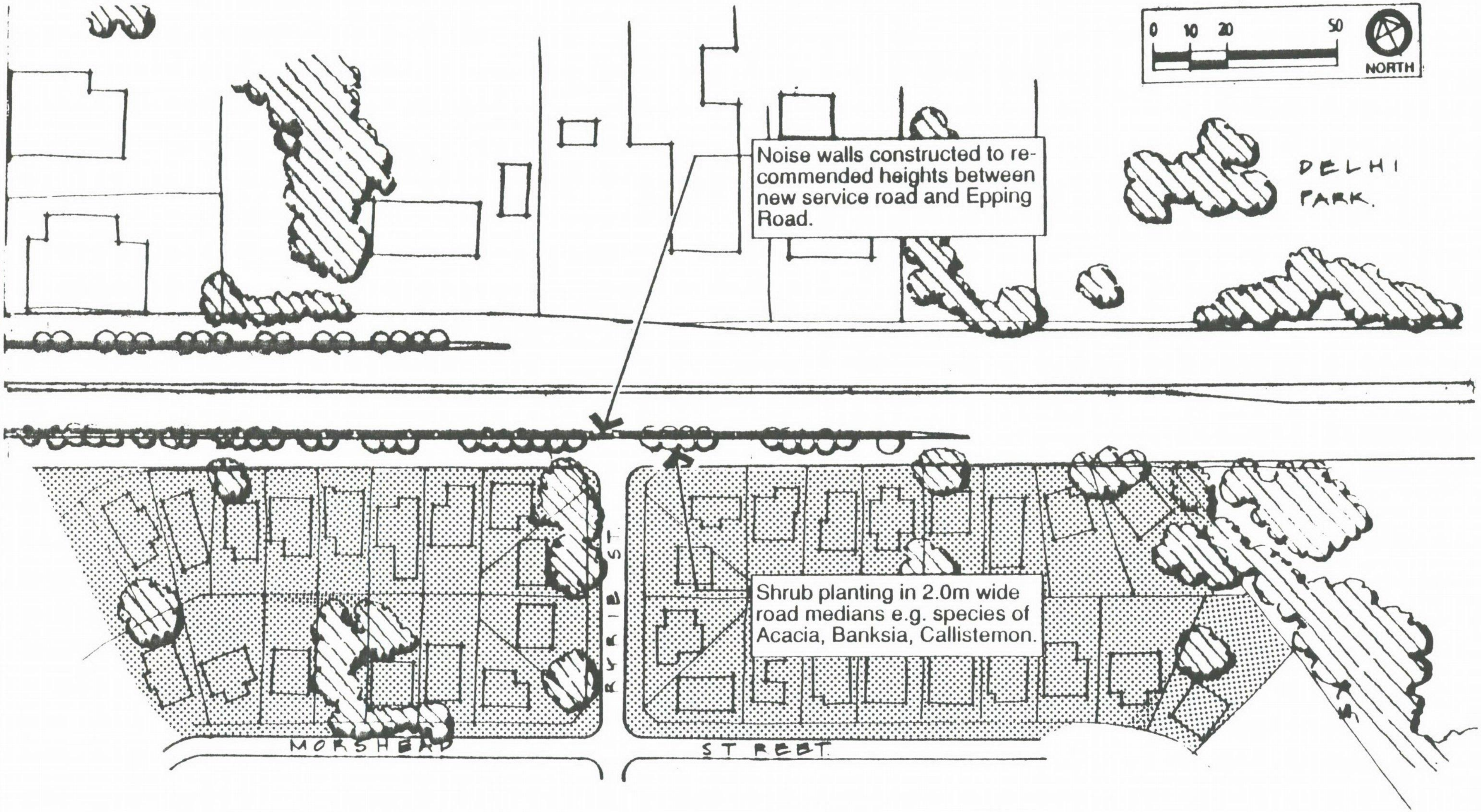
Visual improvements would be obtained from fairly continuous plantings of large tree types on each side of the arterial.

No tree planting would occur on the median because the grade-separated intersections delete the need for a wide median related to turning and queuing movements and the narrow median would not be suitable for tree planting in a close relationship with traffic streams.

Screen planting would obscure views from outside the paved corridor towards noise walls where space would be available at the edges. Some sections of screen walls would be exposed where property boundaries and service roads adjoin the walls.

East of Herring Road, buses would share the three general traffic lanes in each direction and the basic cross-section width would then be narrower than that to the west of Herring Road. Grade-separated intersections would require curving and ramping connecting lanes, incurring edge wall constructions and earth embankments.

Intersections zones where widening and demolition of property would occur, would have immediate local impact which would be sometimes severe, however Epping Road overall, would be improved as a physical landscape corridor by the introduction of noise abatement measures and a continuous and substantial planting programme. Cross-flow access patterns would be considerably improved and in time, planting improvements would overcome the exposure problems of initial construction.



ARTERIAL ROAD: TYPICAL PLAN – EPPING ROAD LANDSCAPE PROPOSAL

FIGURE 7.7

7.3 SUMMARY

7.3.1 Severe Impacts

The more severe impacts of the arterial road option would be:

Carlingford Road

- Serious division of the surrounding community.
- Major restrictions to circulation of pedestrians and local vehicle movements affecting the amenity and quality of the residential environment.
- Changed outlook from many properties to views of poorer quality than those existing – typically onto noise wall construction where insufficient space is available for screening.

Epping Road

- Broad outlooks or distant views in some cases terminated by noise walls or screen planting.
- High noise walls in some locations not able to be adequately screened.

The estimated potentials of Epping Road indicate that it would be suited to the process of upgrading as described in the proposal. Some initial impacts of exposure to edge constructions would be modified within a 2–5 year period by planting measures. It is considered that impacts generally upon existing landscape and visual aspects would be minor.

Improvements

Some aspects such as noise abatement measures, a substantial and comprehensive corridor planting proposal and enhanced facility for cross traffic via grade-separated intersections, represent potential improvements to the existing landscape and human environment around the corridor.

Carlingford and Epping Roads

The two roads form contiguous parts of the proposal and each on its own does not signify a particular option. Unfortunately the apparent benefits of Epping Road for the purpose of upgrading do not continue west of the tunnel through the Epping Ridge. The estimated impact of the proposal on Carlingford Road and its surrounding environment is generally assessed as severe. Any positive benefits that might be gained other than those of the actual transport function, could require long-term comprehensive planning strategies which do not form part of the study's brief.

8 LANDSCAPE : RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

8.1 LANDSCAPE

8.1.1 Generally

Resolution of the expressway's horizontal and vertical alignments would be determined so as to minimise impact wherever possible. Mitigative measures involving detail responses would be then applied in differing locations to screen and reduce visual impact. The arterial road alternative would be designed to fit existing grades as much as possible to reduce the need to adjust levels changes at the edges. Even so, because of the road width some edgelines may need to be retained within a low wall structure to avoid further encroachment onto property margins. Levels differences would otherwise be graded out and planted. The Epping Road segment would include some grade-separated intersections which would require steeper embankments and screening or softening of retaining walls.

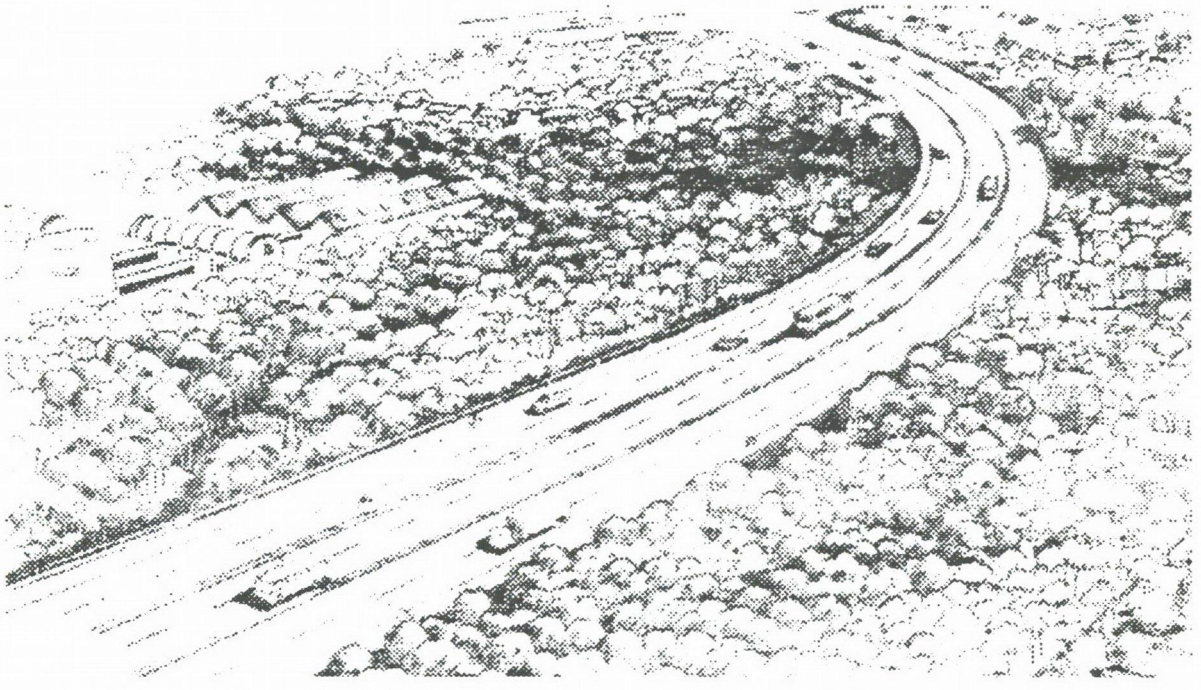
At a broader level of application, landscape treatment may include the development of a corridor theme which endeavours to achieve a substantial landscape impact, for example, along the lines of urban forestry or, in the case of an arterial road corridor, grand avenues of urban tree canopies. Similarly, as compensatory measures, networked circuits of cycleways can be developed to provide better and safer alternatives for the cycleway user. As much as possible, the divisive character of the large road formation should be modified by providing over and underpasses for the convenience of people and to reduce the feeling of constraint being imposed by an impassable barrier within residential circumstances.

8.1.2 Landscape Theme

A landscape theme appropriate to the expressway reservation corridor could include the concept of urban forestry using planting in generous proportions. Urban forestry as a theme idea envisages species composition relevant to once-natural surroundings; a scale of planting that would be largely consuming of available spaces to encourage visual linkages and develop biological corridors to provide meaningful new habitats for urban wildlife. It is a theme that is meant to be resourceful. The detail of an urban forest concept would be focused on long-lived plant materials, mostly trees, with robust characteristics and less those of decoration. Weeds can be allowed to grow in such a plantation if they are able, and fussy attention to detail maintenance would not necessarily be critical to its success.

8.1.3 Co-operative Ventures

The revegetation of the road construction corridor could become the catalyst for co-operative ventures where land contiguous to the road corridor would be included in a broader revegetative process. After decades of relentless clearing of urban bushland, it would seem to be a worthwhile investment and could include the participation of state and local government authorities as well as community organisations.



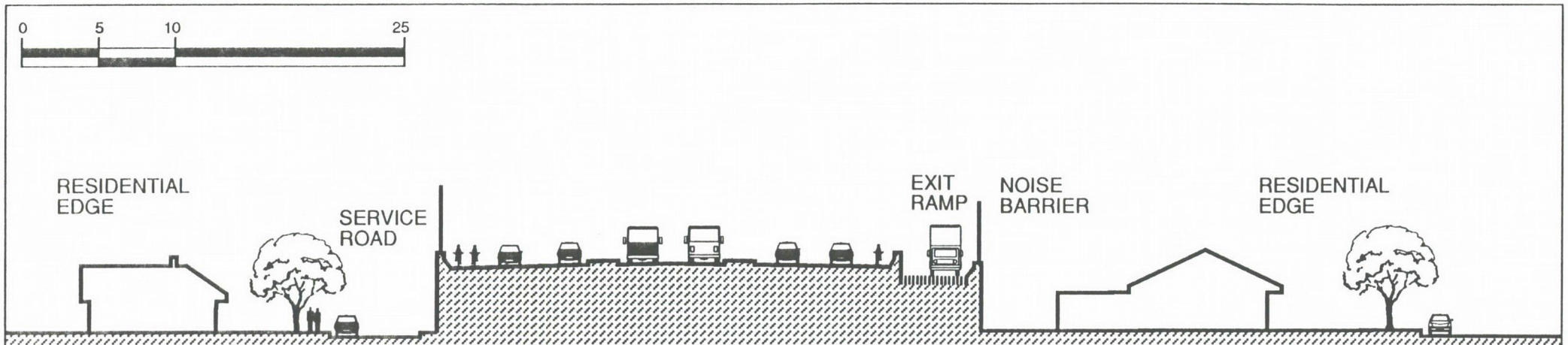
THE EXAMPLE OF THE 'URBAN FOREST' THEME SHOWN HERE IS BASED ON A BROAD SITE SECTION OF THE WESTERN STUDY AREA. TO THE EAST OF PENNANT HILLS ROAD THE THEME CAN STILL BE FOLLOWED BUT WOULD BE RELIANT UPON ADJACENT LAND SPACES BEING DEVELOPED ALONG THE SAME LINES TO ACHIEVE A SIMILAR SCALE OF EFFECT.

8.1.4 Screening

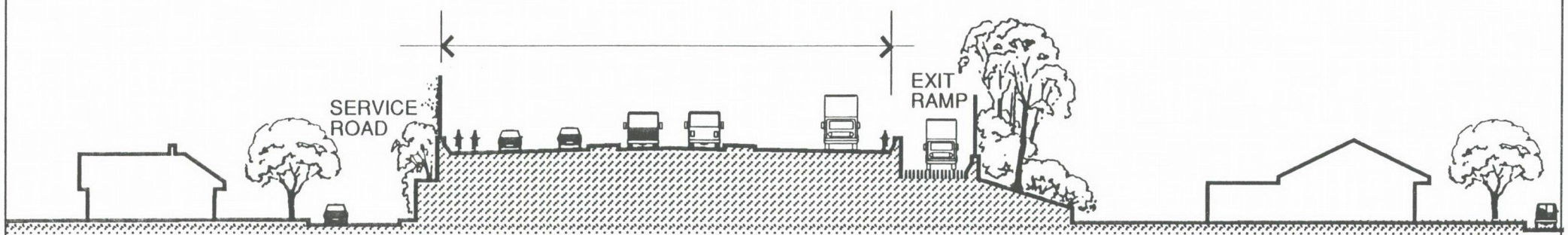
The basic aims of designing to reduce the impact of the built roadway are to visually screen it entirely where possible and otherwise to whatever extent would be practicable; to reduce the apparent scale of its structures, especially its noise wall barriers; to add landscape elements where possible (such as earth mound profiling) to assist the process of reducing noise impact and to obscure or reduce views to the traffic streams. Earth mounding, where space permits, can be constructed so that noise abatement would be achieved without the use of walls. Other situations can occur where earth mounding is formed in conjunction with noise walls so that in combination they would provide noise reduction while reducing the wall heights. (Refer to cross-section diagrams in Sections 6 and 7.)

Where possible, landscape finishes would endeavour to provide a sense of containment of the built environment rather than that of the road corridor. However, space constraints would inhibit this prospect in many situations and the introduced landscape character to a large extent would have a corridor orientation aligned to that of the road.

WHERE SPACE ALLOWS, PLANTING CAN REDUCE THE IMPACT OR SCREEN COMPLETELY THE VIEW OF NOISE WALLS AT THE ROAD EDGE.



The expressway in a difficult location (e.g. approaching a ridgeline intersection) where edges are contained by retaining walls and noise walls add further height. Space constraints deny opportunities to add improvements either within the road corridor or on its margins.



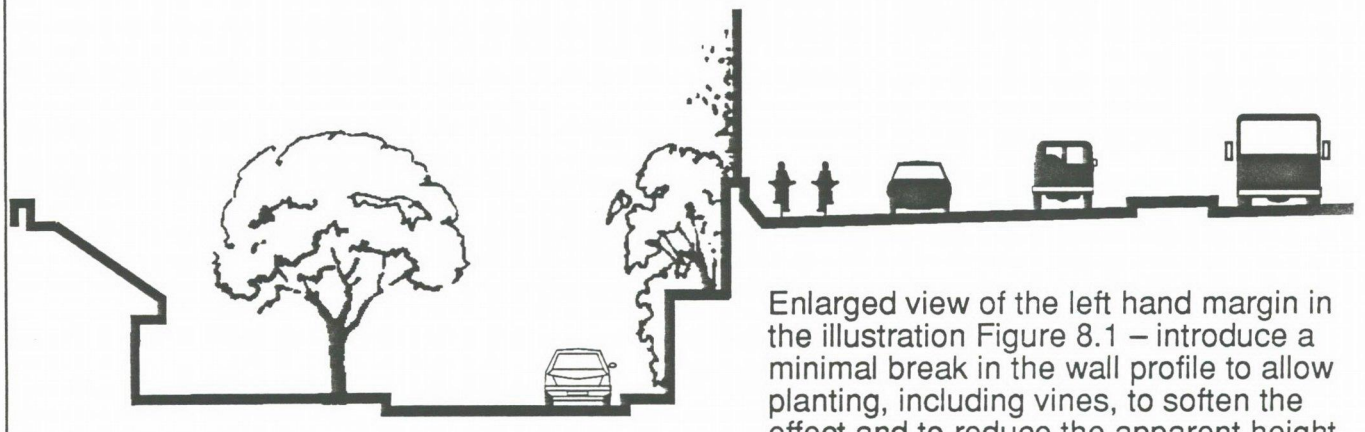
In this illustration some space has been obtained for planting improvements

EXAMPLES OF LANDSCAPE TREATMENT ON THE MARGINS WHERE SPACE ALLOWS.

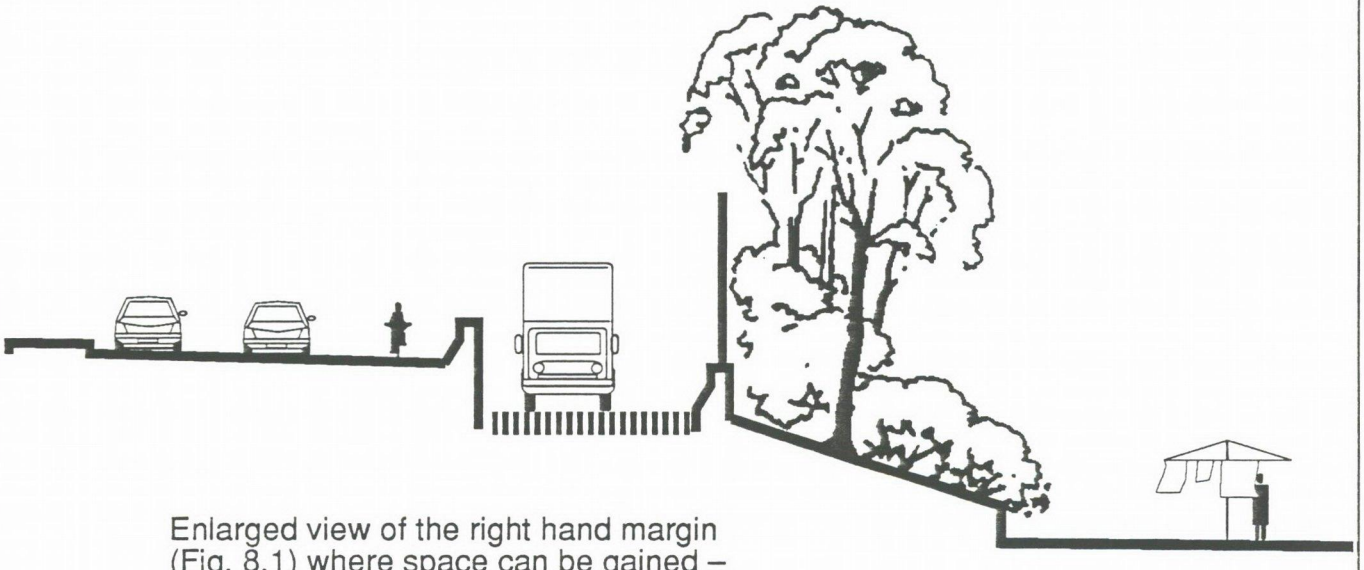
MAUNSELL PTY LTD
BRUCE MACKENZIE & ASSOCIATES PTY LTD LANDSCAPE ARCHITECTS

TYPICAL CROSS-SECTION EXAMPLES EXPRESSWAY PROPOSAL

FIGURE 8.1



Enlarged view of the left hand margin in the illustration Figure 8.1 – introduce a minimal break in the wall profile to allow planting, including vines, to soften the effect and to reduce the apparent height of the walls.



Enlarged view of the right hand margin (Fig. 8.1) where space can be gained – the break in the wall is expanded to allow more substantial planting to provide an effective screen - in this case against the rear garden of a house lot.

TYPICAL CROSS-SECTION EXAMPLES
EXPRESSWAY PROPOSAL

FIGURE
8.2

MAUNSELL PTY LTD
BRUCE MACKENZIE & ASSOCIATES PTY LTD LANDSCAPE ARCHITECTS

8.1.5 Retention of Existing Treed Margins

In bushland and other treed areas, the road edges would be carefully contained so that existing trees would be preserved close to the new construction. Similarly, edges would be contained and construction methods arranged so that spill from earthworks would not encroach upon bushland slopes. Road construction in these situations would be undertaken largely within the carriageway zone so that interference with edgelines of bushland would be made minimal.

In bushland areas reinstatement of edges after construction would be carefully established. Replanting where required would be completely harmonious with the localised plant communities and plant propagation for reinstatement work would be carried out using seed from parent plant material located on site. Mulching would be provided using brushchip material obtained from essential clearing operations carried out on site in preparation for construction.

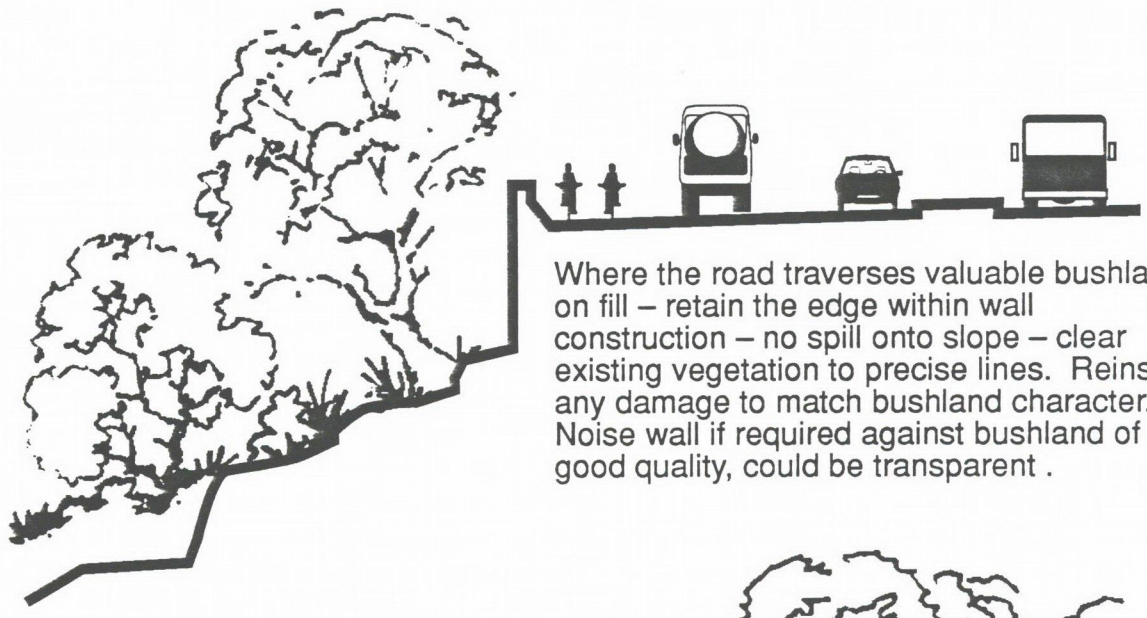
Clearing operations through bushland prior to construction would be done with precision as a first step in ensuring retention of trees close to the edges of the works.

In built-up areas similar measures would be employed to preserve existing trees on adjoining margins and in some cases, valuable trees within existing gardens. But because of space constraints that will often apply in built-up areas, planting and screening treatment may be reduced to narrow margins at the road edge. Even where demolition of existing property would take place, service road requirements to the remaining residential edges could create these situations of narrow margins at the road edge.

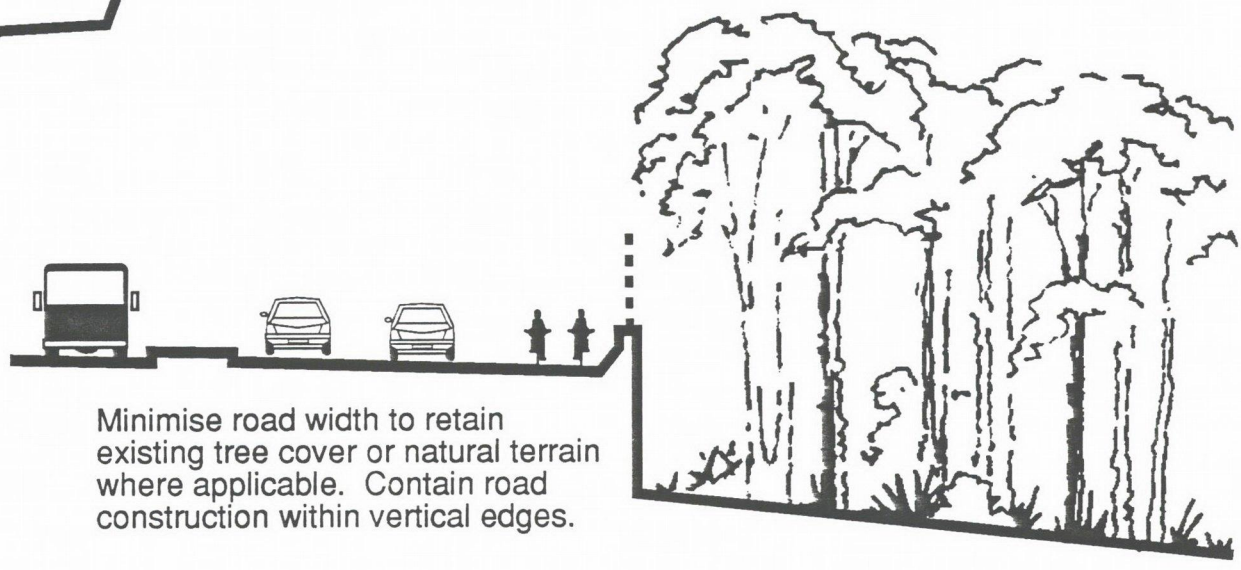
The illustration, Figure 8.4, shows how the initial impact and disruption that would be caused by the large arterial road, could in time be redressed in part by effective planting. The sketch proposes large trees arranged in extensive avenues. The planting scheme would persist along the corridor and be disciplined by a cohesive design pattern. Large trees with broad heavy canopies would help to reduce the apparent scale of the roadway and, forming their own greened corridor, would contribute to the urban circumstances of the future.

8.1.6 Planted Embankments

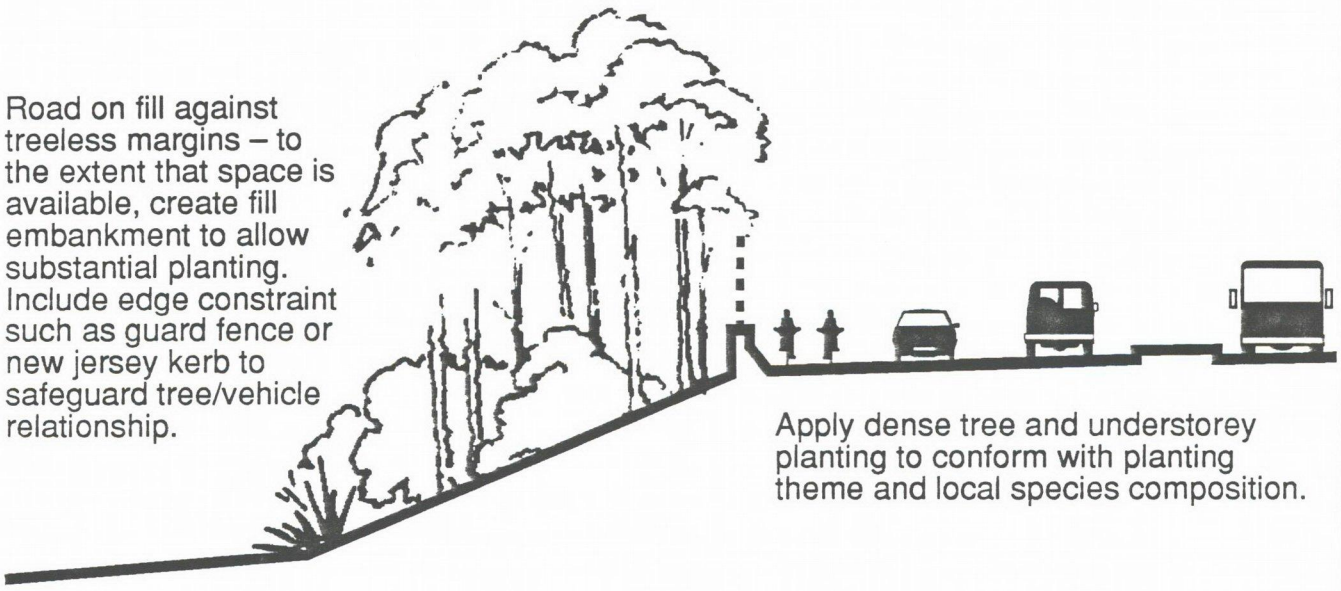
Where existing margins to proposed construction do not feature valuable vegetation, fill or cut embankments would be formed to grades suitable for new planting. The extent of grading for subsequent planting would be dependent upon the availability of residual space and this factor would be variable according to situation. Planting however, where possible, would be installed as a dense ground covering application to provide visual screening and to reduce future maintenance requirements.



Where the road traverses valuable bushland on fill – retain the edge within wall construction – no spill onto slope – clear existing vegetation to precise lines. Reinstate any damage to match bushland character. Noise wall if required against bushland of good quality, could be transparent .



Minimise road width to retain existing tree cover or natural terrain where applicable. Contain road construction within vertical edges.



Road on fill against treeless margins – to the extent that space is available, create fill embankment to allow substantial planting. Include edge constraint such as guard fence or new jersey kerb to safeguard tree/vehicle relationship.

Apply dense tree and understorey planting to conform with planting theme and local species composition.

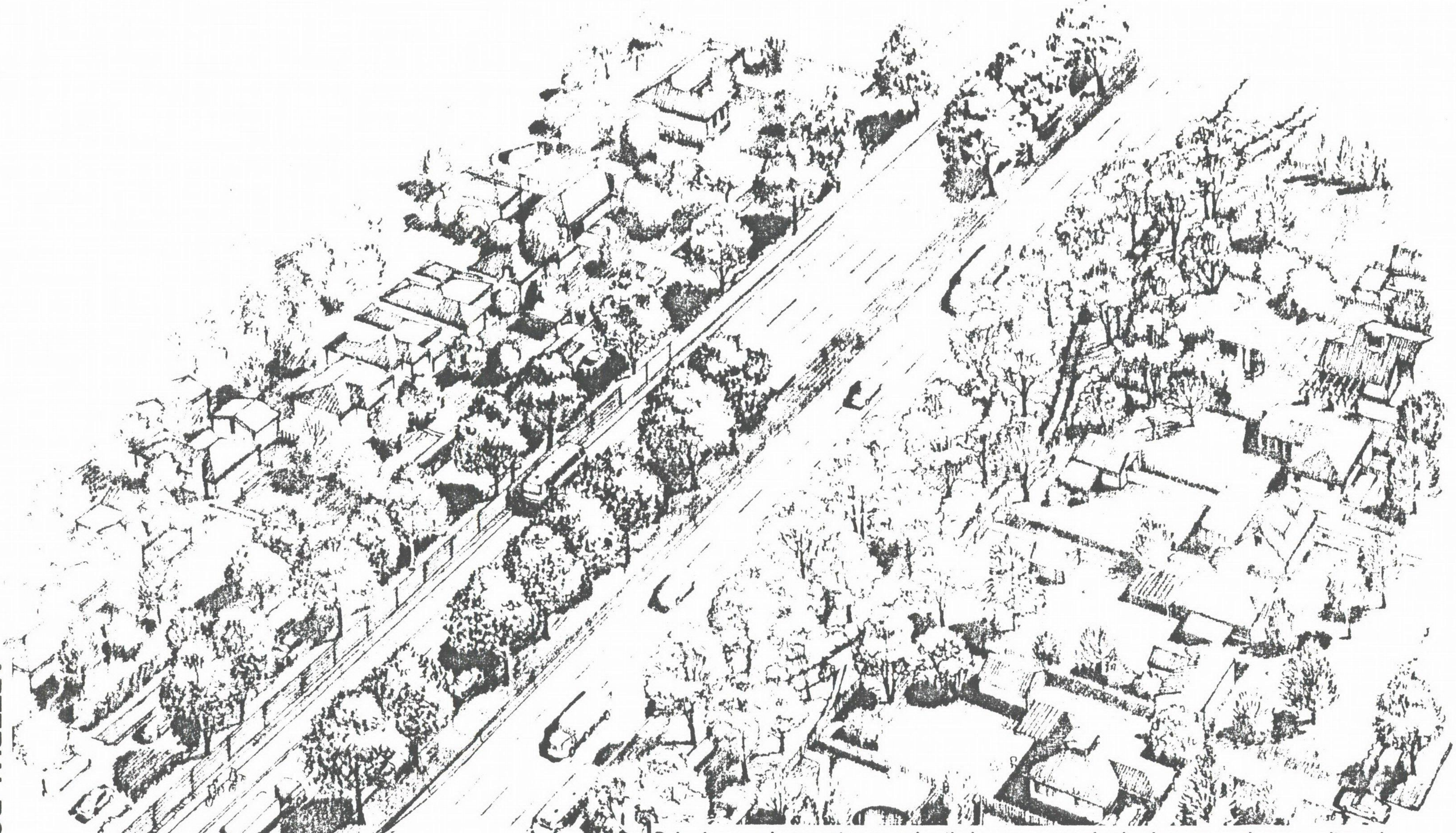
ROAD EDGE RETAINING WALLS & EMBANKMENT SITUATIONS

FIGURE 8.3

MAUNSELL PTY LTD
BRUCE MACKENZIE & ASSOCIATES PTY LTD LANDSCAPE ARCHITECTS

ARTERIAL ROAD

FIGURE 8.4



Suburban environments can enjoy their own sense of cohesiveness and community and be attractive in simple, unspectacular ways. The large road or heavy traffic stream is a divisive element. Noise walls and screening would add to the divisive effect. The road becomes a new boundary.

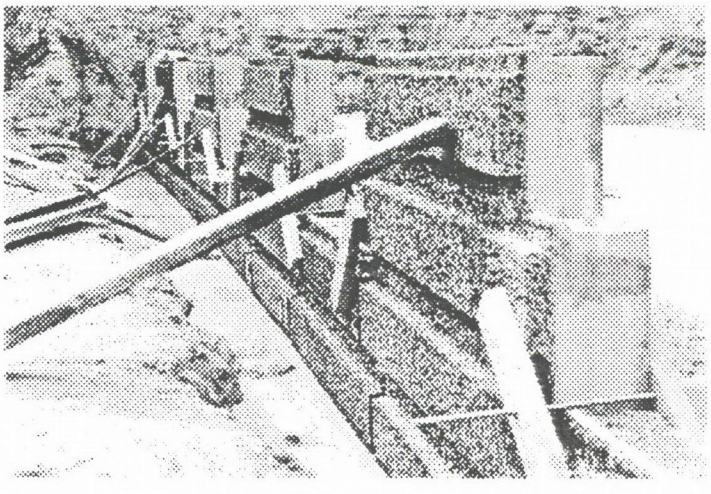
The illustration shows the effect of heavy planting and large trees in an endeavour to reduce the scale of the road. Continuous heavy planting could also, in time, create a greened corridor of large scale which would make some contribution to the broad environment while softening the edges of the local ones.

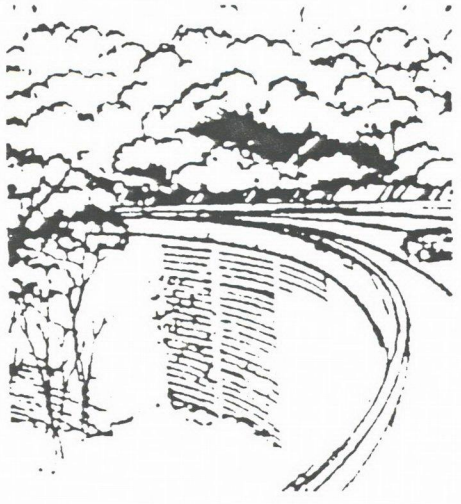
8.2 SUMMARY OF LANDSCAPE INTENTIONS

8.2.1 Preliminary Construction Procedures

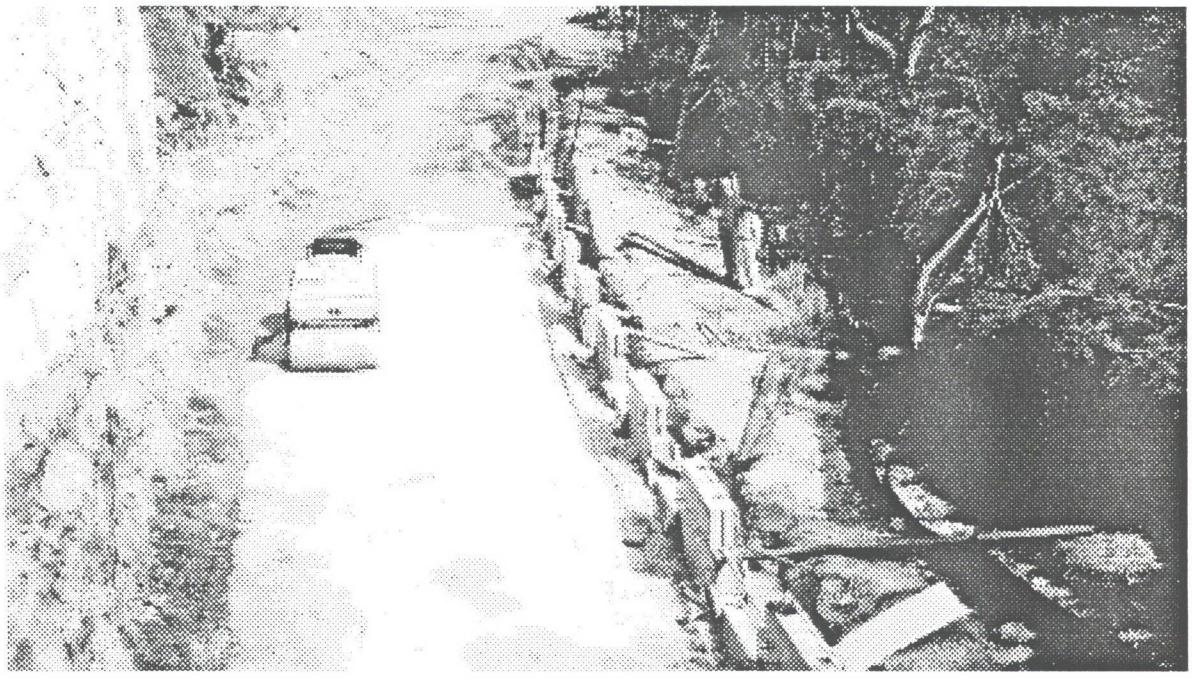
These recommendations form essential aspects of landscape design recommendations. They would apply to design documentation and to the actual construction process and refer to construction matters which can have a lasting or permanent impact on the landscape environment. The recommendations of these Sections, 8.2.1 and 8.2.2 are especially applicable to bushland and heavily vegetated areas. However in already built-up areas the principles still apply in terms of preservation of existing features and vegetation, and constraining construction to precise lines.

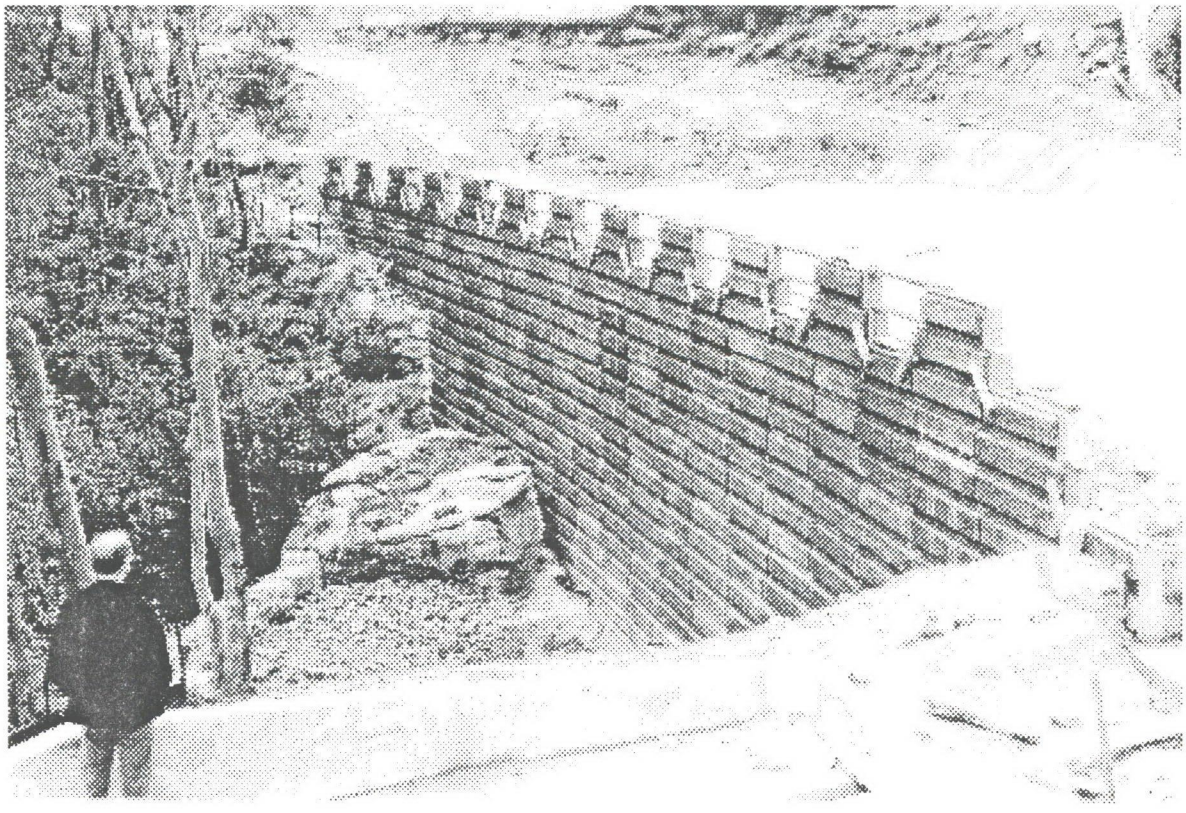
1. Establish the construction corridor on site within precise surveyed edge lines prior to clearing or other preparation work beginning.
2. Handfell trees and vegetation along and within construction lines.
3. Carry out construction, except for particular essential works (silt traps and drainage, erection of formwork, for examples), within the construction corridor, ie. as close as possible to the extent of actual lines of cut and fill.
4. Construct retaining walls prior to the placing of fill materials on downslope edgelines.
5. Arrange drilling of cut lines through rock from within the construction corridor and prior to excavation taking place.
6. Contain construction processes and where possible, construct fencing to define the precise limits of construction activity. Formal constraints in this regard should be built into the contractual obligations of all operatives to ensure control over unspecified spillage, damage to vegetation and landform, spread of debris and refuse, and storage and access for materials and equipment.
7. Prior to road and landscape design development proceeding, detail survey of landscape elements would be needed to establish locations and levels of relevant features, for example, existing mature trees and edgelines of good quality vegetation.





THESE DETAILS AND ILLUSTRATIONS OVERLEAF SHOW RETAINING WALLS IN BUSHLAND ESTABLISHED FIRST TO CONTAIN CONSTRUCTION SPILLS.





BOTH PHOTOGRAPHS DEMONSTRATE HOW A TIGHT EDGE AGAINST BUSHLAND CAN BE MAINTAINED EVEN WHEN MASSIVE CONSTRUCTION PROCEDURES ARE NECESSARY. THE LOWER PHOTOGRAPH ILLUSTRATES A RECOMMENDED CHARACTER FOR RETAINING WALLS IN SENSITIVE BUSHLAND AREAS (CONSTRUCTION BY THE ROADS AND TRAFFIC AUTHORITY).

8.2.2 Conservation of Materials

This process would be integrated with construction detailing and programming so that:

1. Grass and weed vegetation is cleared away and kept separate from other materials.
2. Seed of indigenous plant species is collected from the vegetation to be cleared from the construction corridor.
3. Indigenous and compatible existing plant material from the construction zone is converted to brush chippings and stockpiled.
4. Surface soils, friable sub-surface soils and rough clean excavated materials are stockpiled separately.
5. Surface litter consisting of leaf fall, the humus layer, accumulated seed and the general detritus of a bushland or forest floor, is either stockpiled separately or stockpiled in combination with the surface soil layer previously noted.
6. Stockpile locations, general storage areas, construction camp and depot sites should all be selected with due consideration for landscape conservation.

8.2.3 Detail Recommendations

- Species intended for the work would be tree, shrub and groundcover species selected from the indigenous plant communities of the respective locations encountered. Where appropriate, ie. when working within or in association with bushland areas species selection and combinations of species would respond to the composition of natural communities nearby.

- The fine detail of planting design would be determined by reference to actual conditions on site in conjunction with developed and detailed engineering design.

  Reference should also be made to the detail species schedules and information on species structure and distribution provided in the report prepared by Mt King Ecological Surveys, 'Flora and Fauna Evaluation (Bushland Effect and Management)' with particular reference to maps showing vegetation units.

- In many locations, existing trees of good quality are important local features and also potentially important as elements of the finished road development. Often these trees do not occur, necessarily, in areas of special bushland, but more likely as individual specimens or stands of trees in otherwise altered landscape conditions. Detail design to preserve their positions and importantly, their existing immediate soil levels, would be implemented.

- Soil provisions for planting would be drawn from stockpiled material made up of surface soils, friable sub-surface material and surface litter saved from the construction corridor. Imported soils as may be required to make-up required quantities should be of a compatible character and importantly, free of weed and grass contamination.

  All contaminated soil (including soil with weed and grass contaminations) must be removed from the site. Weedy, grassy soil from site clearing should never be used in the revegetation area.

- Except in specific urban situations, grass surfaces would be eliminated entirely from the planting design scheme. This policy would relate to aesthetic requirements in a bushland environment, minimise later maintenance and reduce the threat of further invasion of weed species into bushland. In urban areas or where bushland margins adjoin larger spaces beyond the reservation edge, grass surfaces may be appropriate as local parkland and play areas.

  Otherwise, planting is proposed as a continuous blanket of groundcover over all margins and residual spaces. Groundcover in this context refers to dense massed planting of tree and shrub species. All planting areas would need to be mulched with a suitable organic material to a depth of 100mm.

- A programme of weed management and control should be developed as an adjunct to the road and landscape construction process and carried out for at least 12 months after completion of the works.

- In bushland areas, species for landscape development and reinstatement generally, would be drawn from the natural plant communities and would be propagated using seed collected on site.

- Stockpiles of brush chip material should be located in existing cleared zones or areas cleared of weed infestation. The size and shape of stockpiles is also important. Heat build up in large stockpiles causes losses through acceleration of decomposition and in extreme cases can lead to spontaneous combustion.

- An arterial road development, typically within urban areas, would be subject to planting design which relates to the following principles:

  – Linear formations of large-canopied tree species installed to create bold avenue effects and reduce the visual scale of construction. Plan drawings and cross-sectional diagrams indicate these effects (refer to Report Section 7). Detail engineering design would determine where the opportunities would occur. In some locations, planting opportunities would be reasonably substantial including paired rows on at least one margin with similar species being installed in groups on the median (allowance would be made also for vehicle breakdown provisions).

  – Multi-stemmed groups of tall and large native tree species of the local area established at major intersections where larger traffic islands would provide suitable spaces (this same theme would apply to interchange locations in the event of an expressway being developed). In these cases a single selected species would be used as a dominant theme species, e.g. Sydney Blue Gum (*Eucalyptus saligna*) or Blackbutt (*Eucalyptus pilularis*) to establish a special focus in a given location.

– Screen planting of massed shrubs on embankments and margins of species selected to form a continuous blanket of cover and provide sufficient height to match the heights of noise wall structures. Native species of the region are recommended in this case in order to provide a selection of hardy and reliable plant types which are harmonious with the indigenous character of the local area.

– Planting of smaller tree types to add variety to massed shrub plantings and to provide suitable species for narrow margins and constrained sites. These trees would be of native species drawn from a broader regional zone but including some which are indigenous to the local area (detail design may raise the need to consider non-native species in locations where existing tree types should be matched).

8.3 KEY SPECIES FOR REVEGETATION – BUSHLAND AREAS

8.3.1 Canopy Species

Shale Soil Areas	
Angophora costata	Smooth-barked Apple
Eucalyptus globoidea	White Stringybark
Eucalyptus paniculata	Grey Ironbark
Eucalyptus pilularis	Blackbutt
Eucalyptus resinifera	Red Mahogany
Eucalyptus saligna	Sydney Blue Gum
Syncarpia glomulifera	Turpentine
Sandstone Soil Areas	
Angophora costata	Smooth-barked Apple
Eucalyptus gummifera	Red Bloodwood
Eucalyptus haemastoma	Scribbly Gum
Eucalyptus oblonga	Narrow-leaved Stringybark
Eucalyptus piperita	Sydney Peppermint

8.3.2 Screening Species

Acacia floribunda	Wattle
Acacia longifolia	Wattle
Allocasuarina littoralis	Black She-oak
Allocasuarina torulosa	Forest Oak
Banksia ericifolia	Heath-leaved Banksia
Hakea sericea	
Kunzea ambigua	Tick Bush
Leptospermum flavescens	Swamp Teatree
Pittosporum revolutum	
Pittosporum undulatum	Mock Orange
Syncarpia glomulifera	Turpentine

8.3.3 Valley Floor Species

Austromyrtus tenuifolia	
Callicoma serratifolia	Black 'Wattle'
Ceratopetalum apetalum	Coachwood
Ceratopetalum gummiferum	Christmas Bush
Cyathea cooperi	Treefern
Elaeocarpus reticulatus	Blueberry Ash
Eucalyptus saligna	Sydney Blue Gum
Tristaniopsis laurina	Water Gum

8.3.4 Understorey and Groundcover Species

To be determined according to location and guided by species schedules provided in the Flora and Fauna Evaluation report.

8.4 PLANTING THEME : ARTERIAL ROAD CORRIDOR

Planting as indicated would be subject to detail design development in accordance with an adopted proposal. The principal planting types are noted:

8.4.1 Tall Tree Species

Tall clear-stemmed native species – typically used in broad traffic islands for visual impact while maintaining traffic sightlines.

Typical species:

Eucalyptus pilularis	...	Blackbutt
E. resinifera	...	Red Mahogany
E. saligna	...	Sydney Blue Gum

8.4.2 Large Heavy-Canopied Trees

Broad-spreading canopy trees with dark coloured dense foliage for establishing avenues and helping to reduce the visual scale of the roadway.

Typical species:

Ficus hillii	...	Hills Weeping Fig
F. rubiginosa	...	Port Jackson Fig

8.4.3 Screen Planting

Bulky ground covering shrubs of sizes ranging between 0.5 metres to 5.0 metres in height applied where space permits to margins and residual areas to screen views of noise walls and the road formation.

Typical species:

Acacia floribunda	...	Gossamer Wattle
A. glaucescens	...	Coast Myall
Banksia collina	...	Banksia
B. ericifolia	...	Heath Banksia
B. spinulosa	...	Banksia
Callistemon spp. & vars.	...	Bottlebrushes
Hakea salicifolia	...	Willow Hakea
Hakea sericea	...	Needlebush
Kunzea ambigua	...	Kunzea
Leptospermum flavescens	...	Swamp Teatree
L. laevigatum	...	Coast Teatree
L. lanigerum	...	Woolly Teatree
Melaleuca nodosa	...	Melaleuca
M. linariifolia	...	Melaleuca
Pittosporum revolutum	...	Yellow Pittosporum
P. undulatum	...	Native Daphne

8.4.4 Other Trees

Trees of smaller size to intermix with screen planting in large planting areas or to be used in smaller edge margins or medians where possible.

Typical species:

Allocasuarina littoralis	...	Black She Oak
A. torulosa	...	Forest Oak
Banksia integrifolia	...	Coast Banksia
Eucalyptus haemastoma	...	Scribbly Gum
E. gummifera	...	Bloodwood
Syncarpia glomulifera	...	Turpentine
Tristaniopsis laurina	...	Water Gum

9. EXPRESSWAY & ARTERIAL ROAD PROPOSALS COMPARED

9.1 A TABLE

The following table lists the various impacts that apply to the expressway and arterial road proposals based on the earlier discussion 'Potential Impacts' (Section 5).

IMPACTS : Sheet 1

EXPRESSWAY	ARTERIAL	
	CARLINGFORD RD	EPPING RD
Division of Built Environment		
Minor	Severe	Nil
Division of Natural Environment		
Moderate to severe – Northern Option. Minor to moderate – Southern Option.	Nil	Nil
Division Created Between Built and Natural Environment		
Minor	Nil	Nil
Physical Destruction & Loss of Bushland		
Northern Option: Very severe Southern Option: Severe Balance of Options: Moderate East of Beecroft Road: Minor to Moderate	Nil	Minor
Changes to the Quality of the Community Environment		
Minor to moderate generally – moderate to severe at edges.	Severe in the short term. Subject to possible change in the long term.	Nil (possible improvement)
Partial Loss of Property and/or Loss of Landuse Values		
West of Railway: Moderate to severe East of Railway: Minor to moderate	Moderate to severe	Minor – (also some improvement)

IMPACTS : Sheet 2

EXPRESSWAY **ARTERIAL**

	CARLINGFORD RD	EPPING RD
Introduction of New/Undesirable Activity		
West of Railway : Severe East of railway : Minor to moderate.	Severe	Minor to moderate
Loss of Trees/Vegetation (other than bushland)		
Moderate	Moderate	Minor
Loss of Views		
West of railway : Severe East of railway : Minor	Severe in short term.	Moderate
Introduction of New/Undesirable Views		
Minor to severe –west of railway. Nil to moderate – east of railway.	Nil to severe.	Nil to moderate
Loss of Amenity		
Severe in key locations. Minor to moderate elsewhere.	Minor to severe dependent upon location.	Nil to minor

10. CONCLUSION

Of the two main options under consideration, the expressway in the reservation, and the arterial road development of Carlingford and Epping Roads, no obvious choice can be made. East of the Main Northern Railway both basic options could be satisfactory choices even though some undesirable impacts would be entailed; of the two, the Epping Road alternative would seem to be the most desirable, although the reservation option also is distinctly practicable.

West of the Epping Ridge both basic options would have highly undesirable aspects. In the case of the expressway, natural and built environments would be compromised, in some places severely. The alternative of Carlingford Road as part of an arterial road development proposes severe impact to most if not all of its surrounding urban area and particularly its adjoining margins. Modification of the more severe impacts could be the subject of a comprehensive planning process and encompass a long time span.

In the Carlingford Road option the connection to a similar chosen option to the west demands a dogleg segment involving further widening and consequent impact upon Pennant Hills Road.

The potential consequences of any of the options in whole or part, as described, raises the further alternative of doing nothing other than local area improvements. These improvements, such as individual intersection upgrades on the existing network, and local traffic management planning, would seem to be insignificant devices in the face of the environmentally destructive and divisive traffic impact which already prevails and continues to expand.

An effective public transport alternative which conjures the most attractive vision of all, would be itself a long-term prospect. The accumulative impacts on the community during this long-term development of public transport would also be degrading of local environments with potentially severe consequences.

10.1 RECOMMENDATION

Therefore this report proposes that a choice between the arterial road option and the expressway in the reservation should be made and of these alternatives would recommend the expressway in the reservation. In this case, the southern alignment is recommended in order to avoid the worst aspects of permanent damage to the natural environment. The northern alignment option is not recommended.

Tying this expressway segment (ie west of the railway) to the more desirable Epping Road segment, has proved to be relatively unattainable because of natural and built environment constraints in conjunction with extreme cost factors.

It follows that the extension of the expressway through to Epping Road would be via the reservation corridor.

A1 APPENDIX A

A1.1 Urban Design Considerations Adjacent to Transport Corridors

A separate report has been prepared as an adjunct to the landscape and visual impacts study of the western study area. Its title "Urban Design Considerations Adjacent to Transport Corridors" (Jackson Teece Chesterman Willis Consultants Pty Ltd) refers to the nature of landuses and building types in the context of noise-related conditions which are associated with modern large roadways. Building types, particularly residential buildings, and their sub-divisional layouts are examined in existing typical circumstances and also as potentially changed circumstances to identify the nature and impact of noise and the means of ameliorating its impact. At the same time, the examples demonstrated include other possible benefits which relate to urban consolidation in the broad corridor of a major transport route.

The urban design report is developed as an introductory examination of existing problems and possible beneficial changes of approach to building development types and layout. To some extent the study has been promoted by the understanding that in many situations, the large new road and existing quiet residential margins are not compatible and sometimes the association would be impossible to reconcile. In such a context, this landscape report, supported by the urban design report proposes that the rethinking of landuse and building types adjacent to transport corridors will often be the only satisfactory solution to the problem of noise and visual impacts. Any such action could be immediate or subject to longer term processes. However, to be effective and successful the process should respond to a planned and coordinated system or sequence of development and should not be left to chance.

The same urban design report raises questions in regard to interchange design and the general prospect of facilitating local area access. Also considered is the concept of incorporating useful local area amenities relating to social, retail and commercial functions. This subject matter is discussed with reference to past practice where contrasting examples of major road construction are illustrated and compared.

A.2 SCHEMATIC ILLUSTRATIONS

A2.1 Dedicated Public Transport Lanes

The illustration (Figure A.1) depicts the expressway proposal in the formation as described within this report consisting of two bus lanes in an exclusive corridor, two general traffic lanes in each direction and cycleways/breakdown lanes on each shoulder. The cross-sectional lay-out on which the drawing is developed, forms the basis of the recommended expressway proposal. It varies in detail and in dimensions and numbers of lanes according to localised design requirements, intersection zones and such like.

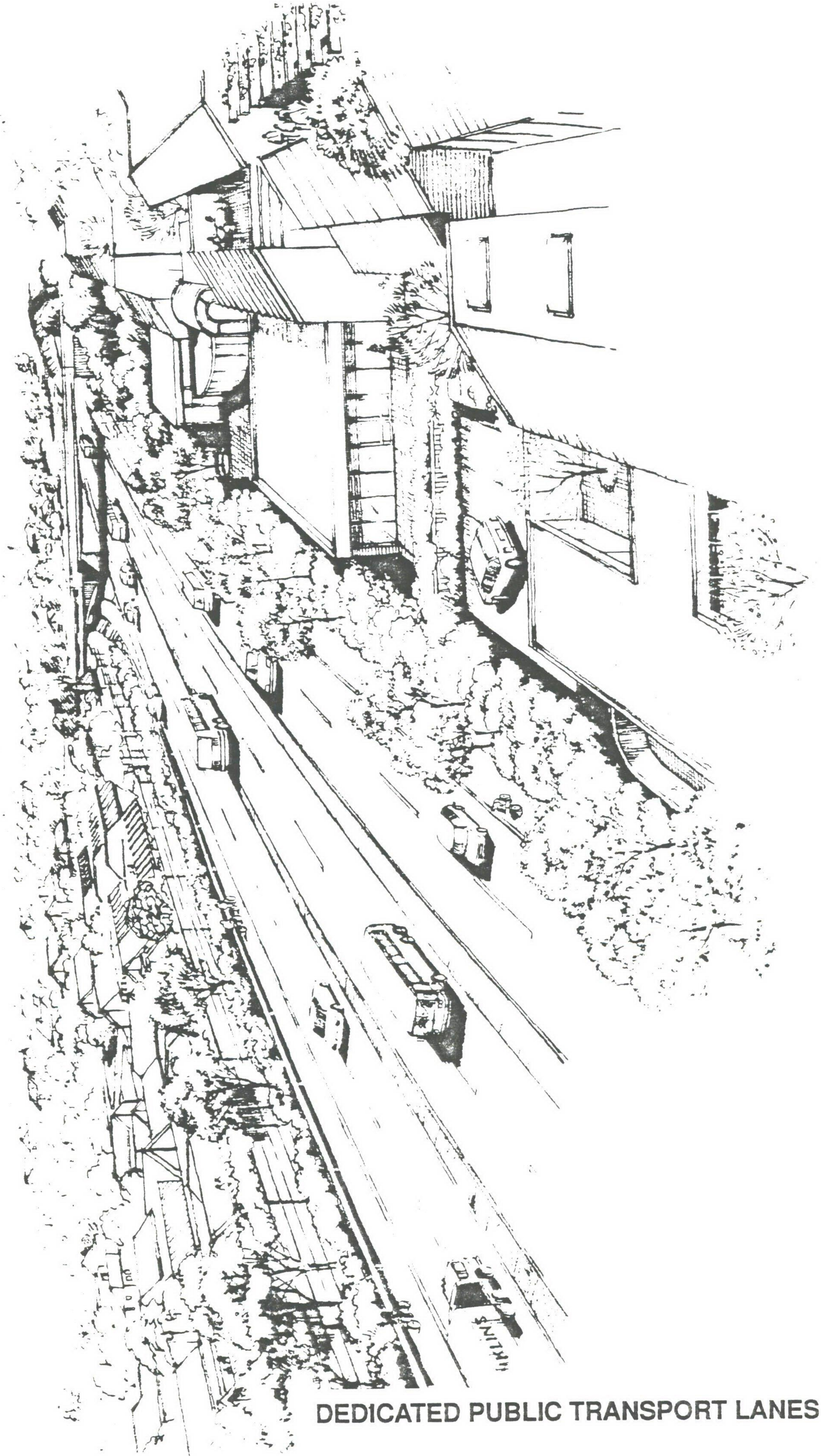
Beyond the roadway edges, the illustration demonstrates images of future changes. These changes may be various in their forms and characters but as examples of the possibilities, the artist's rendering refers to the following concepts:

- Higher-density land uses to promote a more appropriate relationship between the transport corridor and localised population density; increased population density close at hand to enhance public transport prospects in terms of user numbers.

- Enhancement of public transport user demand to promote the transport system's prospects of providing more and better services; this in turn can become a self-generating cycle of expansion and enhancement leading to a later situation where the bus lanes would be more fully utilised.

- On the far side of the expressway corridor, compact medium density housing is shown with its back to the road edge; the noise wall, if it is needed at all, would offend nobody. However, noise insulation could also be made an integral part of the building structures and the organisation of buildings and site layouts can be designed to further reduce the significance of noise impact.

- On the near side, a well-designed and appropriately vegetated development is shown, consisting of commercial offices, possibly professional suites for local practitioners, retail outlets and other community-oriented facilities. In this instance noise-insulated walls and noise tolerant uses such as carparking would address the transport corridor, and stand-alone noise wall barriers would not be needed at all. Vegetation and design qualities presented by good architectural development could contribute to the environmental quality of the transport corridor to tbe benefit of road and public transport users.



DEDICATED PUBLIC TRANSPORT LANES

FIGURE

A1

A2.2 An Evolutionary Process

This illustration shows an imagined evolutionary process where the means of transport have gradually changed while the physical corridor depicted in Figure A.2 has remained much the same. The margins of the road in this future scenario have not changed greatly other than to have the higher density residential content expanded on the far side. However, the changed composition of transport means and applications illustrates the following ideas:

1. The initial bus-related public transport system expanded progressively in terms of user demand, bus numbers and frequency of service as a result of effective promotion leading to natural growth and attractiveness of the system.

2. Increased bus traffic absorbed the capacity of the dedicated bus transit lanes, thus raising the possibility of a spillover of buses onto the normal traffic lanes in order to maintain services.

3. The logical steps in this process led to the bus system being replaced with a light or heavier-rail system in line with the new volumes of commuter requirements which would need to be serviced.

4. The original bus transit lanes included in the first stage of the expressway, eventually provided the corridor space suited to the rail transport system. The rail system with its capacity for quick loading and discharging of large passenger numbers substantially increased the overall capacity of the entire transport corridor.

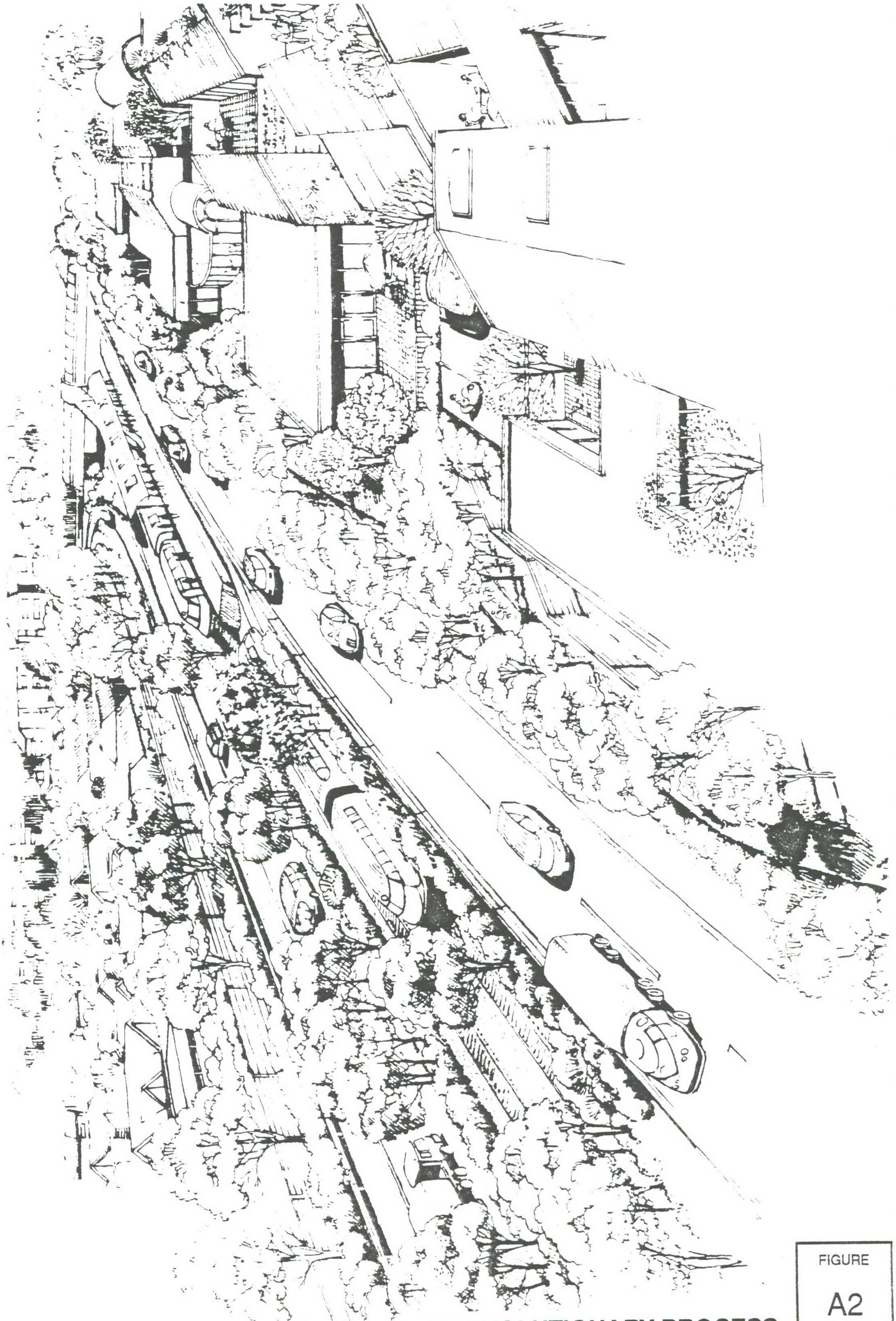
5. In this conceptual image of the future corridor (not too far removed from present-day possibilities), the trucks would be fewer in number undertaking local area deliveries which cannot be better handled by the train system. The trucks in any case would be quieter and relatively non-polluting.

6. Other transport vehicle types would include buses for local area services and mini buses and taxis for specific detail requirements. These vehicles would share the normal traffic lanes with other miscellaneous traffic.

7. The use of private vehicles in this hypothetical developed transport corridor would be minimised because of the much more favourable alternatives that would be offered by the various forms and convenience of public transport. In the meantime, in any case, private vehicle use could have become too prohibitively costly to be a primary choice for commuters.

A comprehensive plan for a new major transport corridor and its landuse margins could encompass the activities of planning and management expertise related to land development, landuse and transport planning action for the immediate and long terms.

The recommendation of this report, to select the expressway proposal based on the assessment of relative impacts upon landscape and visual quality of all alternatives, is valid only if it is part of a comprehensive and persisting future plan.



AN EVOLUTIONARY PROCESS

FIGURE A2

BIBLIOGRAPHY

Beadle N, Evans O, and Carolin R., Flora of the Sydney Region. Reed., Sydney 1972.

Benson D.H., Sydney 1:100,000. Vegetation Map and Explanatory Notes. Royal Botanic Garden, Sydney, 1980.

Blackbutt Action Committe, n.d.
Save Blackbutt: The Case Against State Highway 23 Violating Blackbutt Reserve.

Bradley Joan, Bushland Regeneration. Sydney : Mosman Parklands and Ashton Park Association. 1971.

Buchanan R.A., Common Weeds of Sydney Bushland. Inkata Press. Melbourne. 1981.

Buchanan Robin A., Edge disturbance in natural areas. Australian Parks and Recreation, August 39–43. 1979.

Central Mapping Authority, Parramatta River 1:25,000. Orthophotomap 1978.

Correy A., Appropriate urban design for bushland reserves. Sydney or the Bush Seminar. 13–16. 1983.

Diamond J.M., The Island Dilemma : Lessons of Modern Biographical Studies for the Design of Small Natural Reserves. 1975.

Hass-Klau Dr. Carmen, The Theory and Practice of Traffic Calming Rees Jeffreys Road Fund Discussion Paper 10. 1990.

Leigh J., Boden R., and Briggs J., Extinct and Endangered Plants of Australia. The Macmillan Co., South Melbourne. 1984.

Mackenzie B & Associates, Blackbutt Nature Reserve : Plan of Management. Newcastle City Council 1989.

Mackenzie B. & Associates, F2 Castlereagh Freeway Landscape Study. Roads and Traffic Authority of N.S.W. 1989.

Mackenzie B. & Associates, Visual Assessment of Noise Barriers. Roads and Traffic Authority. 1989.

Manidis Roberts Consultants, Excelsior Reserve, Plan of Management (Draft). 1989.

Mt. King Ecological Surveys, Flora & Fauna Evaluation (Bushland Effect and Management) North West Transport Links Eastern and Western Sections. Draft. 1991.

Temple J. and Bungey D. Revegetation : Methods and Management. Sydney : State Pollution Control Commission. Government Printers. 1980.

Thorvaldson F., The value of urban bushland as a multi-faceted community resource. Symposium on the Management of Urban Bushland. 5–21. 1980.

Traffic Authority of N.S.W., Guidelines for Tree Planting and Maintenance on Urban Roads. 1987.

Walker P.H., A Soil Survey of the County of Cumberland. N.S.W. Dept of Agriculture. 1958.

Wilkinson Murray Griffiths – Bruce Mackenzie & Associates, Noise Barriers and Catalogue of Selection Possibilities. Roads and Traffic Authority of N.S.W. 1991.

Williams G., Rainforest Regeneration 11. National Parks Journal. July 1984.