EIS 336

AA052344

State Highway 23 West Charlestown Bypass, Section: Windale to Kotara : environmental impact statement

STATE HIGHWAY 23
WEST CHARLESTOWN BYPASS

Section : Windale to Kotara

ENVIRONMENTAL IMPACT STATEMENT

Department of Main Roads, N.S.W.

STATE HIGHWAY 23
WEST CHARLESTOWN BYPASS

Section : Windale to Kotara

ENVIRONMENTAL IMPACT STATEMENT

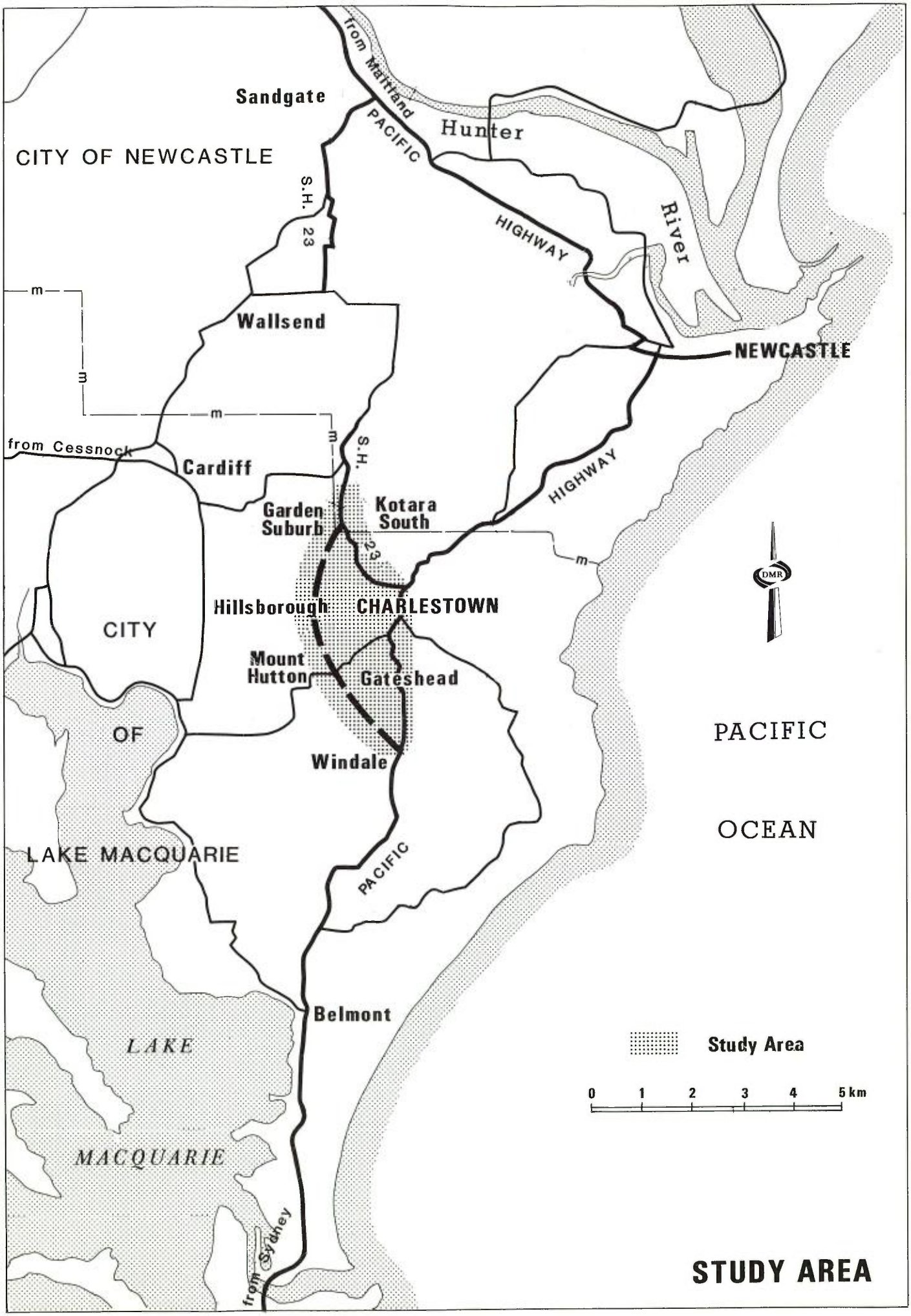
Department of Main Roads, N.S.W.

S U B J E C T: State Highway No 23.
West Charlestown Bypass
Cities of Lake Macquarie and Newcastle.
Section: Windale to Kotara
Environmental Impact Statement Clause 59
Certification.

This is to certify that the subject Environmental Impact Statement has been prepared in accordance with Clauses 57 and 58 of the Environmental Planning annd Assessment Regulation, 1980.

Jno. D. J. Glazier.

Engineer for Environmental Matters
1986


Sandgate
CITY OF NEWCASTLE
from Maitland
PACIFIC
HIGHWAY
Hunter
River
S.H. 23
Wallsend
NEWCASTLE
from Cessnock
Cardiff
S.H.
HIGHWAY
Garden Suburb
Kotara South
23
Hillsborough
CHARLESTOWN
CITY
Mount Hutton
Gateshead
OF
Windale
PACIFIC
OCEAN
LAKE MACQUARIE
PACIFIC
Belmont
LAKE
MACQUARIE
from Sydney
DMR
Study Area
0 1 2 3 4 5 km
STUDY AREA

ASSESSMENT OF ENVIRONMENTAL IMPACT OF

STATE HIGHWAY 23

WEST CHARLESTOWN BYPASS

PUBLIC EXHIBITION

This Environmental Impact Statement will be on public display during normal working hours from 3 December 1986, to 6 March 1987 inclusive, at the following locations:

- Dept of Main Roads
  New South Wales
  Information and
  Display Centre
  Ground Floor
  309 Castlereagh St
  SYDNEY
- Dept of Environment and Planning
  Shop Front
  Remington Centre
  175 Liverpool St
  SYDNEY
- N.S.W. Environment Centre
  57 Wentworth Ave
  SYDNEY
- Dept of Main Roads
  New South Wales
  Library, 5th Floor
  309 Castlereagh St
  SYDNEY
- Lake Macquarie City Council Chambers
  Main Road
  SPEERS POINT
- NSW Government Information Centre
  55 Hunter Street
  SYDNEY
- Dept of Main Roads
  New South Wales
  59 Darby Street
  NEWCASTLE
- Dept of Environment and Planning
  20 Auckland Street
  NEWCASTLE
- Newcastle City Council Chambers
  King Street
  NEWCASTLE

During the period of public display, copies of the Environmental Impact Statement will be available for purchase for $20.00 from the Graphic Services Section, Department of Main Roads, Ground Floor, 309 Castlereagh Street, Sydney, and the Newcastle Divisional Office at 59 Darby Street, Newcastle.

Persons or organisations wishing to comment on the proposal are invited to make written submission on or before 6 March 1987 to:

The Divisional Engineer
Department of Main Roads
New South Wales
59 Darby Street
NEWCASTLE NSW 2300

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1.1 INTRODUCTION AND OBJECTIVES

West Charlestown Bypass will form part of a complete bypass to the west of central Newcastle from Windale to Sandgate. It will contribute to improvement of Newcastle's arterial road system and will utilise a long-standing road reservation.

The Bypass is required to reduce traffic congestion, travel time, accidents and fuel wastage on the existing highway network. It will accommodate continuing traffic growth in western areas of Newcastle and will reduce adverse impacts of through traffic on Charlestown commercial centre and residential roads.

1.2 DESCRIPTION OF THE PROPOSAL

The Bypass, 6km long, will be designed as a four-lane dual carriageway road with a safe travel speed of 80 km/h. Provision has been made for a further two lanes to be contained within the median if warranted in the future. Other features include combined breakdown shoulders and cycleway, a climbing lane north of Hillsborough Road and interchanges where access to and from the Bypass will be available at Warners Bay Road, Hillsborough Road and Myall Road. Access to the Bypass will not be available from Willow Road which will cross over the Bypass on a bridge. No frontage access from adjacent properties will be available. Eight bridges or bridge size structures will be included in the Bypass. A maximum grade of 8% is necessary between Hillsborough Road and Myall Road. A five year construction period is planned for completion of the West Charlestown Bypass.

1.3 ALTERNATIVES

Three alternative transport strategies involving Pacific Highway, Ida Street and Charlestown Road were investigated, in addition to the proposed Bypass.

These strategies include:

(i) Do nothing;

(ii) Traffic management;

(iii) Upgrade existing roads.

It was concluded that there was no feasible alternative to constructing the Bypass in the existing road reservation. The existing pattern of residential development and road networks has evolved in response to the assumption that a road will be constructed in the road reservation. The existing pattern of residential development and road networks has evolved in response to the assumption that a road will be constructed in the road reservation.

1.4 JUSTIFICATION FOR THE PROPOSAL

- State Highway No 23 will remain an important sub-regional arterial road when the Sydney-Newcastle Freeway is constructed west of Lake Macquarie.

- Future residential, commercial and industrial development proposed to the west of Newcastle will impose increased traffic volumes on the area served by State Highway 23.

- The Pacific Highway, Ida Street and Charlestown Road become congested under current traffic volumes. This causes significant delays to through and local traffic. especially in the afternoon peak period.

- Between 1983 and 1985, 204 accidents occurred along the Pacific Highway between Lake Road and Ida Street, (mainly at intersections), resulting in 4 fatalities. In the same period, 176 accidents occurred along Ida Street and Charlestown Road but with no fatalities.

- Based on a discount rate of 7%, the benefit cost ratio is 1.32 with a first year rate of return of 9.1%.

1.5 DESCRIPTION OF EXISTING ENVIRONMENT

1.5.1 Natural

The landform of the area can be described as undulating to rolling with small watercourses which eventually flow to Lake Macquarie or Jewells Swamp. A geological and soils study revealed that the geological setting is one of Permian Age Coal measure sequences with reasonably uniform yellow hard pedal mottled duplex soils. Three soil units were identified with moderate to high potential for erosion.

Most of the vegetation of the study area has been disturbed to some degree by intensive use and/or frequent fires. Nine vegetation communities were identified while ten protected plant species occur in the area. Tetratheca juncea, which is considered to be vulnerable and at long term risk, occurs as isolated specimens. No fauna species regarded as rare, endangered, threatened or of special concern were found in the area. Three major fauna habitats were distinguished but many fauna habitats were disturbed by human activities.

1.5.2 Human

An archaeological study did not find any Aboriginal sites within the study area, although sites are known to occur in the region. Advice was received from a representative of Koe-Inba Regional Aboriginal Sites Protection Committee that there was no impediment to the proposed Bypass. There are no buildings of historic European significance along the proposed route.

No development has occurred within the road reservation. Residential suburbs and open space adjoin the corridor. Some open space is destined for further residential development.

An interim landscape and visual assessment report identified influences on the landscape character of the road reservation. Proximity of residential development is either remote or immediate and will have varying implications for design and construction.

Traffic noise measurements were taken in the study area. These included one day measurements, short readings of 10 minutes duration and (L10 18 hr) readings in Charlestown shopping centre. Existing daytime noise levels along the route of the Bypass are between 50 and 60 dBA (L10, 1 hr).

1.6 ENVIRONMENTAL IMPACTS AND SAFEGUARDS

Soils in the study area are moderately to highly erodible and the yellow and grey mottled pedal duplex soils are prone to slope instability and mass movement during construction. The flora, fauna and soils reports recommended that erosion and sedimentation controls be implemented and maintained at all stages of development. Temporary/semi-permanent and permanent erosion and sedimentation controls will be included in construction and operation of the Bypass. These controls will assist in mitigation of impacts of runoff from the road and natural surfaces. Existing watercourses will not be affected.

Due to considerable coal mining in the area, mine subsidence was identified as a potential problem for road construction and slope stability. Results of geotechnical investigations indicate these problems can be avoided.

Vibration of road construction equipment could have an adverse impact due to proximity of roadworks between the Tickhole rail tunnel and Myall Road. An architectural inspection of all buildings within effective range of vibrations will be undertaken before roadworks commence. If necessary, machinery will be used which does not cause vibration problems.

The loss of 60 ha of vegetation will not affect the status of vegetation and animal species. Reduction of vegetation is not rated as highly significant but the Consultant considered that the Bypass could encourage further disturbance of remaining bushland due to better access. Also, weed infestation, dumping of rubbish and car bodies and erosion and silting problems in watercourses were considered to be potential problems. To safeguard against these impacts it is proposed to clear the minimum area necessary for roadworks and preserve as much vegetation as possible within the road reserve. Regeneration, revegetation and landscaping will be undertaken during and at end of the roadworks. Fencing of the easement will restrict access and help preserve adjacent bushland and prevent indiscriminate destruction.

Fauna habitats have been disturbed extensively and it is not considered the Bypass will inhibit wildlife movement. Potential impacts identified by the Consultant are increased disturbance to habitat, noise, vehicle emissions, road runoff and reduction of wildlife corridors. Safeguards include retention of as much vegetation as possible, easement fencing and erosion and sedimentation controls. The overall impact of traffic noise on fauna is expected to be minor.

Approximately 21 ha of land will be acquired in addition to land the Department of Main Roads owns. Possibly thirty one freehold properties could be affected either partially or totally by roadworks, as well as portions of land owned by the Departments of Lands and Housing, Lake Macquarie City Council and Uniting Church of Australia. The Department of Main Roads will negotiate with all landowners affected by the proposal and all properties and portions of land required will be valued at current market value.

The major noise impact in the construction phase will be during excavation for cuttings with bulk earthmoving operations. Construction noise will be of limited duration and confined to working hours, 7am to 6pm weekdays and possibly Saturdays. Construction plant noise is subject to the requirements of the Noise Control Act and Regulations.

Many houses adjacent to the road reserve have been designed to have less noise sensitive rooms facing the reserve. The Department is examining warranted noise reduction measures along the Bypass for final design and will take into account representations made in response to this EIS. Estimated noise levels between Myall Road to Lookout Road range from 64 dBA to 72 dBA. Acoustically opaque fencing could help to restrict predicted noise levels where warranted.

There will be an increase in the amount of vehicle emissions along the proposed Bypass. Free flow of traffic and distance between the adjoining properties and the Bypass mean that the amount of emissions along the Bypass will be minimised. The rate of dispersion will be assisted by prevailing winds and rain. No significant adverse air quality effect is anticipated with the operation of the proposed Bypass.

Land required for roadworks outside the existing road reservation will require the preparation of a new local environmental plan for rezoning to arterial road purposes.

Land uses on either side of the Bypass will not be directly affected and community severance has been avoided by early planning. Existing cross-road links will be maintained for vehicles, pedestrians and cyclists and a pedestrian/cycleway subway at Windale will be included in the Bypass construction.

Anticipated residential and industrial growth in Cardiff, Wallsend and Windale will have a significant impact on the existing road network. Construction of the Bypass will provide a high standard north/south corridor linking the growth areas and will reduce traffic impact on the existing road network.

The Bypass will affect the scenic quality of the corridor for residents with bushland and open views. Integration of bushland and residential areas adjoining the Bypass with a well designed landscaped Bypass is proposed. Proximity of the Bypass will cause significant visual impact in some locations. A comprehensive landscape program is being prepared to suggest methods to ameliorate any adverse impacts and enhance visual opportunities.

A number of utility services will be intercepted or traversed by the proposed Bypass. All will be the subject of consultation with the responsible Authorities during completion of final design plans.

Impact of the proposed Bypass on the viability of Charlestown businesses is not considered to be significant. Charlestown is an important regional centre of Newcastle with further growth proposed. No adverse economic impact is expected with any loss of highway trade.

Any materials spilt on the Bypass will be dealt with according to the category of the spill and set procedures will be followed to confine spillages and clean and restore the pavement.

It is concluded that construction and operation of the West Charlestown Bypass will be environmentally acceptable and that any adverse impacts will be outweighed by substantial benefits to be gained at local and regional levels.

1.7 ENERGY ASSESSMENT

It is estimated that construction equipment will use 95,600 gigajoules of energy (distillate and petrol) to complete the project.

Energy savings will be possible when the Bypass is opened to traffic. The amount of energy used during construction will be offset within five years by savings in liquid fuel consumption and improved operating conditions.

Known coal resources underlying the Bypass will be unaffected by road construction. Coal mining has been restricted already by the proximity of urban development.

2. INTRODUCTION AND OBJECTIVES

2.1 INTRODUCTION

The Department of Main Roads proposes to construct the West Charlestown Bypass (part of State Highway 23) from the Pacific Highway, Windale to Charlestown Road, Kotara, as shown in the Study Area map. The Bypass will be a 6km long, four lane dual carriageway motorway and will be constructed generally within the existing motorway reservation. Provision is made within the central median for two additional lanes to be constructed at some future date if and when the need arises.

This proposal will form part of a complete bypass to the west of central Newcastle between Windale and Sandgate. It will be part of a high capacity ring road which will improve traffic movement from north to south. The Bypass is the result of long term planning for the Newcastle Region. Impetus has been given to the proposal by undertakings in the State Government's "Newcastle Region Road Improvement Program 1985-1992".

At present, State Highway 23 (Ida Street and Charlestown Road) and the Pacific Highway carry through traffic in Charlestown commercial centre which conflicts with local business and shopping traffic. The Bypass will improve both travelling conditions for through traffic and the amenity of Charlestown. Traffic will be distributed around Charlestown and the Bypass will provide a direct link to the major radial access roads to central Newcastle and industrial areas.

2.2 OBJECTIVES

(i) The objectives of the proposed Bypass are:

- To reduce traffic congestion, travel time and fuel wastage on existing highways by providing a more direct link between Windale and Kotara.
- To accommodate continuing traffic growth in the western areas of Newcastle.
- To contribute to the improvement of the urban arterial road system in Newcastle.
- To reduce adverse impacts of through traffic on the Charlestown commercial centre and residential roads.
- To reduce accident rates on the existing highway route.
- To conform with Strategy 34 of the Hunter Regional Plan No 1 and provisions of the Lake Macquarie Local Environmental Plan, 1984.

(ii) The objective of this document is to:

- Assess the environmental impact of the proposal.
- Identify environmental safeguards that will mitigate any adverse impacts of the proposal on the environment.

2.3 ENVIRONMENTAL IMPACT STATEMENT - PREPARATION AND EXHIBITION

The Department of Main Roads under its enabling legislation conforms with the requirements of Part V of the Environmental Planning and Assessment Act, 1979 for the purposes of environmental assessment. This environmental impact statement (EIS) has been prepared in terms of Section 112 of the Act.

Also, the EIS has been prepared in accordance with the requirements of the Department of Environment and Planning. (A copy of the requirements is included in Appendix A).

In the preparation of this document, the Department has liaised with relevant Government authorities and other organisations to seek their advice and requirements. (A summary of responses received is presented in Appendix B).

All necessary specialist studies have been undertaken to provide input for assessment of environmental impact. These studies have been collated in a Working Papers volume. At the time of writing a detailed landscape and visual assessment study has not been completed for inclusion in that volume. However, an interim landscape and visual assessment report has been included. This landscape study will be of assistance in preparation of final road design plans.

This EIS has been prepared as a basis for public submissions and decision making in regard to the proposed activity. The document will be advertised and placed on public display at various centres in Newcastle and Sydney. During the three month public display period, submissisons can be made to the Department. These submissions will be considered in the preparation of the environmental impact assessment report, a copy of which will be sent to the authors of the submissions received.

Factors which may require further information or clarification will be addressed in the assessment report (under Clause 64 of the Regulation) which will include the project determination.

3.0 DESCRIPTION OF PROPOSAL

3.1 BACKGROUND

The regional context of the study area is indicated in Figure 3.1. The study area is located in the inner south western suburbs of Newcastle urban district, principally within the City of Lake Macquarie.

The route was adopted in 1946 to avoid existing and proposed development, and the motorway reservation was subsequently incorporated in the Northumberland County Planning Scheme, gazetted in 1960.

Initially the road was to be part of the National Highway network bypassing the congested inner suburbs of Newcastle. Following the decision to move the National Highway west of Lake Macquarie, it was given urban arterial status.

The NSW State Government's 1985 publication, "Newcastle Region Road Improvement Program 1985-1992", stated that construction of the Bypass would commence in 1985 with completion in 1989. The principal reasons for the West Charlestown Bypass being deferred from its original proposed commencement date of 1986 are:

- the shortage of Commonwealth funds for arterial roadworks;
- priority given by the Commonwealth Government to development of the National Highway system, and
- the need to divert available funds to other urgently needed works in the region for which commitments have been given.

In view of funding commitments for road construction in the Newcastle region and the State generally, construction of this section of the highway is not anticipated to commence before 1989.

As a temporary measure to relieve congestion in the Charlestown area it is proposed to reconstruct the Pacific Highway and Ida Street junction at Charlestown.

Functions of the route

Both long distance highway traffic and local traffic currently pass through the study area.

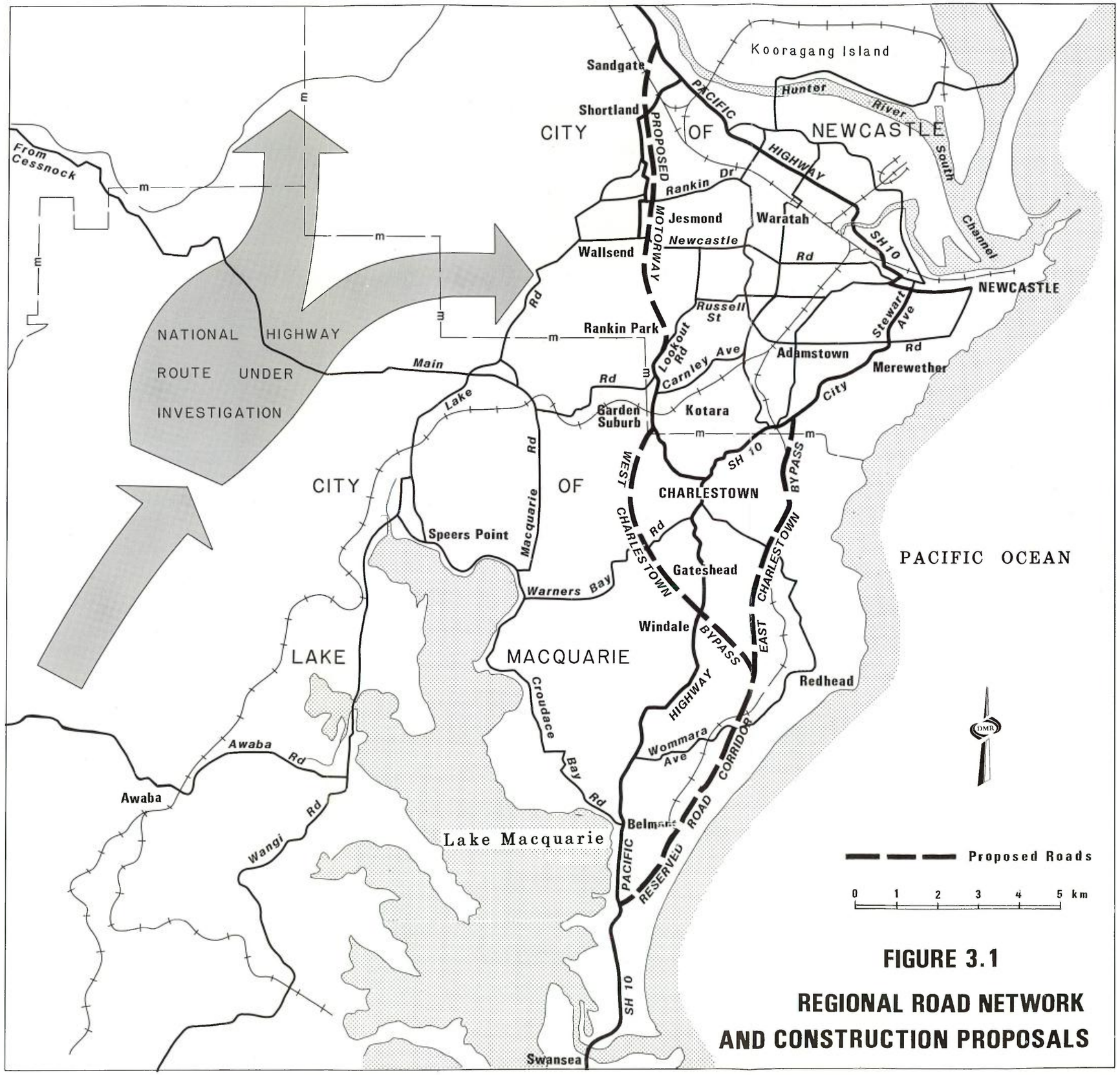


FIGURE 3.1

REGIONAL ROAD NETWORK AND CONSTRUCTION PROPOSALS

Long Distance Traffic

The majority of highway traffic passing through Newcastle would use the Pacific Highway to Charlestown, then Charlestown Road to Rankin Park. Routes to the west of Lake Macquarie are not developed and are only attractive for trips west of Maitland, while the Pacific Highway via Newcastle is less direct.

Once the National Highway is built on the west side of Lake Macquarie and is linked to Minmi Road to provide a bypass of Newcastle, most of the long distance traffic will be removed from the study area. Since through traffic passing through Charlestown currently only makes up about 5 per cent of the total traffic flow, the impact of this loss will be small, except at times of peak holiday flow.

Local Traffic Circulation

The proposed and existing sections of State Highway 23 link the major growth areas of Newcastle with the employment centres in two ways:

a) they bisect the main feeder roads from the west of Newcastle and then act as a ring road leading onto the main radial routes into the city. This allows efficient distribution of traffic to most parts of Newcastle.

b) they link the major growth areas to the north and south of Newcastle, ie, north to Maitland/Raymond Terrace and south of Windale. This will provide relief for existing north/south routes such as Northcott Drive.

The Role of the Bypass

The West Charlestown Bypass will form part of State Highway 23 and intersects three of the major access roads from Lake Macquarie to Newcastle. These roads currently direct traffic into congested sections of the Pacific Highway and Charlestown Road.

The Bypass will distribute traffic around Charlestown and provide a direct link to the major radial access roads to the central Newcastle area and the industrial area of Mayfield.

It will also remove through traffic currently using the Pacific Highway and Ida Street in Charlestown shopping centre. This will improve both travel conditions for the through traffic and the amenity of the shopping centre.

This western bypass road will also complement the proposed eastern bypass of Charlestown in due course rather than acting as an alternative to it.

3.2 DESIGN CONSTRAINTS ON ROUTE ALIGNMENT

As the route of the proposed section of State Highway 23 between Windale and Kotara was adopted in 1946, residential development has occurred on either side of the road corridor, confining the horizontal alignment. The grading is controlled by topography and by geotechnical considerations, particularly unstable strata and mine subsidence areas. Extensive subsidence and surface cracking has occurred within the road reservation between Hillsborough Road and Park Avenue due to mining of the Australasian coal seam by the Australian Coal Company. Also, stability of the cut batter slopes could be a problem.

3.3 ROUTE DESCRIPTION

It is proposed to construct the West Charlestown Bypass generally within the existing bypass reservation between Windale and Kotara, a distance of 6km. The route of the proposed Bypass is illustrated in Figure 3.2. From the Pacific Highway at Windale the road will pass through, or near, existing and developing residential areas including the suburbs of Mount Hutton, Gateshead, Hillsborough, Garden Suburb and Kotara. Plates 1, 2, 3 and 4 illustrate the road reservation at particular locations.

At Kotara the Bypass will connect to the recently reconstructed section of Lookout Road near Tickhole Tunnel on the Great Northern Railway.

The route of the West Charlestown Bypass between Windale and Kotara commences with a grade separated interchange near the present intersection of Lake Road and the Pacific Highway, Windale, with Lake Road being incorporated into this interchange. The extension of State Highway 23 east to connect to the future East Charlestown Bypass and its extension, to the south (Belmont Bypass), will be investigated later in conjunction with other proposals in the area.

Three access roads from the Lake Macquarie area to Newcastle will be intersected by the Bypass. These are Warners Bay Road, Hillsborough Road and Myall Road. These roads currently direct traffic into congested sections of the Pacific Highway and into Ida Street and Charlestown Road at Charlestown.

The proposed interchanges where access to and from the Bypass will be available are:

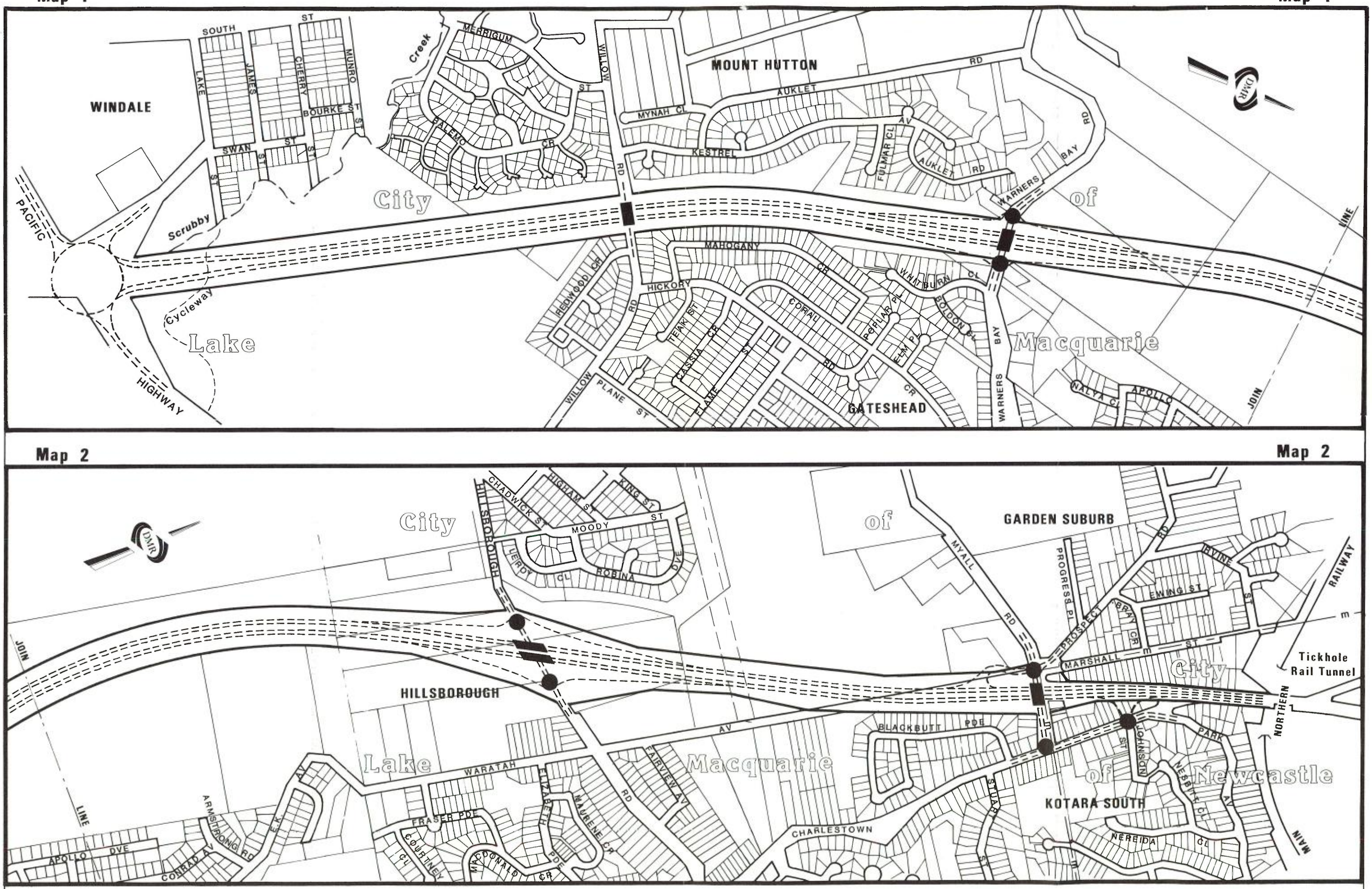
- At the Pacific Highway, Windale. Access to and from the Bypass will be via a roundabout.

Map 1

Map 1

Map 2

Map 2



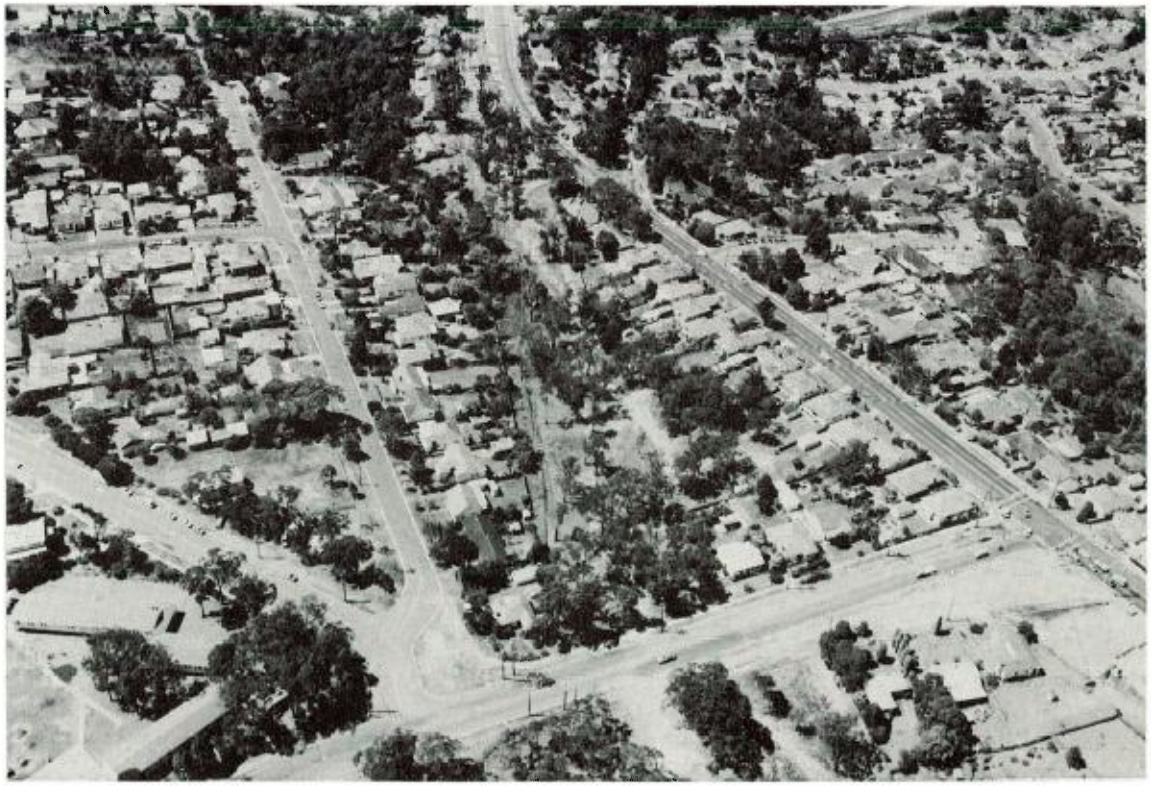
Proposed Roundabout

Proposed Bridge

0 100 200 300 400 500 m

FIGURE 3.2
PROPOSED ROUTE

1. The full length of the route looking north. The Pacific Highway intersection site is visible in the left hand foreground.



2. Myall Road - Charlestown Road - West Charlestown bypass intersection.

PLATE 1

3. Aerial view northwest. Pacific Highway intersection site in the mid-foreground.

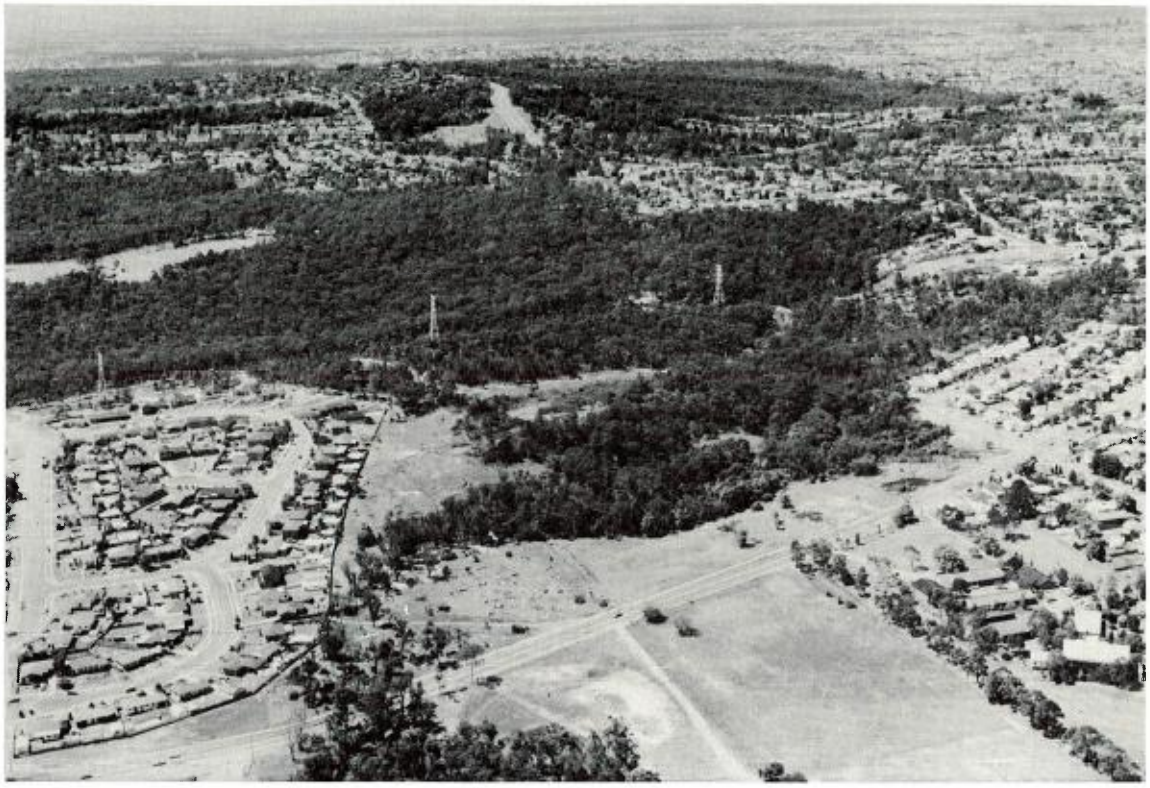
4. Degraded woodland south of Willow Road in the foreground.

PLATE 2

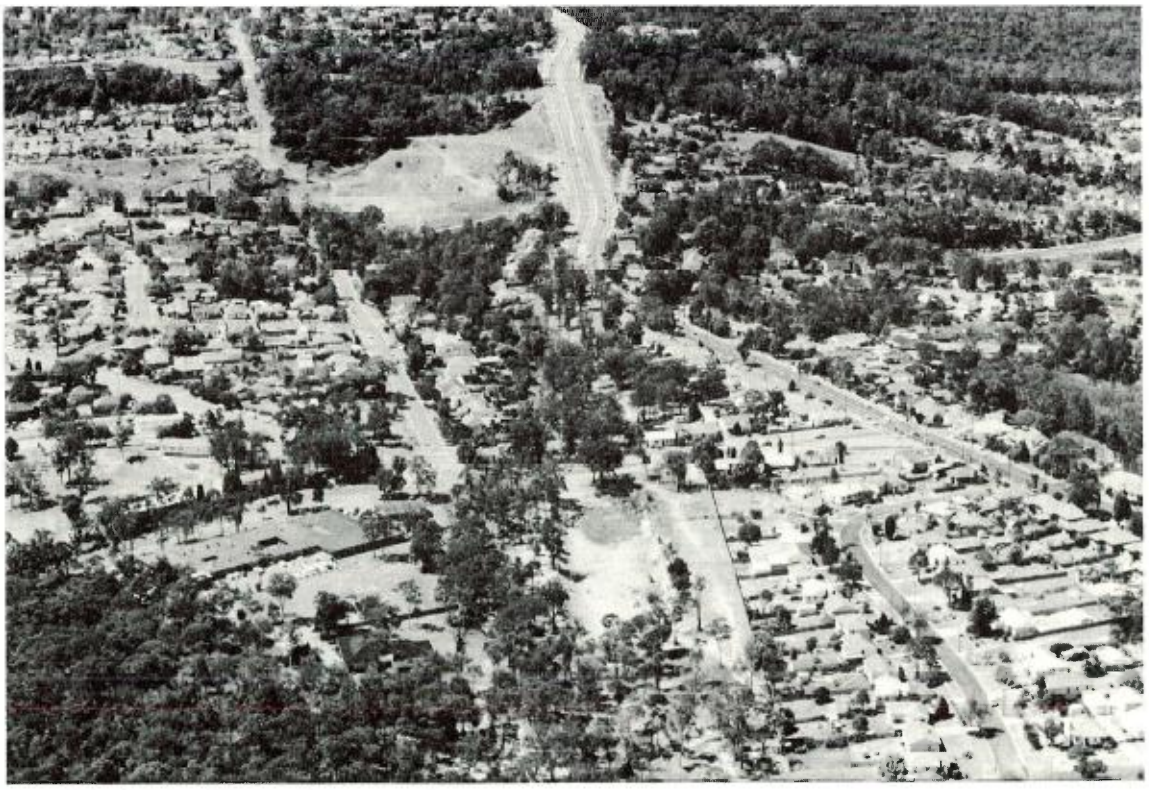
5. Warners Bay Road in the mid-foreground.

6. Good quality woodland south of Hillsborough Road in the foreground.

PLATE 3



7. Hillsborough Road in the foreground.



8. Myall Road in the foreground.

PLATE 4

- A diamond interchange is proposed at Warners Bay Road. It is planned to upgrade Warners Bay Road to dual carriageways between the Bypass and Cadaga Road in conjunction with the work.

- At Hillsborough Road the proposed diamond interchange is located to allow for the future upgrading of Hillsborough Road to dual carriageways.

- An interchange suitable for slower speeds has been adopted at Myall Road to reduce the effect on properties, and to assist in the traffic management of the areas roads.

While access to and from the Bypass will not be available from Willow Road, this road will cross over the Bypass on a bridge. Access from Marshall Road to Myall Road will be closed and Park Avenue will not have direct access to the Bypass. Residents using Marshall Street to Myall Road will have to travel via Bray Crescent and Prospect Road to gain access to Myall Road.

3.4 DESIGN ELEMENTS

3.4.1 Design Speed

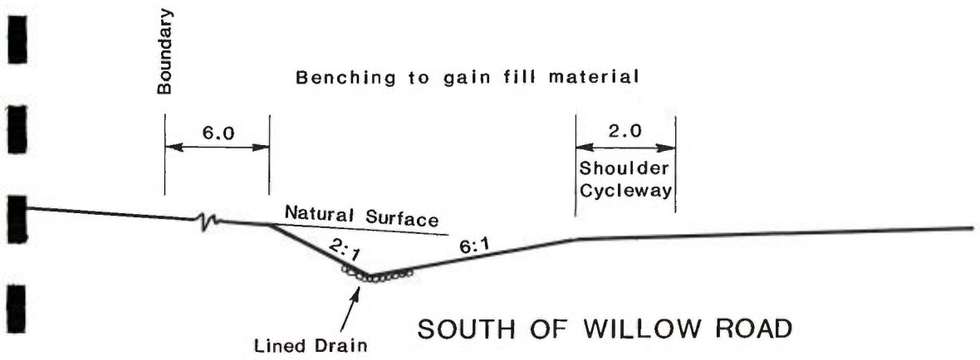
The Bypass has been designed to cater for a speed limit of 80km/h, decreasing to 60km/h at the northern end immediately south of Myall Road. All roads crossing the Bypass reservation have a present speed limit of 60 km/h which will be retained.

3.4.2 Width of pavement and formation

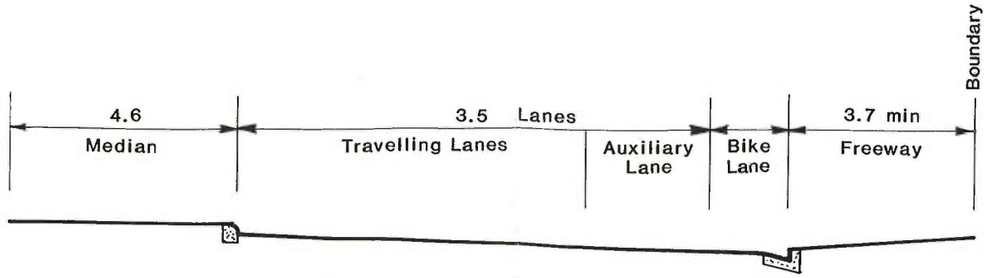
Based on an origin/destination survey and the anticipated traffic growth rates, a four lane facility will be required. This road has the potential to draw a large number of locally generated trips in the Charlestown area, and as such, traffic demand may be higher than that predicted. Due to this possibility the road will be built initially to 4 lanes, (two travelling lanes in each direction) with the option of further expansion to 6 lanes by the reduction of median width. A climbing lane will also be required on the 8% grade north of Hillsborough Road, to maintain the same level of service throughout.

Typical cross sections of the Bypass, in cut and fill and in particular locations, are shown on Figure No. 3.3. The cross section indicates four 3.5 metre travel lanes, 1 metre inner shoulders and an 8m depressed median. A climbing lane north of Hillsborough Road will be 3.5 metres wide with 2 metre cycleways on the outside of travelling lanes which can be used by breakdown vehicles.

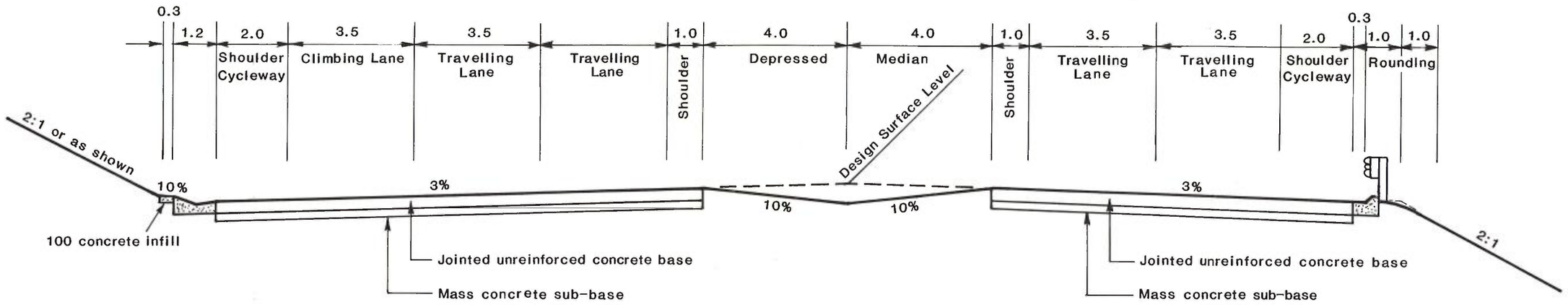
In future, the median and inner shoulders can accommodate two 3.5 metre travelling lanes separated by a 2.4 metre raised median.



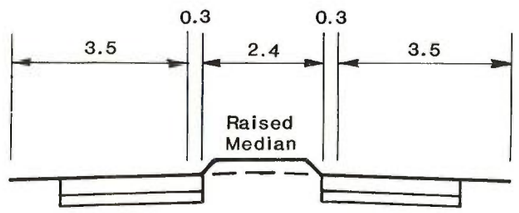
SOUTH OF WILLOW ROAD



NORTH OF MYALL ROAD



IMMEDIATE CONSTRUCTION

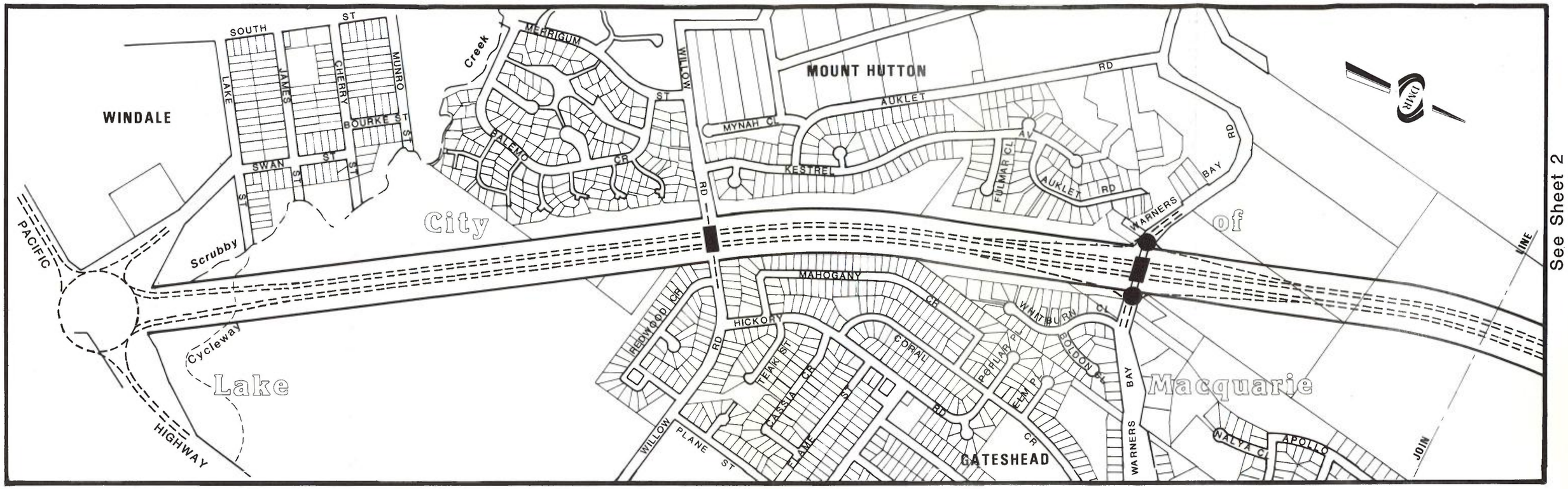


FUTURE CONSTRUCTION

FIGURE 3.3

CARRIAGEWAY DETAILS

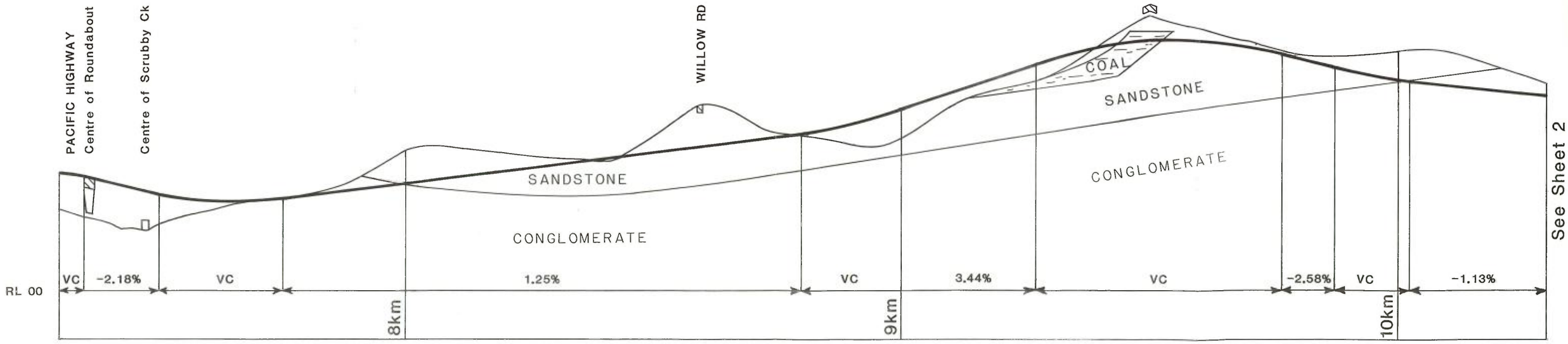
TYPICAL CROSS SECTIONS



SCALE

HORIZONTAL 0 100 200 300 400 500m

VERTICAL 0 10 20 30 40 50m

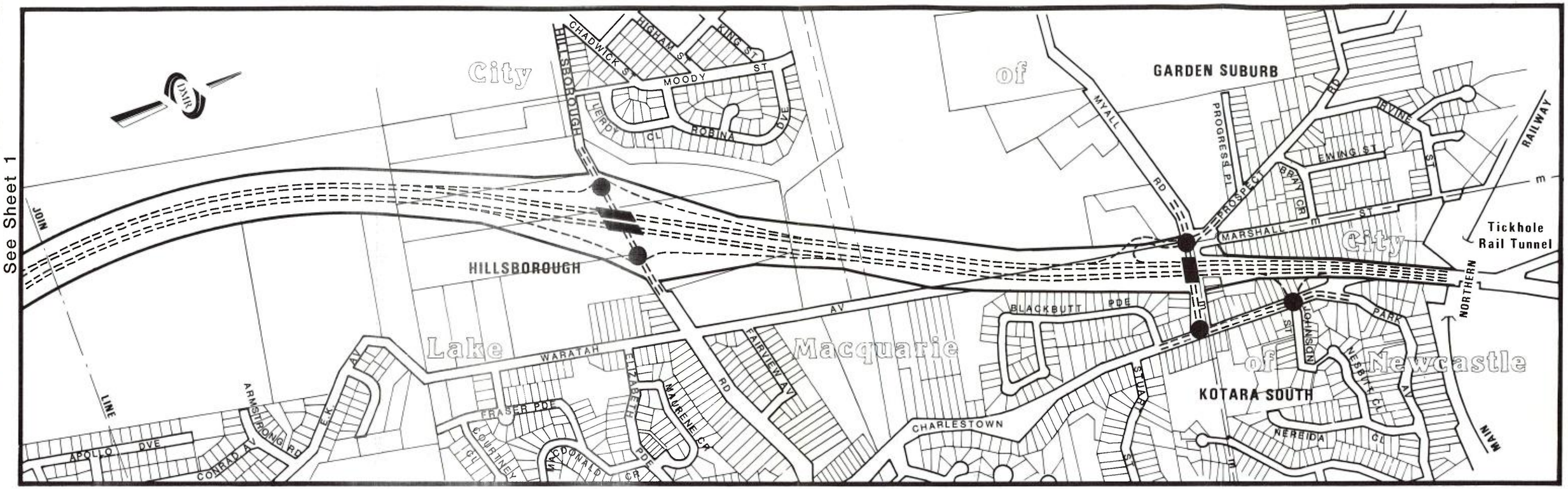


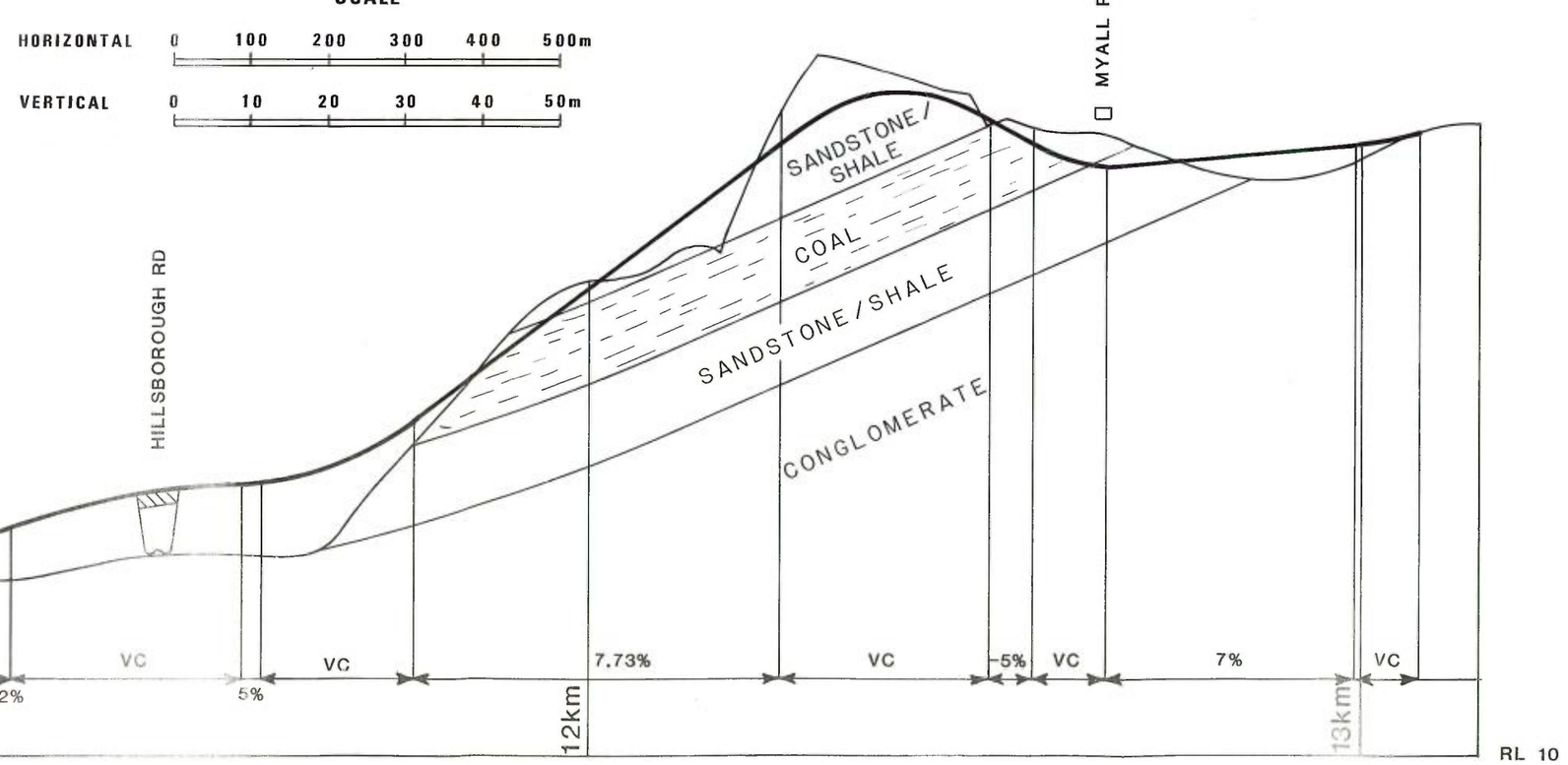
LONGITUDINAL SECTION

FIGURE 3.4

PLAN AND PROFILE

See Sheet 1





LONGITUDINAL SECTION

FIGURE 3.4

PLAN AND PROFILE

Due to the nature of the topography, earthworks, involving 600,000 m^3 of cut, will be used to balance the fill requirements.

Although final design of the highway has not been completed, a 6km length of the proposed longitudinal section is shown on Figure 3.4 (Sheets 1 and 2) for illustrative purposes. It indicates the underlying geological strata as well as the road grade line.

The road formation south of Willow Road will be benched to eliminate the need for importing fill material. This section was chosen for benching as the area was sparsely timbered and was considered the least environmentally sensitive.

3.4.3 Horizontal and Vertical Alignment

a) Horizontal Alignment

The horizontal alignment is controlled by the acquired corridor which provides for a high standard of alignment. The route between Windale and Garden Suburb was adopted in 1946 and developments have occurred around the corridor, restricting alteration to the adopted alignment.

b) Vertical Alignment

The vertical alignment is controlled by :-

i) The interchanges
ii) Geotechnical problem areas - unstable areas, mine subsidence and coal seams.
iii) Cross drainage lines
iv) Attempts to balance earthworks
v) Natural terrain

The natural terrain is generally undulating, allowing for moderate grades. However, an 8% grade has been adopted between Hillsborough Road and Myall Road to minimise the depth of cut, in potentially unstable areas.

3.4.4 Cycleways

The Bypass reserve is shown on the Newcastle area Bikeplan as a proposed on-road route. Normally bicycles are not compatible with high speed traffic, especially at onloading and offloading ramps. Also, the mixing of bicycles and automobile traffic on arterial roads is undesirable. The adoption of a separate bicycle path was considered but was rejected because crossing of the interchange ramps would still be a hazard, and the natural surface has steep longitudinal grades which would result in cyclists wanting to use the road shoulder in lieu of the separate cycleway.

Some provision will be made in the design for cyclists by widening the road pavement by 1.5 metres adjacent to the kerb and gutter for the northern section south to Myall Road. For the section between Myall Road and the Pacific Highway, the pavement will be widened by 2 metres.

The existing pedestrian/cyclist path linking Gateshead to Windale will be retained by the construction of a reinforced concrete box culvert 70 metres long.

3.4.5 Pedestrian Access

State Highway 23 will have access control and the only points where the pedestrians can cross the corridor are at the Pacific Highway, pedestrian/cycleway route between Windale and Gateshead, Willow Road; Warners Bay Road; Hillsborough Road; and, Myall Road. Footways will be provided through all the interchanges.

There are a number of tracks crossing the corridor between the Pacific Highway, Windale and Willow Road, Mount Hutton which are used mainly by children walking to Gateshead schools and to recreational activities. When the Bypass is constructed the access across the corridor in this vicinity will be limited to the overbridge at Willow Road or the pedestrian/cyclist underpass near the Pacific Highway.

3.4.6 Drainage

The proposed route traverses several drainage systems which flow into Lake Macquarie and/or Jewells Swamp. Existing drainage is via runoff from natural surfaces and adjacent roads and structures, to stormwater pipes and channels, and finally to natural streams.

The proposal will cut existing streams and will require culverts to pass drainage below the road (cross-drainage). The road itself will also require drainage to cater for runoff from its own catchment.

Road construction along the route will have impacts on the drainage patterns, summarised in three principal factors as :-

* increased flows due to changes in the drainage pattern (principally by changes to the natural surface by paving and cut slopes).

* increased flow velocities as water passes through the cross-drainage culverts.

* potentially increased sediment supply to the natural streams through erosion and weathering of cut slope and any spillage from vehicle loads.

The above changes to sediment supply are "long term" impacts. Substantially increased sediment supply could occur during construction through the earthworks activity, unless erosion and sedimentation controls are implemented (see Section 7.2).

The impact of the alternative routes on the three principal factors is examined below.

a) Increased flows

Generally in the large catchments, the areas affected by the road will be small compared to the total catchment area of the cross-drainage culverts, but the effect will be significant in the small catchments.

In each catchment the discharge from roadway will have a differing effect on the culvert size. Where necessary, retention basins will be constructed to prevent flooding down-stream. A retention basin will be constructed upstream of the Bypass on the Scrubby Creek catchment to reduce discharge downstream. This basin will be deep and will be fenced for safety. Other structures will be determined following investigation of sites in conjunction with the Hunter District Water Board and the Department of Housing.

It should be noted, that as one moves down each stream, the catchment area affected by the road becomes a decreasing proportion of the total catchment and therefore the road has a decreasing effect on flows in the stream.

The road formation will sever watercourses and some discharge will be diverted to adjoining catchments. The amount of diverted discharge will be small and the watercourse to which they are to be diverted to will be larger ones. The drainage calculation will be determined in consultation with the Hunter District Water Board and Lake Macquarie City Council.

b) Increased Flow Velocity

The natural flow velocity in the streams passing through the site is of the order of one to two metres per second. Site inspections show the streams themselves are able to withstand such flow velocities without erosion of the channels.

However, after road construction, the flow velocities through the culverts will be higher than existing velocities.

Predicted flow velocities would cause considerable erosion of the stream channels immediately downstream of each culvert. Energy dissipators and stream protection measures at the culvert outlets will avoid this problem.

c) Increased Sediment Supply

It is anticipated that the batter slopes through cuttings (termed cut slopes) will experience some gradual erosion as the exposed rock weathers. Some erosion on fill slopes will also occur unless effective treatments are applied at the construction stage. Further, some spillage of loads and dust from vehicles using the route will provide additional sediment to the natural streams. In the absence of any real field data on these effects, it is not possible to quantify their magnitude.

The effect roadworks, drainage pipes and culverts will have on the drainage system (including natural water courses) downstream of the proposed works, will be investigated in the final design to minimise any adverse effect on property, eg the golf course and residential areas. It is discussed in Sections 7.1 and 7.2.

3.4.7 Traffic Control and Street Access

The Bypass will be a controlled access road as defined under Section 4 of the State Roads Act, 1986.

The West Charlestown Bypass will be dual carriageway design with grade separated interchanges at Pacific Highway, Warners Bay Road, Hillsborough Road and Myall Road. Willow Road will be an overpass.

Accordingly, direct vehicle access will be restricted to the interchanges at the Pacific Highway at Windale, Warners Bay Road at Mount Hutton, Hillsborough Road at Hillsborough, and Myall Road at Kotara South, as discussed previously (Section 3.3). There will be no direct access from the adjoining properties.

3.5 BRIDGES

Although the detailed bridge design has not commenced, it is anticipated that eight bridges or bridge size structures will be required at intersections along the Bypass. These structures will be probably of prestressed concrete.

3.6 METHOD OF CONSTRUCTION

The work will be constructed by contract to the Department. Separate contracts will be let for divisible parts of the work to suit available funding. It is not possible to state in this document definite construction details which will apply, especially number and type of heavy machinery which will be required.

3.7 STAGING

A five year construction period is planned for the West Charlestown Bypass and it is proposed to construct the work in three stages. Stage construction depends primarily upon programme funding by the State Government.

Stage one connects the existing State Highway 23 at Kotara (Lookout Road) to Hillsborough Road at Hillsborough.

Stage two connects Hillsborough Road to Warners Bay Road at Mt Hutton. Stage three connects Warners Bay Road to the Pacific Highway at Windale.

3.8 COST

The total estimated cost of the West Charlestown Bypass is $26M (1986). This includes roadworks, bridges, intersections and public utility adjustments, but not property acquisitions.

3.9 SITE CLEARING AND WASTE DISPOSAL

Site clearing will be limited to the minimum necessary for access outside of the area to be occupied by the cuttings and embankments, plus a small number of stockpile areas for topsoil and base materials. The remaining timber and other vegetation within the motorway reservation will be preserved. The total area of vegetation to be cleared along the kilometres is approximately 60 hectares, ranging from grass and shrubs to forest timbers up to 20 metres tall.

Newcastle and Lake Macquarie Council areas are covered by a Ministerial Order under the Clean Air Act which prohibits open burning. On occasions variations to the Ministerial Order have been approved to allow disposal of cleared vegetation under strict supervision. In this instance it may be impractical to seek a variation to the Ministerial Order due to the location of the proposed Bypass within an urban area.

Other methods of disposing of vegetation, including burying, forced trench burning or chipping, will be investigated. To bury, the pits would have to be very large and located outside the motorway formation area. This would result in more disturbance created by additional loss of vegetation and wildlife habitat. The optimum size of trenches for forced burning is 3m x 2m. These trenches would be too small and hence too slow and costly for the quantities involved. On site chipping is a possible option, although with the size of trees involved difficulties with their root systems may cause problems. Disposal of root bolls may be difficult. In some situations they can be buried in the earthworks outside actual carriageway construction. Chain sawing into smaller segments suitable for chipping may be possible.

It will be possible to use chips in landscaping the Bypass. If chipping is not appropriate, timber suitable for firewood could be distributed direct to the public.

Whatever method is employed to dispose of cleared vegetation, it will be a method approved by the State Pollution Control Commission and Lake Macquarie and Newcastle City Councils. The impact of the direct destruction of vegetation within the construction area will be reduced by a programme of regeneration and revegetation of the finished earthworks. This programme is outlined in Section 7.11.

3.10 STREET LIGHTING

The provision and upkeep of street lighting are matters for Councils.

The design of the Bypass will not incorporate street lighting along the corridor generally. However, the interchanges with the Pacific Highway, Warners Bay Road, Hillsborough Road and Myall Road will be illuminated.

3.11 RESTORATION AND LANDSCAPING

During construction all erodible surfaces will be protected prior to replacing of top soil and revegetation. Construction requirements include provision for the works to be kept clean and tidy as they proceed and to remove rubbish and surplus material regularly. As soon as practicable after completion of the work, all buildings, workshops, temporary works, construction plant and equipment used on the site will be removed.

Landscaping will be by revegetation with indigenous species. Section 7.11-Visual Appearance, Landscaping and Revegetation, provides further details of this aspect.

3.12 PUBLIC UTILITY ADJUSTMENTS

The project affects, water, sewer, power, communications, gas and petroleum services. Existing water mains and 33kV, 11kV and Low Voltage mains cross the road reservation at the Pacific Highway/Lake Road intersection, Willow Road, Warners Bay Road, Hillsborough Road and Myall Road. Sewer mains cross the road reservation at five locations. Advice has been received that future water mains crossings may be required along Myall Road and possibly Hillsborough and Warners Bay Roads. Several sewers require amplification and all may require protection and alteration. Electricity poles and mains or installation of underground mains may be affected by road construction also.

Generally public utilities are located within the road reserve and arterial roads carry distribution plant. However, public utilities will not be permitted generally within the road reserve of the Bypass because it is an access controlled road.

Accordingly, utility installations will be permitted in the road reserve only at strategic locations to provide transverse crossings, preferably within structures.

The Bypass design will provide for relocation or protection of these services to the requirements of the relevent authorities in accordance with agreements between the Department and those authorities.

4. ALTERNATIVES

4.1 INTRODUCTION

Four alternative transport strategies for the study area have been investigated. Three strategies involved the existing Pacific Highway route while the remaining strategy is the proposed West Charlestown Bypass.

4.2 DO NOTHING

The proposed West Charlestown Bypass will bypass some of the most congested lengths of the Pacific Highway, Ida Street and Charlestown Road.

The Pacific Highway through Charlestown shopping centre had a 1984 annual average daily traffic volume (AADT) of 41,000 and has 6 lanes with clearway conditions during peak periods and 4 lanes during off peak. During the peaks, major delays occur at the intersection of the Pacific Highway and Ida Street, but other delays for highway traffic are minor. More extensive delays occur for side road traffic due to highway volumes and the constraints of traffic signal co-ordination. Congestion does occur outside clearway hours due to activity associated with shopping, and it is unlikely that this can be improved without the introduction of off-peak clearways. This option is likely to generate large scale opposition.

If the work were not to proceed and the existing road system remained unaltered, the level of service on the existing congested length of the Pacific Highway, Ida Street and Charlestown Road would worsen.

The existing route of State Highway 23 from Charlestown to Myall Road, (ie Ida Street and Charlestown Road) a distance of 2km, consists of four lanes undivided to Hillsborough Road and two lanes between Hillsborough Road and Myall Road.

The Charlestown Central Business District is proposed for long term expansion to the boundary of Charlestown Road, Frederick Street, Marie Street and Griffiths Street. The proposed expansion will increase traffic movements from Charlestown Road into the Business Centre from the intersection with Griffiths, Chapman and Hopetoun Streets.

Some minor improvements may be introduced, including traffic signal co-ordination and extension of clearway restrictions. However, the additional traffic generated in the area will increase the travel time on the section in the future.

4.3 TRAFFIC MANAGEMENT

Temporary improvement to the existing situation would be achieved by traffic management in the short term.

Improvements that could be implemented are:

1. 12 hour clearway at Charlestown.

2. Improve the access to Charlestown Central Business district at Cadaga Road and E.K. Avenue. This would attract trips away from the Pacific Highway.

3. Signalisation at the Lake Road, Oakdale Road and Pacific Highway intersection.

4. Co-ordination of traffic signals from Hillsborough Road to the Pacific Highway.

5. Improve the capacity at the Myall Road and Charlestown Road intersection.

6. Increase the capacity of the Pacific Highway and Ida Street intersection.

However, the improvements that could be introduced to improve traffic management will not provide a long term improvement to the traffic capacity.

4.4 UPGRADE EXISTING ROADS

The Pacific Highway from Windale to Ida Street/Charlestown Road intersection consists of a six lane divided carriageway.

There are no proposals to increase the capacity of this road. Increasing the capacity by construction of additional lanes would require acquisition of expensive commercial property through Charlestown. This is not compatible with the planning of the Charlestown Central Business District by Lake Macquarie City Council, and the cost of acquisitions would be prohibitive.

Charlestown Road between the Pacific Highway and Park Avenue, Kotara is a mixture of two and four lane undivided single carriageway. This road could be upgraded to a six lane divided carriageway facility with at-grade intersections controlled by traffic signals or roundabouts. This work would require the acquisition of portions of more than 120 properties.

As a result of upgrading, Charlestown Road would improve. There would be no improvements to the Pacific Highway. Such a proposal does not separate local and through traffic, and delays on side roads entering or leaving Charlestown Road would remain high.

The amenity of the remaining properties bordering Charlestown Road would progressively worsen as traffic volumes increased. There is no effective way of ameliorating the environmental impact of the road on the existing properties.

Purchase and demolition of properties on both sides of the existing Charlestown Road is a radical step that would not have the support of the community or Council.

In summary, upgrading the existing road network is not considered to be a practical alternative to the West Charlestown Bypass because of the restrictions on the Pacific Highway through Charlestown and the impact of the widening of Charlestown Road.

4.5 WEST CHARLESTOWN BYPASS

In view of high costs of road construction including ancilliary costs, property acquisition, scarcity of funds and competing demands for roadworks throughout the State, the Department of Main Roads considers that construction of the West Charlestown Bypass using the existing road reservation is most advantageous.

Lake Macquarie and Newcastle City Councils, developers, landholders, and lessees of portions of land have been aware of the Department's intentions to use the road reservation for road purposes for many years. Future planning in the area has been based on the assumption that at some time a road would be constructed in the reservation. The pattern of residential development and road networks have evolved in response to this assumption.

In view of congestion and other traffic problems experienced on the Pacific Highway, Ida Street and Charlestown Road, the need for the West Charlestown Bypass has been established. It is considered that construction of the Bypass will change the existing environment of the reservation but that it will have less social and economic effects than the other alternatives.

4.6 CONCLUSION

In order to improve traffic management in the region, there appears to be no feasible alternative to constructing the Bypass in the reservation already provided. Because of residential and commercial development with the area, any alternative route or the widening of the existing route of State Highway 23 (Ida Street and Charlestown Road) would entail disruptive and expensive acquisitions with an inferior level of service.

5. JUSTIFICATION FOR THE PROPOSAL

5.1 INTRODUCTION

Although the Sydney-Newcastle Freeway (National Highway 1) is to be located west of Lake Macquarie and the role of State Highway 23 will diminish due to that decision, State Highway 23 will remain an important sub-regional arterial road. A recent survey of traffic volumes indicated that Charlestown Road near Hillsborough Road carries more than 30,000 vehicles per day. It is not expected that traffic volumes will decrease significantly on State Highway 23 when the Freeway is operational. Future residential, commercial and industrial development is proposed to the west of Newcastle which will impose increased traffic volumes on the area served by State Highway 23.

In 1985 the NSW Government announced the Newcastle Region Road Improvement Program 1985-1992 which included improvement to State Highway 23, including construction of the West Charlestown Bypass. Due to financial constraints as mentioned in Section 3.1, construction of the West Charlestown Bypass will not commence until 1989 at the earliest.

5.2 LEVEL OF SERVICE

The existing route of State Highway 23 (Ida Street and Charlestown Road) has a level of service of "E". Level of service is a qualitative measure of the effect of a number of factors, which include speed and travel time, traffic interruptions, freedom to manoeuvre, safety, driving comfort and convenience and operating costs (Highway Research Board, 1965). Level of service is a six point scale where level A is desirable and Level F is undesirable.

It is intended that the Bypass will maintain a level of service B or better. The Pacific Highway between Windale and Charlestown, and Ida Street and Charlestown Road to the Tickhole Rail Tunnel, will have a level of service C or better.

5.3 EXISTING AND FUTURE TRAFFIC SITUATION

5.3.1 Road Network

The major route through the study area is the Pacific Highway (State Highway 10) which is a six lane divided highway. There are a number of traffic signal installations along the way to allow for cross-movements of traffic and pedestrians. The major intersections along the Pacific Highway are the junctions of Lake Street, Warners Bay Road (MR 325) and Ida Street.

Ida Street and Charlestown Road (State Highway 23) intersect with the Pacific Highway at Charlestown. There are several sets of traffic signals on Charlestown Road, the major installations being at Hillsborough Road and Myall Road. Warners Bay Road, Hillsborough Road and Myall Road provide important links from developing residential and industrial areas near Lake Macquarie.

Existing traffic movements around the Newcastle Region are dominated by the Newcastle C.B.D. and the large industrial areas of Mayfield, Hamilton and Lambton. However, the Department of Environment and Planning (DEP) advise that growth in these areas has largely ceased. It is therefore, predicted that traffic volumes to and from these centres will remain fairly static while new areas in Lake Macquarie to the South and West of Newcastle develop.

The DEP has defined the following two major growth areas:

1. Cardiff/Wallsend to West Wallsend.

2. Windale, south (including Redhead and Belmont North/Valentine).

Residential and industrial development in these areas will significantly change the traffic patterns through and around Charlestown. Traffic movements between these centres will grow with their development.

5.3.2 Traffic Volumes and Accidents

A recent survey of traffic volumes on roads in the study area (average daily volumes) indicate 11,000 vehicles per day (vpd) on Warners Bay Road; 18,500 vpd on Hillsborough Road; 12,200 vpd on Myall Road; and, 9,800 vpd on Park Avenue.

Figure 5.1 presents details of the existing traffic volumes on major roads within the study area.

There are several locations within the existing road network which become congested under current traffic volumes. Noteably the Pacific Highway through the Charlestown shopping centre is under considerable pressure throughout the day with clearway conditions being provided during both the morning and afternoon peaks. Ida Street and Charlestown Road between Charlestown and Kotara has for several years required no standing restrictions over most of the section between Pacific Highway and Park Avenue.

Despite these traffic management arrangements the capacity of the road system is still dependent on the capacity of the major intersections.

Traffic volumes at the intersection of Pacific Highway, and Ida Street cause significant delays to both through and local traffic especially during the afternoon peak period. While it is acknowledged that improvement works programmed in the near future for this intersection will provide some relief it is considered that delays will be inevitable still especially as the volume of traffic using Ida Street and Charlestown Road increases.

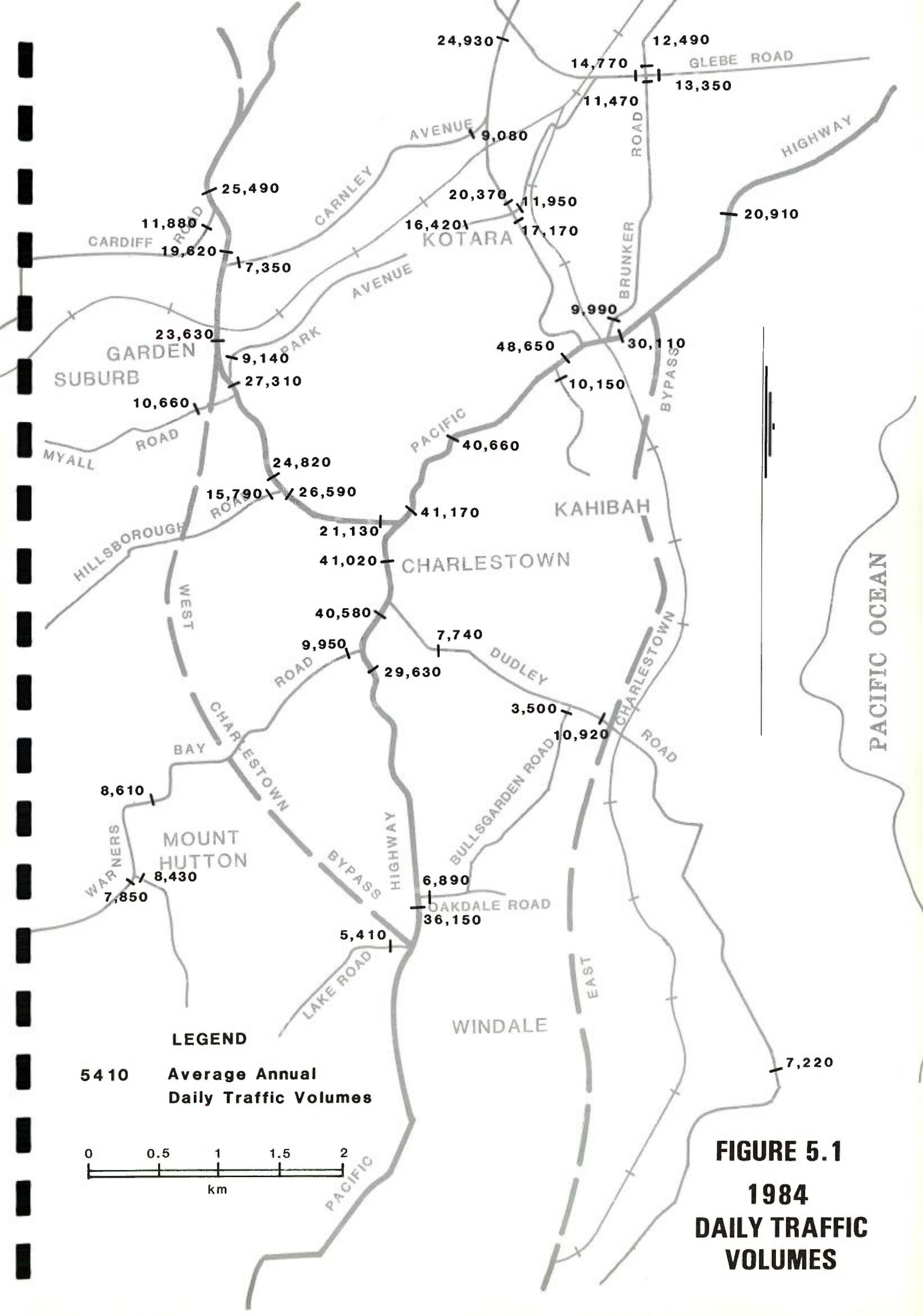


FIGURE 5.1

1984

DAILY TRAFFIC VOLUMES

Problems associated with the existing road network and the traffic volumes being catered for are further illustrated by the number of accidents recorded on both Pacific Highway, Ida Street and Charlestown Road as shown in Figure 5.2. Several accident 'black spots' were identified in the Newcastle Region Road Improvement Program 1985-1992. Compilation of accident figures between 1983 and 1985 show that on the Pacific Highway between Lake Street and Ida Street, 204 accidents occurred resulting in 4 fatalities. Most accidents occurred at intersections of the Pacific Highway with Sydney Street, Oxford Street, Warners Bay Road, Dudley Street, Frederick Street, Smart Street and Ida Street. Along State Highway 23 to Tickhole Rail Tunnel in the same period, 176 accidents occurred but with no fatalities. Most accidents occurred at intersections of the highway with Griffiths Street, Wills Street, Hillsborough Road, Myall Road and Park Avenue.

Travel times through Charlestown vary considerably between different days and at different times. Measurements of travel time indicate that variations of up to 10 minutes can occur due to the presence of illegally parked or broken down vehicles.

5.3.3 Traffic Predictions

The expected growth in traffic volumes on Pacific Highway and Charlestown Road is illustrated in the following Table 5.1.

TABLE 5.1
TRAFFIC VARIATIONS AND PREDICTIONS WITH BYPASS

	1990		2010	
	NORTHBND	SOUTHBND	NORTHBND	SOUTHBND
Pacific Highway Gateshead	780	1732	952	1875
BYPASS	281	450	908	1213
% BYPASS	26%	21%	49%	39%
Charlestown Road to Sth				
Myall Road	758	1082	820	1172
BYPASS	506	1126	1315	2434
% BYPASS	40%	51%	62%	68%

The percentage of traffic expected to be carried by the Bypass will significantly increase with time reflecting the shift in traffic patterns.

Traffic predictions based on population and employment forecasts prepared by the DEP indicate that while traffic volumes in and out of Newcastle will remain static there will be steady growth in the North/South traffic volumes through Charlestown via Pacific Highway, Ida Street and Charlestown Road. This traffic growth will follow from the development of industrial and residential land south of Gateshead and west of Newcastle.

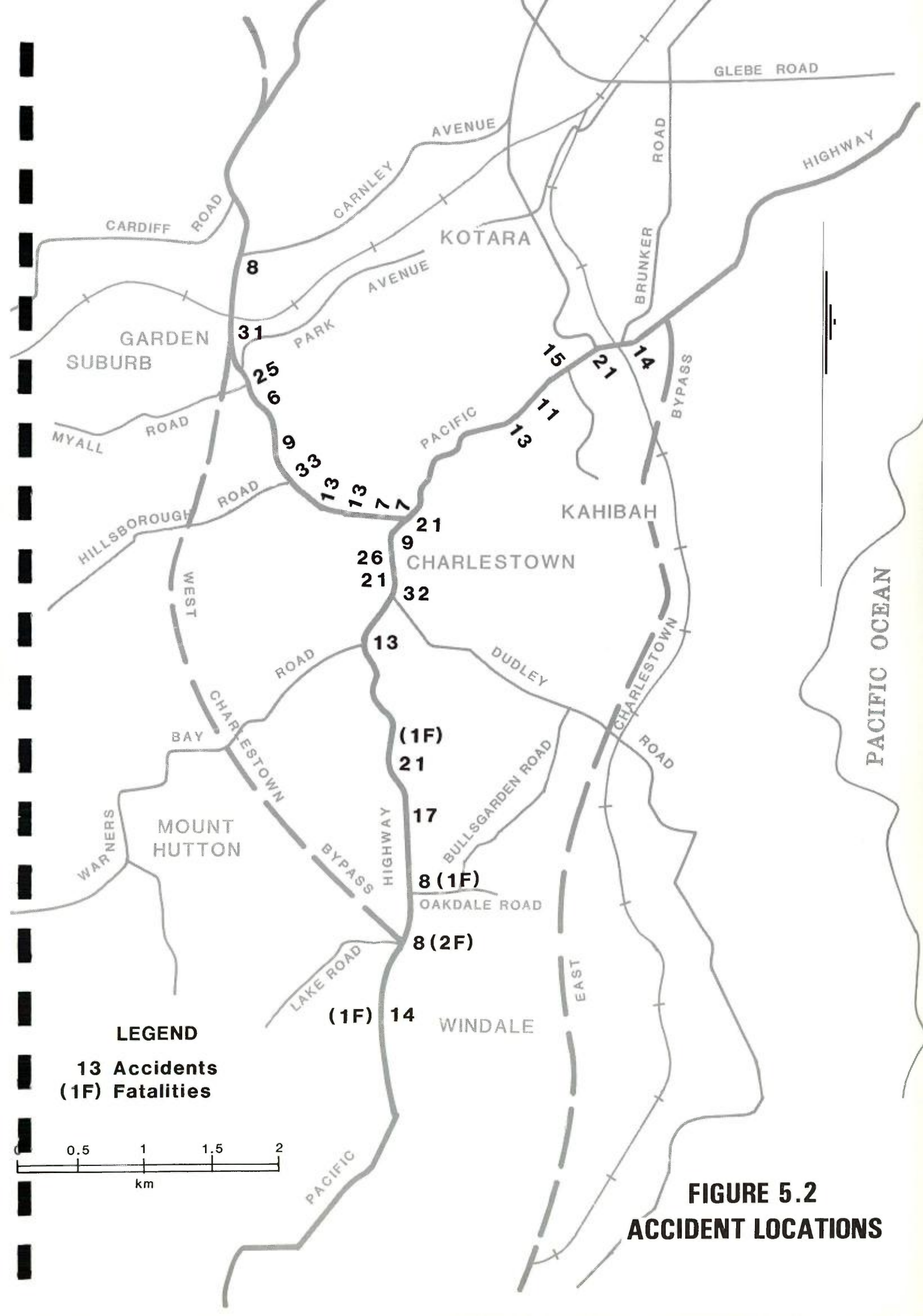


FIGURE 5.2
ACCIDENT LOCATIONS

Congestion of roads within the existing network will be significantly increased by this anticipated growth in traffic volumes and the accompanying shift in traffic patterns. The West Charlestown Bypass will cater for this growth in the North/South movement of traffic through the area.

Construction of the West Charlestown Bypass will bring an overall reduction in the number of serious accidents and personal injuries. It has been established in studies carried out by groups such as the NRMA that controlled access roads, such as the West Charlestown Bypass, have accident numbers between 2 and 5 times below roads such as the existing Pacific Highway and Ida Street and Charlestown Road.

It is estimated that travel time via the Bypass between Gateshead and Kotara will be approximately 5 minutes compared with the existing average peak hour time of 9 minutes.

5.4 ECONOMIC EVALUATION

An economic evaluation of the Bypass has been conducted, comparing the costs of construction and maintenance with the benefits derived by all road users. The road user benefits include savings in commercial and private vehicle operating costs, commercial vehicle travel time costs, accident costs and private vehicle occupants' travel time.

The benefits were determined by re-allocating the 1986 traffic onto the proposed network and calculating the new travel times and speeds. Two discount rates, 7% and 10%, were used in the analysis.

Three measures of return have been estimated:

- Nett Present Value (NPV). The present value of benefits less the present value of construction costs. An NPV greater than zero indicates benefits exceed costs at the discount rate used;

- Benefit-Cost Ratio (BCR) - The ratio of the present value of benefits divided by the present value of construction costs. A ratio greater than one indicates benefits exceed costs;

- First Year Rate of Return (FYRR) - The PV of benefits in the first full year of operations are calculated as a percentage of the PV of the total capital costs, giving a measure of the return on the investment in the first year of operation. A value less than the discount rate indicates that the cost of the money invested is greater than the benefits.

Table 5.2 illustrates the results of the analysis assuming the two discount rates. Adopting a discount rate of 7% the benefit cost ratio is 1.32 with a first year rate of return of 9.1%.

TABLE 5.2 ECONOMIC ANALYSIS

Discount Rate %	NPV ($M)	BCR	FYRR (%)
WEST CHARLESTOWN BYPASS			
7	7	1.32	9
10	-1.4	0.93	7
WIDENING IDA STREET AND CHARLESTOWN ROAD (STATE HIGHWAY 23)			
7	-6.6	0.35	3
10	-6.8	0.26	3

5.5 CONCLUSIONS

With the predicted changes to the development in both Newcastle and Lake Macquarie local government areas, it is important that the road network be improved in order to assist and cater for this development. DEP population predictions indicate that the population within the Lake Macquarie area will increase by up to 30% over the next 25 years while the population in the Newcastle area will remain at approximately the existing level.

The West Charlestown Bypass will provide an important link in the road network required to provide for the growth and development of the Lake Macquarie area.

6. DESCRIPTION OF EXISTING ENVIRONMENT

6.1 NATURAL ENVIRONMENT

6.1.1 Topography

The general landform of the area can be described as undulating to rolling with terrain components being mainly crests and sideslopes. Local relief along the reservation varies from less than 20m Above Sea Level at Windale to about 100m near Kotara. The ridge at the Warners Bay Road intersection is some 60M ASL.

The area comprises parts of the Elrington and the Beresfield Land Systems (Story, et al, 1963). The Elrington Land System is characterised by rounded hills and open valleys and is mainly represented in the northern section of the study area and also in the vicinity of Warners Bay Road. Undulating lowlands of the Beresfield Land System are apparent in the Hillsborough area and to the south of Warners Bay Road.

6.1.2 Hydrology

Only one main waterway, Winding Creek, crosses the route just south of Hillsborough Road and there are other small streams including Scrubby Creek and Johnsons Creek. Definite water tables can be located from adjacent creeks, marshy areas and Winding Creek. Evidence of perched water tables, one between Warners Bay Road and Hillsborough Road and possibly one south of Willow Road, are high moisture vegetation and deep weathering zones. The zone of perched water table immediately north of Warners Bay Road appears to be seasonally dependent being super-saturated during winter and less saturated in summer.

Further evidence of the presence of percolating ground waters between Warners Bay Road and Hillsborough Road, is the abundance of silicified wood.

All drainage of areas north of Warners Bay Road along the road reservation eventually flow into Cockle Creek and Lake Macquarie via Winding Creek. Areas south of Warners Bay Road flow into Jewells Swamp via Johnsons Creek and Scrubby Creek. Jewells Swamp is designated wetland No 861, under State Environmental Planning Policy No 14.

6.1.3 Geology and Soils

A geological and soils investigation was undertaken by C Francis and G Hennessy of the Department of Main Roads as input to this environmental impact statement (Hennessy, 1986). The majority of field work was carried out within the road reserve with geological and soil boundaries outside this area being largely inferred or projected from broader scale maps. The report is summarised as follows:

a) Geology

The geological setting is one of Permian Age coal measure sequences (Newcastle Coal measures) consisting of coal seams, sandstones, conglomerates, claystones, tuffs and shales (Figure 6.1). Major geological structures are faults and dykes bearing northwest to southeast. The dominant joint direction is approximately 310° which parallels the fault and dyke direction.

Weathering profiles vary from slightly weathered outcropping sandstone/conglomerates to thick (4m) sequence of silky and tuffaceous clays.

b) Soils

For the soil survey existing cuttings, gullies and hand auger holes were surveyed using the Soil Conservation Service's "Soil Data System" (Figure 6.2). Soils are predominantly yellow hard pedal mottled duplex types and vary in depth from 0.60m to 2.00m. Deeper soils are located on the lower slopes and open depressions. Figure 6.2 also illustrates topographic relief in the study area.

Surface soils are semi-pervious but generally have low infiltration rates and appreciable runoff may result from moderate to heavy rain. Subsoils are largely impervious resulting in intermittent perched watertables in the sub-surface horizons and partial saturation in the upper B horizon of hillslopes during wet periods. Waterlogging occurs on lower footslopes and adjacent to drainage lines.

Soils of the survey area are reasonably uniform but can be divided into three units determined largely by geology and terrain.

Soil Unit 1: Yellow and Grey Mottled Pedal Duplex Soils.

These soils are formed from shale and to a lesser extent coal parent material. They are found on the upper slopes or hill crests which have gradients up to 30° and with profiles up to 2.0m deep. These soils have poor internal drainage due to an impervious heavy clay subsoil. Because of their heavy texture and position in the landscape, they are often associated with intermittent perched water tables. They are very strongly acidic and are the most fertile of the three units identified.

Soil Unit 2: Gravelly Yellow Duplex with Occasional Bleached Horizon Soils.

This unit is restricted to the slightly undulating topography of the Winding Creek area and is formed upon conglomerate and alluvial parent material. The duplex nature of these soils varies and they tend towards a gradational textural profile in the flat area just south of Winding Creek.

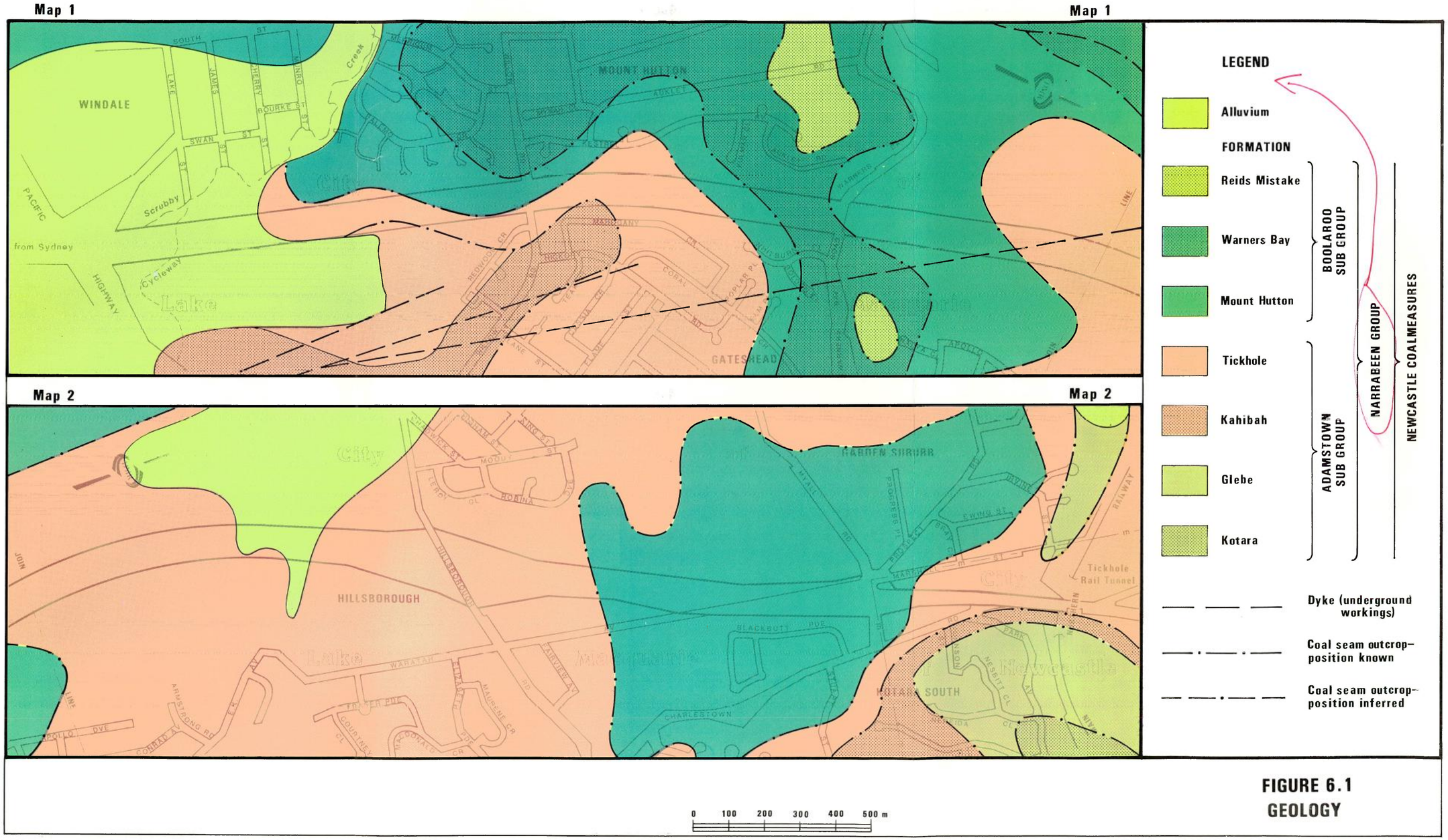


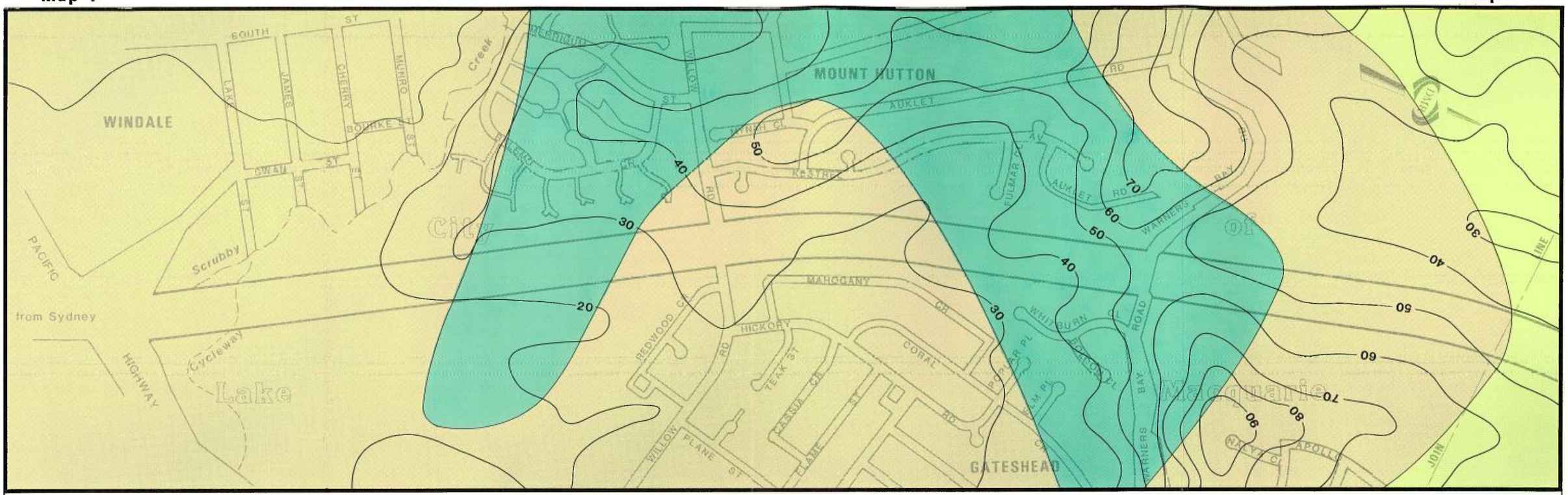
FIGURE 6.1
GEOLOGY

Map 1

Map 1

Map 2

Map 2



SOIL UNIT 1 Yellow and grey mottled pedal duplex soils

SOIL UNIT 2 Gravelly yellow duplex with occasional bleached horizon soils

SOIL UNIT 3 Hardsetting yellow duplex soils

0 100 200 300 400 500 m

FIGURE 6.2
DISTRIBUTION OF SOIL UNITS

Due to the conglomerate and alluvial parent material this unit has a gravelly nature with an accumulation of mainly medium to coarse rounded gravel at the surface. This unit is very strongly acidic and is very susceptible to gully and tunnel erosion once disturbed.

Soil Unit 3: Hardsetting Yellow Duplex Soils.

This unit occurs on lithic sandstone, siltstones and alluvial areas of gently sloping midslopes and lower slopes. Soil profiles range from 0.5m to 1.56m in depth with soil depth generally decreasing upslope. Soils are very strongly to strongly acidic and are probably the least fertile of all the soils identified.

6.1.4 Climate

This analysis of climatic conditions for the Charlestown area is based on a study by the former NSW Planning and Environment Commission and Lake Macquarie Municipal Council (1980) and records of the Bureau of Meteorology, Sydney. There are no recording stations in the study area, so there could be local variations. The nearest meteorological stations are located at Nobby's Signal Station on the coast and the Maryville Station at Tighes Hill.

The study area is located in the sub-tropical climatic zone and maritime influences are apparent.

a) Rainfall

The average annual rainfall for the study area approximates 1086 mm at the Maryville Station and 1100 mm at Nobby's Station. Late winter and early spring are the driest periods of the year. The wettest months tend to be from mid summer to early autumn, although June receives a high rainfall. Afternoon thunderstorms account for most of the summer precipitation.

b) Temperature

Temperatures are warm to hot in summer (average 26 degrees C - January) and cool to mild in winter (average 8 degrees C-July).

c) Winds

East to south-easterly winds prevail in summer months and west to north-westerly winds prevail in winter. Easterly sea breezes occur frequently during summer afternoons, modifying hot summer temperatures. Strong winds in winter exceeding 52 km/hour are from the north west and also occur in summer.

6.1.5 Vegetation and Fauna

A detailed vegetation and fauna study was undertaken by Bartrim and Martin, Biological Studies (1986). The study report is summarised as follows.

i) Vegetation

The proposed bypass route traverses predominantly bushland remnants on the eastern side of Lake Macquarie. Most of the area has been disturbed to some degree by intensive use and/or frequent fires. Generally, the bushland remnants are isolated islands of vegetation within the urban area.

For the purposes of the study the length of the study corridor was subdivided into four readily identifiable sections, Tickhole Rail Tunnel to Hillsborough Road; Hillsborough Road to Warners Bay Road; Warners Bay Road to Willow Road; and, Willow Road to Pacific Highway. The approximate distribution of the nine recognised vegetation communities are shown on Figure 6.3 and in Table 6.1 in Appendix C. It was assessed that the section from Hillsborough Road to Warners Bay Road would support the greatest number of species as well as being representative of most of the study corridor.

An assessment of the condition of vegetation along the proposed route was based on the following criteria:

- Track development
- Degree of clearing
- Presence/degree of weed infestation
- Evidence of other sources of disturbance such as logging
- Presence/extent of erosion
- Incidence of fire

Table 6.2 in Appendix C shows the results of assessing the various sections of the study corridor.

Attention is drawn to the presence of protected species under the 13th Schedule of the National Parks and Wildlife Act, 1974. Ten protected plant species occur generally in the dry sclerophyll communities and include Adiantum aethiopicum, Blandfordia grandiflora, Chalochilus sp., Ceratopectalum gummiferum, Cryptostylis subulata, Cymbidium suave, Dipodium punctatum, Lomatia silaifolia, Microtis sp. and Orthocerus strictum. Tetratheca juncea occurs as isolated specimens and was recorded between Tickhole Rail Tunnel and Warners Bay Road. This species is considered vulnerable and at risk in the long term (Leigh et al, 1981). Hakea bakerana occurs occasionally and is uncommon in the Newcastle/Lake Macquarie area.

A total of 136 plant species were identified, including 12 weeds. This compares favourably with the 190 species recorded in nearby Blackbutt Reserve which has a much greater diversity of communities present than along this study corridor.

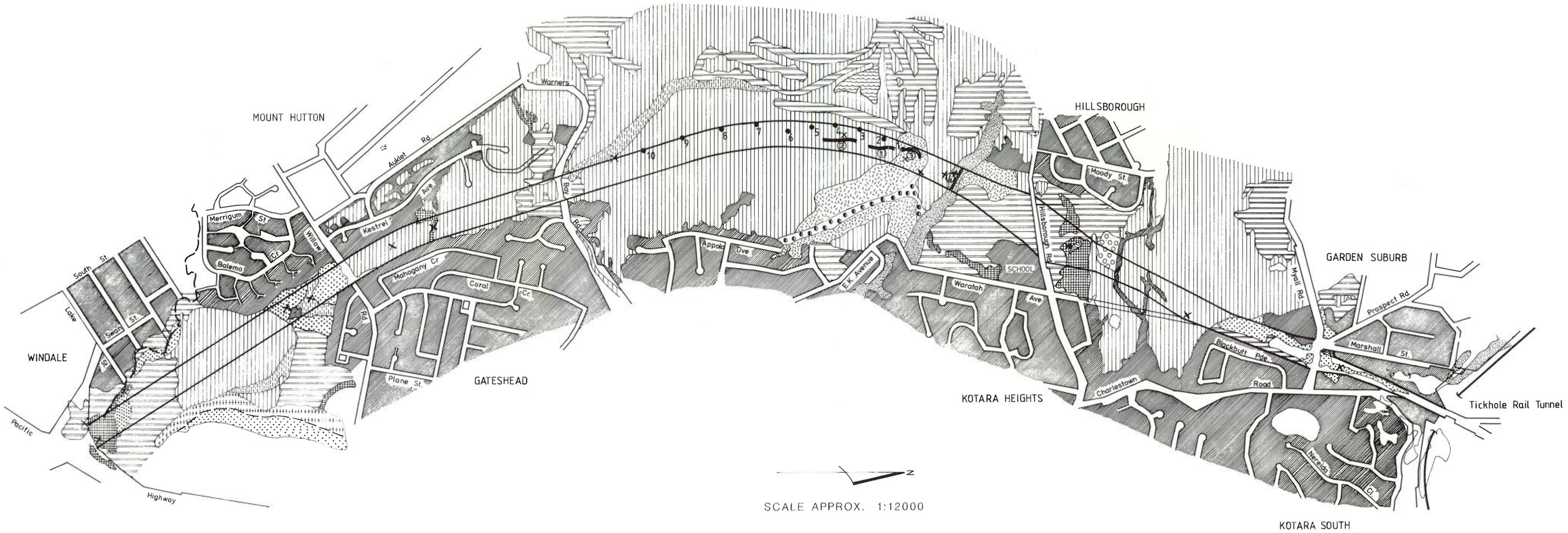


FIGURE 6.3

VEGETATION

The main community common to most of the area consists of a dry sclerophyll forest with pronounced heath elements in the understorey. Variations of this community occur but can be related to the incidence of fire. partial clearing or other disturbances. The major vegetation communities are:

1. Scribbly Gum, Smooth-barked Apple, Red Bloodwood - Open-forest: comprises a dry sclerophyll forest overstorey with a pronounced heath understorey. This community occurs along most of the study corridor, its continuous distribution broken only by clearings, watercourses and Community 4. The distribution of the community is related to the presence of poor quality soils with a high clay component derived from a Permian coal measure sequence. This consists of layers of sandstone, conglomerate, coal seams and claystone. The low shrub understorey and ground cover are well developed and are characterised by peas, Banksias, Epacrids, Leptospermums, grasses, herbs and ground orchids.

2. Scribbly Gum, Smooth-barked Apple, Red Bloodwood Woodland-cleared understorey.

3. Scribbly Gum, Smooth-barked Apple, Red Bloodwood Forest with watercourse elements.

4. Sydney Peppermint forest - sclerophyll forest overstorey and a much more pronounced mid-understorey than Community 1 with wet sclerophyll elements. The dominant species is very common on poor sandstone soils in the Central Coast area (Anderson, 1968) and typically favours valleys and sheltered slopes.

5. Sydney Peppermint forest with watercourse elements. This community has a very localised occurrence along a dry watercourse.

6. Watercourse Community. In this community there are a high proportion of water associated species in all strata. The mid-understorey is well developed and exhibits some rainforest elements such as Lilly Pilly and Sandpaper Fig.

7. Degraded Watercourse Community.

8. Pastureland, Grassland, Regenerating Vegetation.

9. Weed Infested Pastureland.

(ii) Fauna

Bartrim and Martin's fauna survey found no fauna species regarded as rare, endangered. threatened or of special concern or expected to occur along the proposed route. Bushland remnants crossed by the proposed Bypass perform an important function as wildlife corridors. Only three major habitat types were distinguished in a study corridor which is relatively uniform in habitat. Within these habitats, numerous microhabitats would supply the specific requirements of particular species. Some species, particularly avifauna, would cross the artificial boundaries of the major habitats (see Figure 6.4).

While the survey concentrated on avifauna and mammals it was constrained by the ongoing use of bushland areas for recreation purposes. In the vicinity of Charlestown golf course was the area of particular value in the survey as it was the largest, least disturbed area of fauna habitat along the study corridor. No detailed survey of amphibians was conducted owing to the restricted and degraded nature of suitable habitat.

Main characteristics of the three major habitats and associated microhabitats are presented in Table 6.3 in Appendix C. Habitat 1 basically corresponds with the vegetation Community 1, and is the most prevalent habitat along the study route.

Table 6.3 (Appendix C) presents a simple evaluation of the major habitats within each sector of the proposed bypass. The area between Hillsborough Road and Warners Bay Road is rated only as of moderate value to fauna due to the degree of past and present disturbance and the relatively low number of fauna species characteristically using the predominant habitat type. Size of the bushland remnants within the road reservation is another major factor limiting their overall value to wildlife.

Avifauna

A total of 29 avian species were observed which represents only 9% approximately of the total recorded for the Newcastle region (Morris 1975). The number recorded during the survey period was considered to be abnormally low possibly due to noise of cicadas which appears to discourage birds from using an area and the noise also hindered identification of bird calls. Low numbers could be due to recent burning of much of Habitat 1.

Although the majority of avian species was recorded in Habitat 1, this habitat is not regarded as a high quality bird habitat with its pronounced heath component and lack of mature trees. Commonly recorded species included the Laughing Kookaburra, Black-faced Cuckoo-shrike, Rufous Whistler and Brown Thornbill.

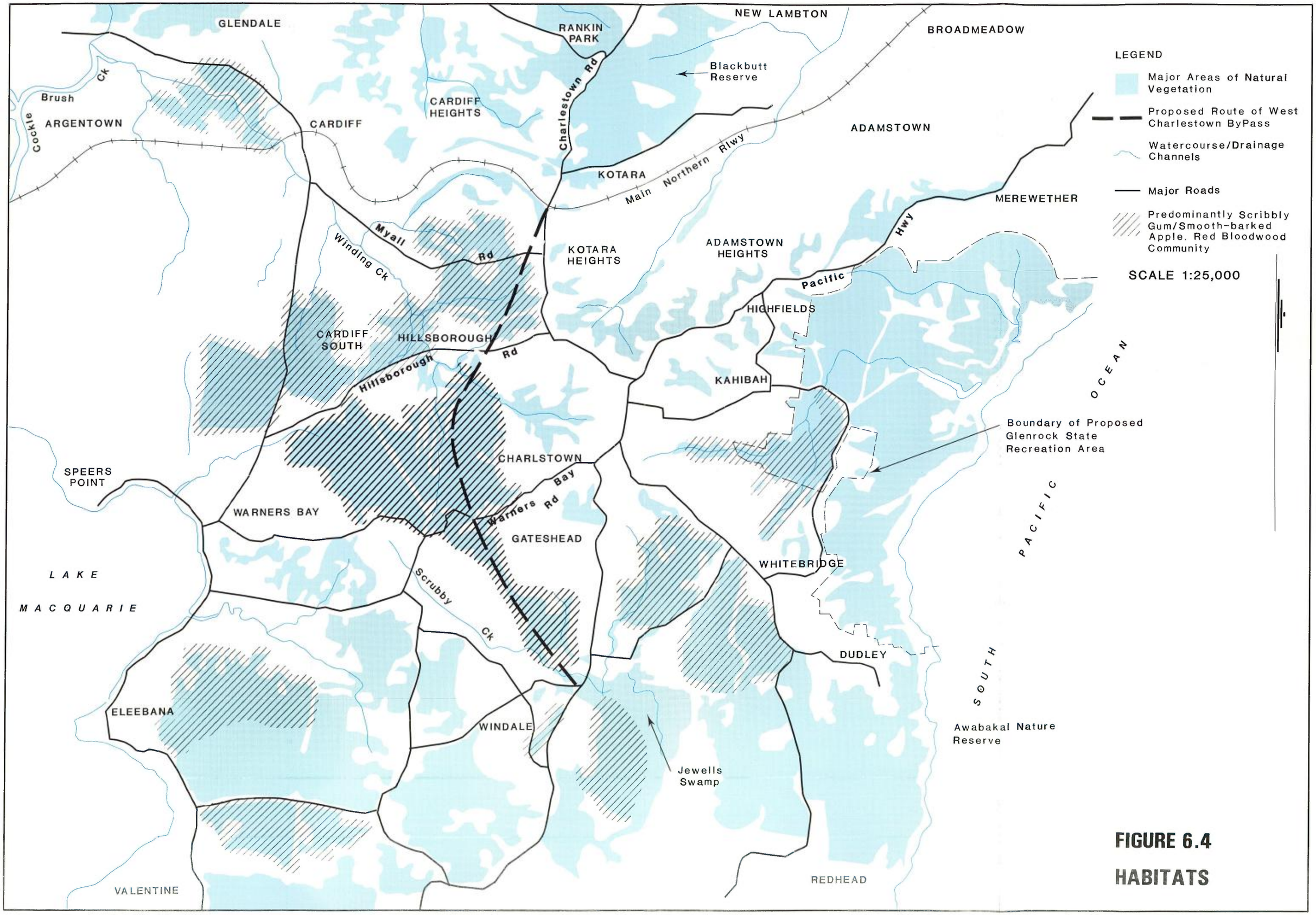


FIGURE 6.4

HABITATS

Mammals

Three native mammals, the Northern Brown Bandicoot, Common Ringtail Possum and Sugar Glider, and three introduced species, Black Rat, Domestic Dog and Brown Hare, were found during the survey. Another native mammal, the Common Brushtail Possum, not found in the survey, would be expected in Habitats 1 and 2 along most of the study corridor. It is a common species of suburban bushland areas and has been recorded in other bushland areas in the Lake Macquarie/ Newcastle region.

The Northern Brown Bandicoot is a common suburban animal and would be expected to utilise most of Habitats 1 and 2 and some of Habitat 3. Its ability to survive in the area is most likely related to its adaptation to the suburban environment allowing it to recolonise fairly readily in burnt or otherwise disturbed sectors of bushland.

Common Ringtail Possums would be the most limited mammal in distribution along the route, typically favouring dense, tall shrub growth. The Sugar Glider recorded in Habitat 2 would be expected to occur mainly in the vicinity of Winding Creek which supports large mature eucalypts.

The low number of mammal species recorded in the motorway reservation seems fairly typical for local urban bushland remnants. The small size of remnants together with human activities has probably caused the loss of larger ground fauna, such as macropods, from the area.

Other small ground mammals which would be found typically in Habitats 1 and 2, such as Brown Antechinus and Bush Rat were not found in this survey. They were probably absent due to a number of adverse factors, including the high incidence of fire and proximity to urban development encouraging predation by domestic pets.

Reptiles and Amphibians

Four species of reptiles were observed during the survey, all being common in the Lake Macquarie/Newcastle area. These were the Jacky Lizard, Common Scaly Foot, Eastern Water Lizard and Eastern Blue-tongued Lizard. Generally, the habitat would not be expected to support large numbers of species but overall numbers observed were very low. As for avifauna, this may be partly attributable to the effects of recent and frequent fires and predation by birds.

No amphibians were recorded during the survey, although a small number of unidentified tadpoles were observed in a stagnant pool in Habitat 2. The lack of amphibians can be attributed to the restricted and degraded nature of any suitable habitat and consequently a small amount of time was allocated to searching for species.

6.2 HUMAN ENVIRONMENT

6.2.1 Aboriginal and Early European settlement.

Dr Helen Brayshaw, of Brayshaw and Associates, conducted an archaeological survey of the bypass reservation. The consultant's brief was to identify and assess any Aboriginal sites within the area to be affected by the proposed development, to advise on future management requirements of any sites and to liaise with local Aboriginal communities.

A number of sites are known to occur in the region but no archaeological sites were found in the course of the survey. The dominant site types from the ocean shore, in the Jewells Swamp area and to Lake Macquarie is the midden, sometimes containing stone artefacts. There are also a number of open occupation sites, or campsites, containing stone artefacts, but no midden material. Axe grinding grooves have been found in the Blackbutt Reserve/Cardiff area and an axe grinding groove site was found 3.5 km to the east of this proposed bypass in a tributary of Flaggy Creek.

Dr Brayshaw made contact with representatives of the Buttaba and Awabakal Local Land Councils, as the proposed route passes through both Land Council areas. A representative of the Koe-Inba Regional Aboriginal Sites Protection Committee, representing Aboriginal communities of the Central Coast, was present at the meeting. This person said that all evidence of past Aboriginal occupation has evidently been destroyed by contact use of the surface area and that there was no impediment to be placed on the proposed bypass.

Dr Brayshaw recommended that. in the absence of archaeological sites and sites of importance to the local Aboriginal community, no objection be made to the proposed development. There are no buildings of historic significance along the proposed route.

6.2.2 Land Use and Land Tenure

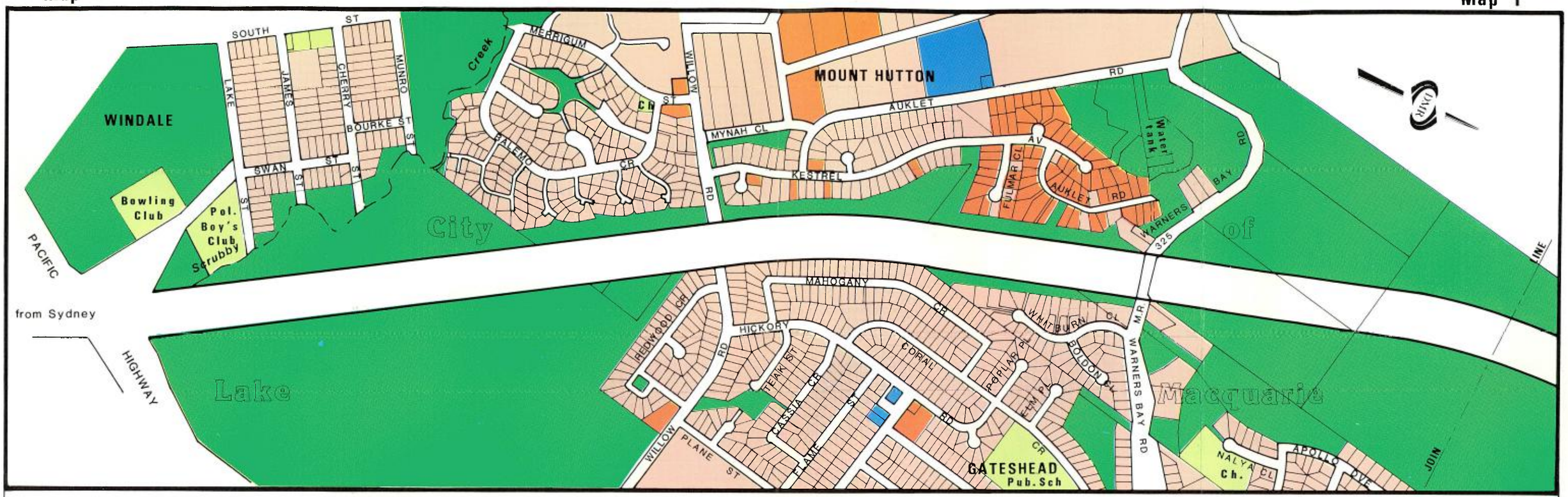
The study area is located approximately 9km south west of the Newcastle city centre. It is bounded by the suburbs of Kotara, Rankin Park, Garden Suburb, Hillsborough, Charlestown, Gateshead, Mount Hutton and Windale.

These suburbs are residential in character with many houses being post World War Two construction. Street patterns vary from the early grid pattern to the more recent curvilinear subdivisions.

As the motorway reservation was gazetted in the Northumberland County District Planning Scheme, 1960 no development has occurred within the road reservation. Existing land use within the reservation is open space containing natural vegetation or being used for various purposes. Adjoining the route, residential and open space uses occur (Figure 6.5). New shopping centres are developing in the newer residential areas (eg near Mount Hutton) while Charlestown is a major regional centre.

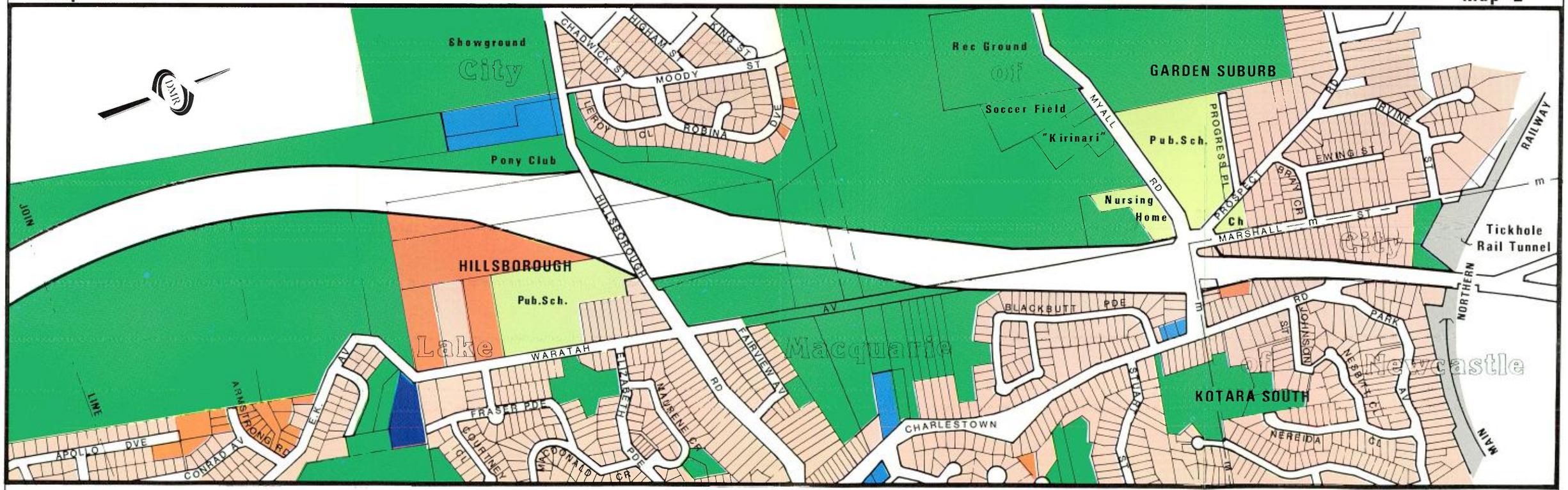
Map 1

Map 1



Map 2

Map 2



RESIDENTIAL
COMMERCIAL
VACANT
SPECIAL USES
OPEN SPACE
INDUSTRIAL
RAILWAY

0 100 200 300 400 500 m

FIGURE 6.5
LAND USE

While much of the road reserve is natural bushland, other uses include a practice golf range, sports oval for an associated soccer club, a pony club ground and open areas for horse grazing. These activities take place through lease arrangements with the Department. All lessees were advised in 1985 that normal lease arrangements were terminated and that short-term leases would be introduced until construction of the bypass commenced. Underlying much of the area are disused tunnels from coal mining.

Land adjoining the motorway reservation is either residential or open space. The Department of Housing (previously the Housing Commission) has developed a number of residential areas on either side of the bypass route. Some houses adjoin the road reserve boundary while in some cases a buffer of natural vegetation has been retained between the road boundary and properties. Other residential areas have been developed, although there are still pockets of vacant residential blocks.

Special use areas adjoining the road reserve are the Police Boys Club and Bowling Club at Windale, Hillsborough and Garden Suburb Public Schools, Glendon Special School and Garden Suburb Nursing Home on Myall Road.

Open space areas outside the road reserve are Crown Land reserves for Public Recreation, which includes Charlestown Golf Course, a proposed technical college and vacant-Crown Land, and Lake Macquarie Council land reserved for public open space. There are some areas of vacant freehold land and the Department of Housing (Landcom) and the Uniting Church of Australia are holding land for future housing development (Figure 6.6).

A survey of residences affected by the proposal was undertaken by the Department's Architectural Section. The purpose of the survey was to determine whether any building, likely to be either directly or indirectly affected by the proposal, has architectural or cultural value for present or future generations.

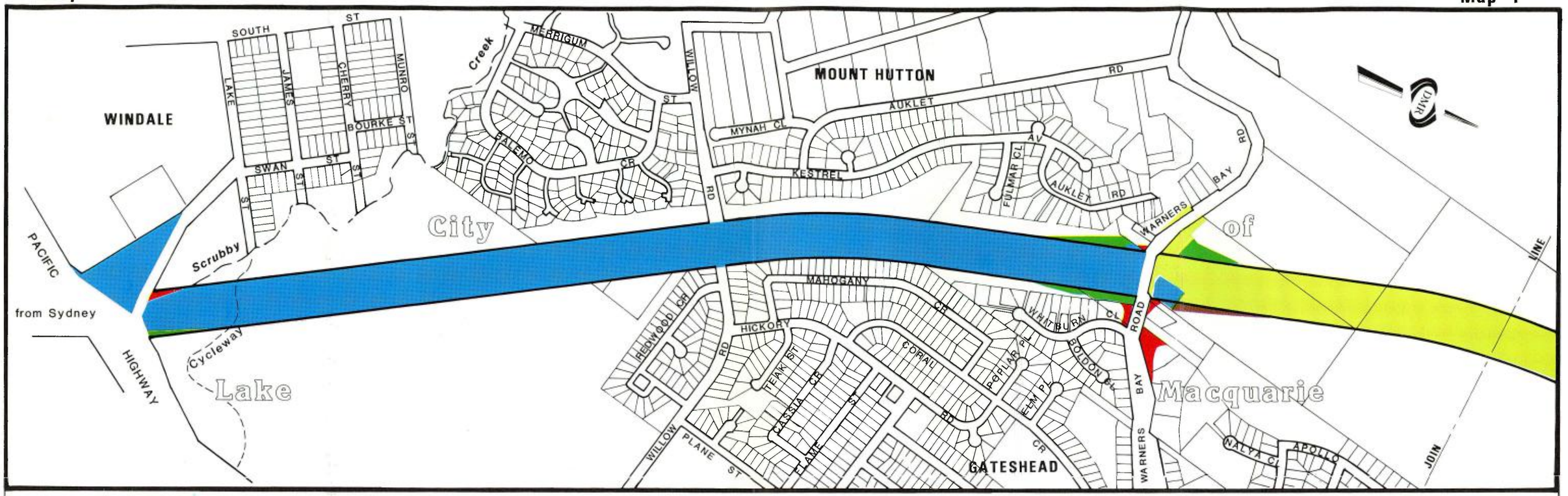
The motorway reservation could directly affect approximately 13 houses in Marshall Street. Further houses at the eastern end of Myall Road, around the Bypass intersections with both Hillsborough Road and Warners Bay Road, and along Mahogany Crescent, are indirectly affected to varying degrees. The existing residential development is categorized as follows:

1. Marshall Street

The development along this street comprises both brick and timber framed residences. Most of these houses would have been constructed in the period from the mid 1950's to late 1960's.

Map 1

Map 1



Map 2

Map 2

D.M.R. LAND

FREEHOLD

RECREATION RESERVE

VAC. CROWN & RESERVED ROADS

HOMES FOR AGED

0 100 200 300 400 500 m

FIGURE 6.6

LAND TENURE

2. Myall Road

Three houses along the northern side of Myall Road between Charlestown Road and the Bypass, and three along Charlestown Road, are indirectly affected by the proposal. These houses comprise both brick and timber framed construction and are of similar vintage to those in Marshall Street.

3. Hillsborough Road

The houses along the southern side of Hillsborough Road west of Waratah Avenue are of timber frame construction with pitched tiled or corrugated iron roofs and probably constructed in the 1960's on early 1970's.

4. Warner's Bay Road

The area around the junction between the proposed Bypass and Warners Bay Road is a mixture of rural and residential developments. Some residences in the area were possibly constructed prior to World War II.

5. Mahogany Crescent

The proposed Bypass will run along the rear of Mahogany Crescent which is in a sub-division of Gateshead. The timber framed cottages are typical of the development and probably constructed between the late 1950's and late 1960's.

To sum up, almost all of the houses would have been constructed after World War II. It is considered that none of them warrant preservation or conservation on the grounds that they are of historical or cultural significance.

6.2.3 Statutory Zoning and Planning Proposals

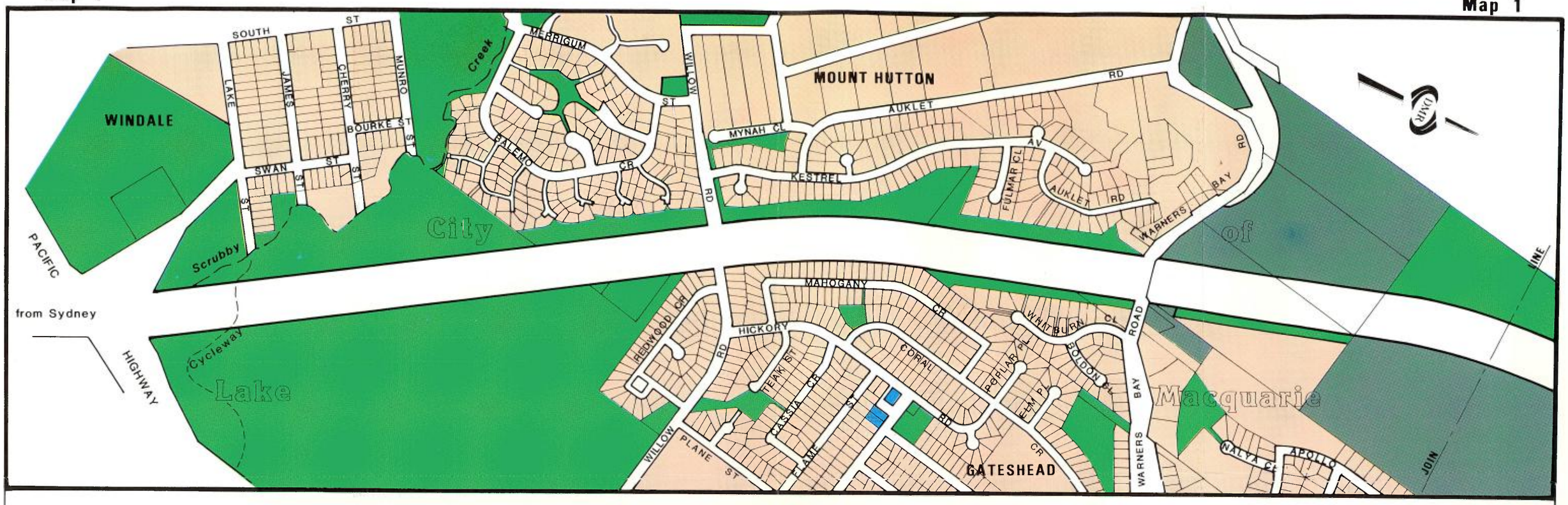
Statutory zonings under the current planning instruments are indicated in Figure 6.7. Generally these coincide with the existing land uses described previously in Section 6.2.2.

In the Lake Macquarie Local Environmental Plan (LEP), 1984, two areas are shown as Existing Arterial Road. These are from Waratah Avenue to the Newcastle City Council boundary at Myall Road, and from Pacific Highway, Windale to Warners Bay Road. The land is vacant and is owned by the Department of Main Roads. It is not zoned and is subject to statutory controls under the Local Government Act, 1912 and State Roads Act, 1986. Roadwork within the boundaries shown on the Plan is permissible without consent subject to Part V determination of this EIS.

The remaining road reservation is zoned 5(b) - Special Uses (Proposed Arterial Road Reservation). Roads are permitted with Council consent, however, Clause 8 of the LEP adopts Model Provisions Clause 35 under which nothing in the LEP restricts or prohibits road construction within the boundaries shown on the plan map. Thus roadwork within boundaries is permissible subject only to Part V determination.

Map 1

Map 1



Map 2

Map 2

RESIDENTIAL
RURAL
RAILWAY
COMMERCIAL
OPEN SPACE

0 100 200 300 400 500 m

FIGURE 6.7
LAND ZONINGS

Abutting the road reservation are areas zoned rural A and B, Residential 2(a) and Open Space for Public, Local and Special Recreation.

Within the City of Newcastle local government area, the road reservation is zoned Existing Arterial Road in the Northumberland Planning Scheme. The land is vacant and is owned by the Department of Main Roads.

As the road reserve is not zoned but unzoned existing road. it is not subject to development control provisions of the Northumberland Planning Scheme. It is subject to statutory controls under the Local Government Act, 1912 and State Roads Act, 1986.

Roadworks within the boundaries shown on the Planning Scheme are permissible without consent, subject to Part V determination of this EIS.

The Hunter Regional Environmental Plan No 1, was gazetted in 1982. One policy of the Plan is to encourage public investment to ensure suitable improvements to the road network in the Region. To implement this policy, Strategy 34 allows progressive upgrading of regional road corridors and to provide by-passes where appropriate, including the southern corridor through Charlestown, by local Councils and the Department of Main Roads.

Major planning proposals in the study area are new residential subdivisions by the Department of Housing.

6.2.4 Community Structure and Employment

The area through which the Bypass traverses is undergoing a transformation, basically from a residential area bordering natural bushland to extensive residential subdivision with pockets of open space.

The study area is within the Hunter Statistical Region of New South Wales (Australian Bureau of Statistics). Within the region, Lake Macquarie local government area grew 2.25% in the 1976-81 period. Population in Newcastle local government area showed a decrease of 2.53% in the same period.

Eight Census Collection Districts are traversed by the road reservation. These Districts contained a total population of 5118 at the 1981 Census which represents 3% of the City of Lake Macquarie population (147,943). Results of the 1981 Census reveal that most employed people in these eight Districts worked in manufacturing, wholesale and retail trade and community services such as health and education.

6.2.5 Public Transport

The Main Northern Railway crosses the northern boundary of the study area. However, public transport within the study area is provided by the Urban Transit Authority. Bus routes follow major and other residential roads in Windale, Mount Hutton, Hillsborough, Garden Suburb, Kotara, Gateshead, and Charlestown.

The existing bus network will not be affected by the proposed Bypass.

6.2.6 Landscape and Visual Assessment

An interim landscape and visual assessment report was prepared by Bruce Mackenzie and Associates (1986). A more comprehensive report is being prepared by the Consultant, outlining recommendations for landscape development.

Landscape Character

The proposed Bypass passes through broad vegetated zones and narrower corridors of remnant vegetation as defined by the limits of suburban development. At present the proportion of the corridor length that traverses the broad vegetated zones outweighs that which borders on suburban development. This pattern is expected to be reversed in the future.

Within the context of the local geography four major factors influence the landscape character along the corrridor:

- existing vegetation types;
- degree of disturbance to the existing vegetation;
- topography;
- proximity of suburban boundaries.

The effect of human disturbance is probably the most significant factor affecting the vegetation and thus the landscape character, along the route. The extent of disturbance relates to accessibility of any particular area. It varies from the minimal impact of pedestrian tracks, through to the total clearing of sites and replacement with grassland for recreation purposes.

Pony and trail bike riding cause noticeable environmental degradation through the clearing of vegetation cover and resulting erosion. Indiscriminate dumping of household refuse is leading to spread of weeds within the remnant natural vegetation zones, whilst abandoned car bodies are found in many creek beds.

Visual Assessment

For purposes of this assessment, the Bypass route was divided into twelve sections. There are varying circumstances within the Bypass corridor which raise different impact considerations and varying implications for construction and finished design. Section 7.11 describes the visual impact and possible methods to be incorporated in design of the Bypass to ameliorate any adverse impact.

Proximity of residential development to the Bypass corridor may be considered as either remote or immediate. Visual impact on remote residences will be relatively minor. The combined effects of topography, remnant vegetation cover and the presence of other properties interrupting lines of sight, will eliminate any direct views of the Bypass. Where vistas are available, they will be broken, generally (ie only small sections of road will be visible from any one place), and they will be distant.

Visual impact of those properties immediately adjacent to the corridor may be significant in particular locations, to road users and residents.

6.2.7 Ambient Noise Levels

Three different types of traffic noise measurements were taken in the study area.

(a) One day measurements. These were taken at four locations and consisted of hourly measurements for 24 hours (see Figure 6.8). At one site, Hillsborough School, equipment failure limited the readings to school hours.

(b) Short readings. Pairs of 10 minute readings were taken at eight locations along the route of the proposed Bypass.

(c) (L10 18 hr) readings. These were measured at four locations in Charlestown shopping centre, the busiest area where traffic noise levels will be reduced by deviating traffic to the Bypass. The measurement method used was to relate short readings (2 to 10 minutes) to the daily pattern at another noise measurement station with a similar pattern.

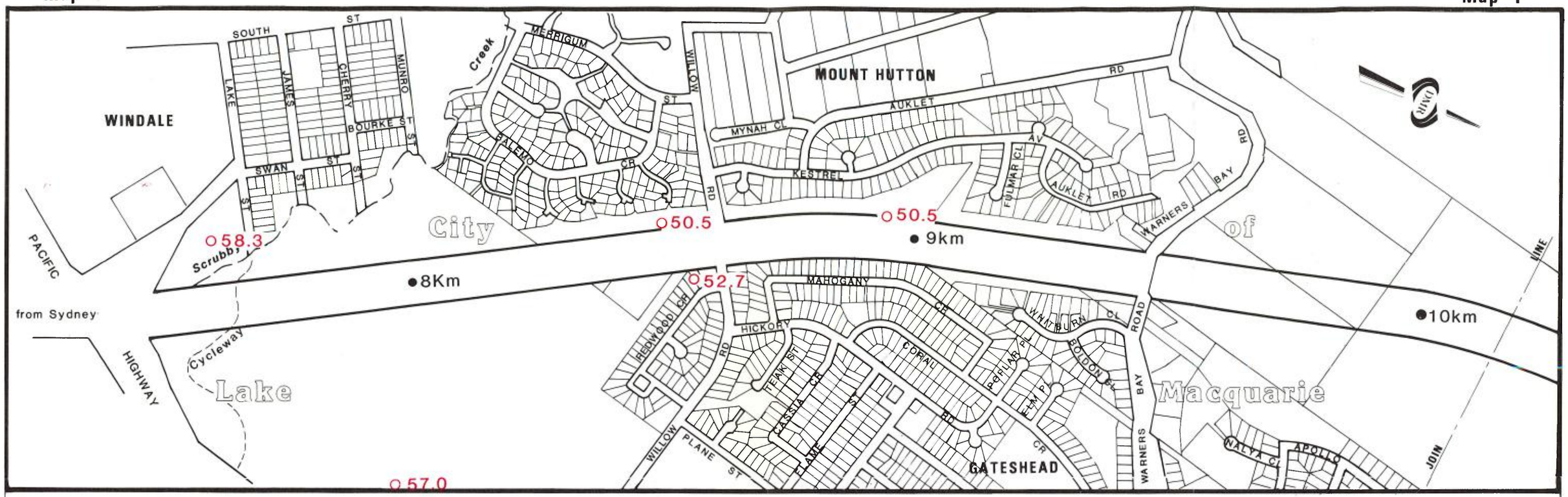
The following items of noise reading equipment were used:

(1) Bruel and Kjaer 4426 Statistical Noise Analysers with Type 2312 Alphanumeric Printer.

(2) Type 4921 Outdoor Microphone for the 24 hr readings.

Map 1

Map 1



Map 2

Map 2

NOTE: Noise Levels are L10,(dBA)

0 100 200 300 400 500 m

FIGURE 6.8
EXISTING NOISE LEVELS

(3) Type 4165 Condenser Microphones for the short readings with Type 2169 Preamplifier, and Type UA0237 foam windscreen.

Field calibration was carried out at 12 hr maximum intervals for the 24 hr readings, and before and after each 10 min reading. The analysers and printers are regularly serviced by the agents.

The existing daytime noise levels along the route of the proposed Bypass are between 50 and 60 dBA (L10, 1 hr). being generally above 55 dBA where existing traffic noise from nearby roads is the predominant noise source, and being below 55 dBA elsewhere. Most of the noise measurements were taken several metres from existing houses and represent the noise level to which these homes are exposed. The levels generally exclude the noise generated within nearby houses.

7. ENVIRONMENTAL IMPACTS AND PROPOSED SAFEGUARD MEASURES.

7.1 DRAINAGE

The proposed Bypass will interrupt natural runoff but with adequate culvert provision and retention basins as described in Section 3.4.6 existing watercourses should not be affected. While runoff from the Bypass will be greater than from the present natural surface, erosion and sedimentation controls will mitigate any adverse impacts.

7.2 EROSION AND SEDIMENTATION

The clay subsoils of the yellow duplex soils are moderately to highly erodible and any disturbance of the surface can lead to severe rilling and the development of gully erosion (Hennessy, 1986). Active tunnel and gully erosion is evident on all three soil units with Soil Unit 2 being the most erodible due to a high dispersive content.

Yellow and Grey Mottled Pedal Duplex Soils (Soil Unit 1 - see Section 6.1.3) are prone to slope instability and mass movement during construction. Removal of trees and shrubs from these steep slopes will increase the hazard. To minimise the siltation of Winding Creek and Scrubby Creek and to reduce the amount of sediment reaching Lake Macquarie, effective control of runoff will be essential during construction.

Special land management practices must be used during construction to avoid severe erosion. Temporary/ semi-permanent and permanent erosion controls are necessary with roadworks proposed for the Bypass.

By using retarding and sediment basins as part of the construction process, the velocity of flow of runoff and peak discharges can be controlled which will help preserve the existing drainage system and minimise sediment reaching Lake Macquarie.

7.2.1 Erosion and Sedimentation Control

Erosion control measures will be included in the construction stage to address the identified potential problem areas and to provide comprehensive erosion control. In this project, the need for adequate controls has been stressed in the Consultant's report on vegetation and fauna and in the Department's soil study. The soil report states that most of the soils affected by the proposal have a high potential for erosion. The flora and fauna report by Bartrim and Martin, 1986 recommended that erosion and sedimentation controls be implemented and maintained at all stages of development. Thus substantial measures will be needed to control erosion on cleared construction sites.

Erosion Controls

(i) General

Erosion controls will comprise structures and other works to alleviate the erosion hazard, together with regeneration measures to stabilize exposed areas and reduce the amount of run-off. Some of the controls will be temporary measures which will be implemented as soon as the surface soil is exposed. Other measures will be permanent ones, since they will be part of the finished roadworks.

The Department of Main Roads has prepared a manual, "Interim Guidelines for the Control of Erosion and Sedimentation in Roadworks." These guidelines will assist design and construction staff in their efforts to minimise erosion and sedimentation from the road construction sites. The manual contains a range of erosion prevention and sediment control measures applicable to each stage of the development of the road project.

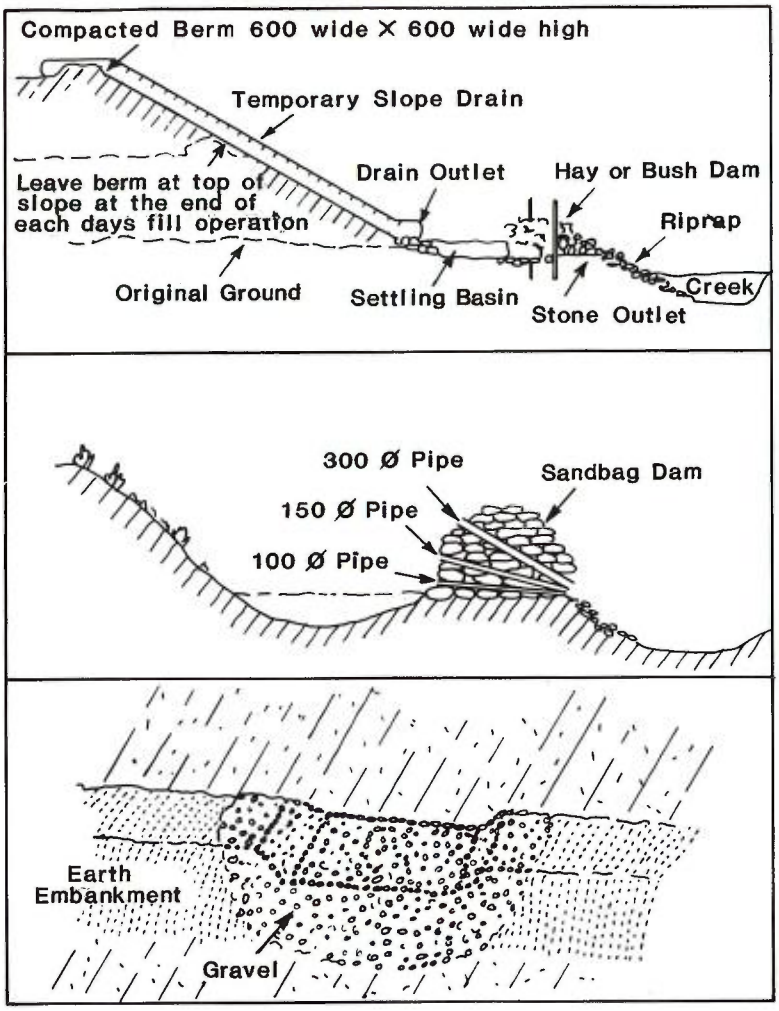
(ii) Temporary Controls

A major aspect of erosion control is the implementation of temporary measures during the construction stage. Planning for these controls will commence before construction starts, and continue as the work progresses. Controls will be developed progressively once the construction site is cleared. Examples of some of the proposed measures are given in Figure 7.1.

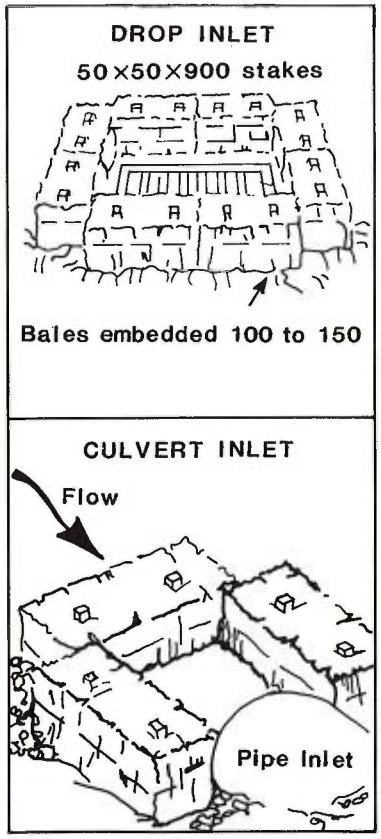
Since surface conditions vary so much, temporary erosion controls will be developed to suit each individual construction site. Careful planning will allow for the most efficient balance between construction needs and erosion control requirements. An example of this planning is the proposal to limit the area of clearing at any one time to a prescribed minimum. This limitation, in association with the intended overall limitation of vegetation destruction within the road reserve, will minimize sediment run-off, and reduce the cost of erosion controls.

When the construction site is cleared, gently graded contour drains will be formed to divert water and sediment into nearby stable areas. These drains are intended to reduce sediment run-off from the site, by diverting much of the flow before it reaches the main outlet channel. By spacing these drains at suitable vertical intervals, the rate and velocity of overland flow will be reduced. This will help to prevent rilling and consequent scouring.

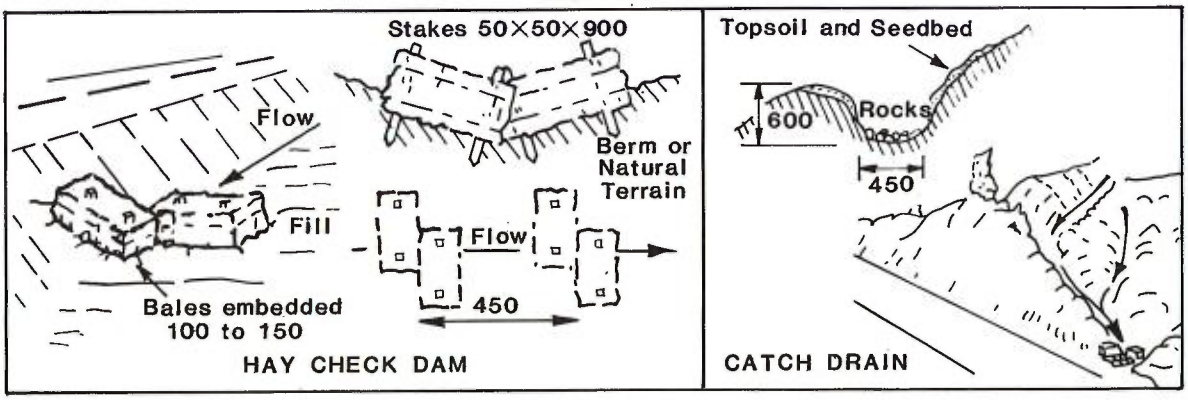
SEDIMENTATION TRAPS



DRAINAGE STRUCTURES



SLOPES



RUNOFF CONTROL STRUCTURES

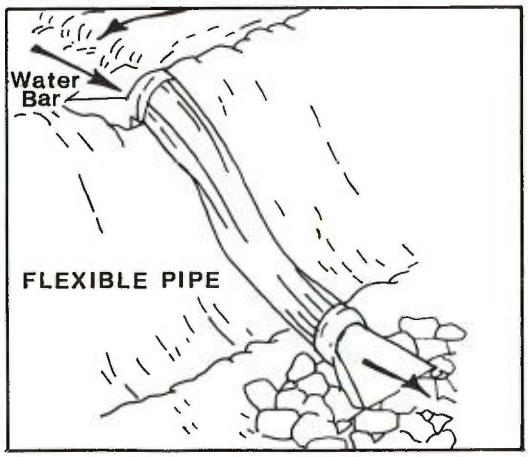


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FIGURE 7.1

TEMPORARY EROSION CONTROL MEASURES

ALL MEASUREMENTS IN MILLIMETRES

Haul roads, and the other access tracks associated with construction activities, will be planned with special attention to their erosion potential. Where these tracks have steep grades, which could concentrate the flow of water, diversion drains will be constructed at close intervals. In addition, when considered to be necessary temporary berms and drains will be formed at the end of each work period. The latter works will prevent the scouring of unconsolidated earthworks when the workforce is away from the job.

Sediment which does reach the downstream end of a construction site will be collected in sediment traps or basins. These structures will be either Hay Check Dams or more substantial structures (see Figure 7.1), depending on the catchment characteristics of a particular site. For each structure, an access track will be constructed to facilitate its maintenance, which includes regular clearing out of the sediment to ensure that the trap can function efficiently.

When necessary, temporary culverts or channels will be used to pass natural run-off through a construction site. This procedure will maintain dry conditions on the site. It will also prevent sediment from mixing with the natural flow coming from upstream of the roadworks.

Areas which are cleared well in advance of construction will be seeded to produce a temporary cover-crop of shortlived, infertile grass. Fill batters and other exposed areas will be vegetated progressively, with native species, as construction work proceeds (see Section 7.11). As this cover becomes established, infiltration rates will increase and surface run-off will be reduced.

Erosion problems which may last beyond the construction period will be treated with permanent control measures.

(iii) Permanent Controls

While temporary and semi-permanent erosion control measures are aimed at limiting runoff during and immediately after construction, permanent control measures are primarily designed for the stabilisation of exposed surfaces and slopes, the disposal of surface runoff with minimum erosional damage, and the minimisation of return maintenance. They include the establishment of a vegetation cover, and structures such as bridges, culverts, catch drains, median drains, batter drains, and pavement drainage culverts. Energy dissipators will be used, as required, to reduce water velocities and to protect drainage outlets. Open drains will be either grassed on lined to minimise erosional effects.

Where practicable, catch drains, diversion drains and through drainage culverts will be installed before major clearing and earthworks are undertaken. This will be done to intercept existing natural drainage in order to channel it through the construction area without mixing with sediment from the disturbed ground. The cross drainage system will be designed to discharge water with a minimum adverse impact outside the road reservation. This will be achieved by keeping discharge rates and sediment loads as close to pre-existing natural conditions as is practicable.

7.3 MINE SUBSIDENCE

There has been considerable coal mining in the area but the proposed Bypass, except for the extreme northern and southern ends, avoids most of the old workings. Although mine subsidence is not considered to be a problem, the route intersects an abandoned vertical shaft near Myall Road.

Any subsidence thought likely to occur is now considered complete or is likely to be too deep to cause any substantial effect. The abandoned vertical shaft has been filled in within the road reserve between Pacific Highway and Willow Road. The Mine Subsidence Board has advised that there are no plans at this stage for future mining along the route.

The Board advised also that a section of the proposal will require geotechnical investigations to be undertaken to determine the depth and extent of underground coal workings (bord and pillar). The Department engaged a consultant to assist the geotechnical investigation of the area between Hillsborough Road and Myall Road. Results of the investigation indicate that ground movement could occur due to excavation for the road and mine subsidence. This information has assisted in design of batter slopes to counter slope instability. Further geotechnical investigations will be conducted if required.

7.4 VIBRATION

Geological investigations indicate that blasting of rock will not be required as the solid rock material is soft and can be easily ripped with bulldozers. However, vibrating rollers used in normal road construction could have some impact on residences between the Tickhole rail tunnel and Myall Road.

The Department and its contractors follow established guidelines on vibration. An architectural inspection of all buildings within effective range of vibrations is undertaken before road construction commences to determine possible effects of vibration. If inspections indicate that the guidelines cannot be complied with, then other road construction machinery will be used.

7.5 VEGETATION AND FAUNA

7.5.1 Vegetation

A detailed evaluation of the route in terms of its impact on vegetation was undertaken by Bartrim and Martin. (1986). The evaluation in this section is based on the detailed study. Loss of vegetation and animals from the study area due to the Bypass construction has been assessed as not seriously affecting the overall status of the species involved.

The main impact of the proposal on vegetation will be the total clearing of approximately 60 ha of vegetation comprising predominantly Scribbly Gum, Smooth-barked Apple, and Red Bloodwood Woodland Open-forest. This clearing will be contained within an easement generally 100m wide, except in the vicinity of intersections. In most sectors, the full easement will not be utilised and vegetation will be retained wherever possible.

The area between Hillsborough Road and Warners Bay Road, as shown in Figure 6.3, could undergo the broadest area of impact because it may be utilised to obtain fill for other parts of the route. However, the area of disturbance will still be restricted to the designated easement.

Protection of existing vegetation during construction and revegetation of exposed areas after construction will be necessary. Fertility levels in the yellow duplex soils are low to very low with severe deficiencies of phosphorous and nitrogen. Consequently topdressing with a suitable fertiliser may be required for successful revegetation (Hennessy, 1986).

Removal of the plant communities present is not considered of significance on a statewide basis. In the local context, 60ha of the bushland which is well represented. although poorly conserved in the Lake Macquarie area, will be cleared. The reduction of this vegetation in isolation is not rated as highly significant, considering the size of the reduction and the present condition of the communities. The significance of impact is also reduced by consideration of the proposed use of much of the adjacent bushland for urban development.

These bushland remnants in their present form provide important linkages with other vegetation in the area. Any further reduction of these corridors affecting their long term viability may be considered a signficant impact locally.

The long term effect of clearing will be mitigated to a limited extent by the retention of natural vegetation where possible and proposed landscape treatment. It is important to retain as much vegetation as possible in the road reseve because of the probable future removal of adjacent bushland for housing development.

Plant species of some conservation significance which will be affected by road construction, including Tetratheca juncea, are not considered numerous enough to preclude road construction. Care will be taken in areas adjacent to construction work to avoid disturbing these plants, particularly Tetratheca juncea.

Other potential impacts of the Bypass identified by the vegetation Consultant are:

Edge effects - the proposed route will effectively dissect two moderately sized bushland remnants, substantially increasing the area of bushland open to disturbance. This may encourage the development of new tracks in remaining bushland although the Bypass as a major road would not be expected to encourage this type of disturbance. Weed infestations may be encouraged and could be a potential problem in the vicinity of Winding Creek and its tributaries. Rapid rehabilitation of earthworks should help to mitigate this impact.

Dumping of rubbish including car bodies in adjacent bushland. This is not likely to be a problem because the Bypass will be a relatively highspeed road with stopping, apart from breakdowns, prohibited. The boundaries will be fenced to deny access.

Erosion and Siltation - steep-sided slopes along the route are subject to erosion, eg along the banks of Winding Creek. Potential problems of siltation of Winding Creek, Scrubby Creek and subsequently Jewells Swamp and other small watercourses would be reduced by erosion control and rapid revegetation of disturbed areas.

The following environmental safeguards are proposed to help preserve the existing vegetation:

- Site clearing will be restricted to the minimum area necessary to accommodate and construct cuttings and embankments, plus a small number of areas for stockpiles of top soil and base material and depots. The remaining vegetation within the road reserve will be preserved and disturbance to adjacent bushland will be strictly controlled.

- The impact of direct destruction of vegetation within the construction area will be reduced by a programme of regeneration, revegetation and landscaping during and at the end of the construction period.

- Erosion and sedimentation control will be implemented and maintained at all stages of road construction, particularly near Myall Road and in the vicinity of Winding Creek and Scrubby Creek.

7.5.2 Fauna

The proposed Bypass will result in a loss of fauna populations corresponding to the loss of 60 ha of bushland. Highest numbers of individuals would be lost between Tickhole Rail Tunnel and Warners Bay Road which contain the best representation of fauna habitats (see Figure 6.4). As discussed in Section 6.1.5 construction of the Bypass will not have a significant impact on fauna as their habitats have been disturbed extensively. Certain species presently living along the route may be displaced and will need to colonise adjoining areas. The Consultant did not consider the Bypass would inhibit movement of wildlife across the Bypass corridor.

Other potential impacts identified by the consultant on fauna species in adjacent bushland areas and safeguards are:

Increased disturbance to habitat - through use by humans, fire, erosion, siltation and weeds will cause a decrease in fauna numbers. Some of the present adjoining bushland is planned to be cleared for residential developments. However, as much vegetation as possible will be retained within the road easement which will be fenced to prevent further intrusion into fauna habitats. Erosion and sedimentation controls will be implemented as outlined in Section 7.2

Noise - all fauna species will be subjected to increased noise levels. The effect of noise on wildlife is little known but the overall impact is expected to be minor.

Vehicle emissions and road runoff - fauna close to the Bypass may be affected by polluted runoff and vehicle emissions. There was no evidence provided to substantiate this impact. However, possible hydrological changes which could affect fauna will be minimised by the proposed drainage structures. Special consideration will be given to protecting Winding Creek and its tributaries from pollutant runoff and increased sediment load.

Reductions in wildlife corridors - the extent of loss of bushland as wildlife corridors will be reduced to some degree by the retention of bushland immediately adjacent to the roadway and the revegetation of disturbed areas with native trees wherever possible.

7.6 PROPERTY ACQUISITIONS

The majority of land within the Bypass reservation is owned by the Department of Main Roads (Figure 6.6), but a further acquisition of approximately 21 hectares will be required to accommodate intersections. In total, thirty one freehold properties could be affected as well as portions owned by the Department of Lands, Department of Housing (formerly Landcom and Housing Commission), Lake Macquarie City Council and the Uniting Church of Australia. A portion of land will be required from Windale - Gateshead Bowling Club Co-op Ltd.

Five of the thirty one freehold properties will be totally acquired and houses on four of these properties will be demolished. The greatest impact on freehold property will be in the section between Myall Road and Tickhole Rail Tunnel and those near the proposed intersections of the Bypass with Hillsborough Road and Warners Bay Road.

In acquiring property, the Department of Main Roads will negotiate with all landowners affected by the proposal. Each property and all portions of land will be valued at current market value determined by sales of similar properties nearby, unaffected by road proposals.

There is one property which will be isolated by roadworks at the intersection of the Bypass and Charlestown Road. The Department of Main Roads is prepared to buy this property from the present owner if necessary and then sell the property at the completion of roadworks.

The method of disposal of residue portions of land when roadworks are completed has not been determined.

7.7 NOISE

7.7.1 Construction Phase

Although a range of construction plant will be required, it is likely that scrapers will generate the highest noise levels. The major noise impact will be the excavation for the cuttings which could take in excess of four weeks to complete. Bulk earthmoving operations are part of the early stages of the total construction process.

Construction noise goals are often difficult to achieve, especially where heavy construction is proposed near urban development. In terms of noise generation, the construction of a highway will generally be intrusive when compared with the existing background noise levels. However, the effect of construction noise will be ameliorated by the knowledge that it will be of limited duration and constrained to working hours, namely, 7am to 6pm weekdays and possibly Saturdays. Only in extenuating circumstances would these working hours be extended.

In addition, construction plant is subject to the requirements of the Noise Control Act and Regulations.

Interest in the construction operations may also help to offset some of the nuisance aspects which may be associated with construction noise.

7.7.2 Operation Phase

The effects of noise associated with traffic on the Bypass have been assessed using the British noise prediction model, "Calculation of Road Traffic Noise" (CORTN) for the year 2000, that is, approximately ten years after its opening. Levels at the time of opening are likely to be 2-3 dBA less. Predicted L10 levels have been calculated at a large number of locations. The noise parameter most generally used in traffic noise assessment is L10 (18 hr) dBA. This is the average L10 level in dBA, 6am to midnight during a normal weekday. The noise level during the most sensitive hours (ie, evenings, night time, and weekends) is generally lower than L10 (18 hr).

The following noise level criteria are being considered in determining where noise reduction measures are justified.

(a) The NSW State Pollution Control Commission environmental goal of 60 dBA (L10, 18 hr) for new houses and roads. This environmental goal has been reviewed by an inter-departmental committee which has recommended, as an interim environmental design goal for new arterial roads, a level of 63 dBA in the L10, 18 hr scale, recognising that even applying all feasible and cost-efficient methods of noise reduction that level is not always achievable. Generally the nearest houses along major roads are exposed to noise levels significantly higher than 63 dBA.

(b) The Department of Main Roads' Noise Policy, which provides for the consideration of noise reduction measures only when the L10, 18 hr estimated noise level is:

(1) 68 dBA or greater and has risen by at least 2 dBA; or

(2) 63 dBA to 68 dBA and has risen by at least 15 dBA, ie, at a previously "quiet" location.

This policy also states that, generally, where the building in question was built or purchased by the current owner after the road proposal was first made known publicly, then the provision of noise reduction measures may not be considered to be justified.

Planning for the proposed Bypass began many years ago, before subdivision of the adjoining land occurred (see Section 3.1). This allowed opportunity for many of the environmental effects of the Bypass to be taken into account and minimised in the subdivision and building design. The effect of traffic noise can be considerably reduced by having less noise sensitive rooms, such as laundries and bathrooms. and no or only small windows facing the proposed new road. This apparently has occured for the majority of the houses adjacent to the road reserve. However, the Department is examining warranted noise reduction measures along the Bypass for final design, and will take into account representations made in response to the public exhibition of this Environmental Impact Statement.

Noise levels have been predicted for each section of the Bypass and are summarised below with some detail of possible attenuation treatments where considered to be warranted. All noise levels given are L10 (18 hr), dBA.

Pacific Highway (7.3km) to 7.8km

This section of the proposed Bypass is mainly at ground level. Existing noise levels near the road reserve are just under 60 dBA (see Figure 6.9). The vegetation cover of the adjoining buffer reserves will reduce the estimated traffic noise level to below 60 dBA at the Gateshead High School, the bowling club, and at the nearest houses. No noise reduction treatment is proposed. WILL PART OF THIS SECTION BE REZONED TO THAT SUGGESTED BY DEPT. MINERAL RESOURCES? (APP. B-3)

7.8km to 8.6km (Willow Road)

Along the western boundary the residential subdivision has been set back from the road reserve but some of the nearest houses face the proposed Bypass. Their estimated noise levels are 62-64 dBA. Land use along the eastern boundary is Open Space, except at Redwood Place.

Willow Road to Warners Bay Road

Along the eastern boundary, the Mahogany Crescent residential subdivision has not been set back from the road reserve but Whitburn Close has. The estimated maximum noise level for the closest houses in Mahogany Crescent is 64 dBA while for Whitburn Close it is 61 dBA.

Along the western boundary the residential subdivision has been set back. However, due to the nature of the terrain, the estimated noise level for the closest houses is 63-64 dBA.

A measured existing noise level at the road boundary was 50.5 dBA.

Warners Bay Road to Hillsborough Road

At present most of the adjoining land use zonings are either Open Space or Rural. This section of adjoining land uses will be partly shielded by cut batters. The golf course noise level will be below 60 dBA. Noise shielding can be incorporated into the development of the currently undeveloped land.

Hillsborough Primary School and Glendon Special School are situated at the junction of the road reserve and Hillsborough Road. The predominant existing noise source is traffic using Hillsborough Road, giving a reading of 57 dBA at the Primary School. The estimated traffic noise level at the closest building of this school is 64.5 dBA, emanating mainly from Hillsborough Road. Hillsborough Primary School has been well designed to reduce traffic noise from the Bypass.

Hillsborough Road to Myall Road

At the nearest houses in Leroy Crescent and Robina Drive (north of Hillsborough Road) the estimated noise levels are 60-61 dBA. For the houses in Blackbutt Parade which back onto the road reserve, estimated noise levels will range from 65 to 71 dBA. A 2m high acoustically opaque fence, 0.5m taller than the existing paling fence, would not achieve a large noise reduction.

On the western side of the road reserve south of Myall Road there is a proposed residential subdivision, an existing house recently built near the road reserve, and a nursing home. Estimated noise levels range from 64 dBA for the nearest subdivision block, 66 dBA at the nursing home, to 71 dBA at the new residence. It is possible that either a 2m high acoustic fence could be used at some locations to restrict the predicted noise levels. For other roadside land which is undulating and undeveloped, feasible treatments for noise reduction will be further investigated during the final design process.

Myall Road to Lookout Road

The road reservation is restricted in width through this built up area and houses back onto the reserve on both sides (in Charlestown Road and Marshall Street). The estimated noise levels at the rear of these houses ranges from 64 dBA on the eastern side to 72 dBA for the closest houses on the western side. A 2m high acoustically opaque fence on the eastern boundary, and beside the shoulder of the Bypass for the western side, would help to restrict the predicted noise levels.

7.8 AIR QUALITY

For the existing route of State Highway 23 (Ida Street and Charlestown Road) and part of the Pacific Highway between Windale and Charlestown, air quality will improve with construction of the Bypass. It is anticipated that a substantial proportion of the traffic flow on the Pacific Highway and Charlestown Road will divert to the Bypass with its free flow traffic conditions. This will benefit the 300 houses which front the Pacific Highway and Charlestown Road between Windale and Garden Suburb, as well as the four schools and shopping centre along the subject section of the Pacific Highway. On initial opening, it is anticipated that 24% of traffic on the adjacent section of the Pacific Highway, and 46% on Charlestown Road, will divert to the Bypass. By the year 2010 these figures will increase to 44% and 65%, respectively.

Some concern has been expressed about the effect of carbon monoxide fumes on children attending the Hillsborough and Garden Suburb Public Schools and Glendon Special School.

For the corridor along the proposed Bypass, there will be some increase in the existing amount of vehicle emissions to the atmosphere. However, the distance between the adjoining properties and the Bypass carriageways will be much greater than for the existing highway route, and the traffic will be free flowing. This means that the amount of emissions along the Bypass will be minimised and there will be greater opportunity for dispersion.

The rate of dispersion is largely dependent upon certain meteorological parameters. Surface wind patterns at Maryville Meteorological Station indicate that wind direction is well distributed throughout the year, with seasonal variations. Afternoon winds have been recorded as being calm for only two percent or less of the time for all seasons except winter, for which ten percent calm has been recorded. Since winds help to prevent the formation of stable atmospheric conditions which restrict dispersion of automobile emissions, the potential for the concentration of emissions from vehicles using the Bypass is low.

Rainfall data from Maryville shows roughly equal number of days of rain in the four seasons, and on average, on more than a third of all days in a year. Rain days help to wash pollution from the air.

In addition, since more stringent emission control standards on motor vehicles were introduced in 1986, no significant adverse air quality effect is anticipated with the operation of the proposed Bypass.

7.9 LAND USE AND COMMUNITY STRUCTURE

(i) Zoning

Roads are not prohibited uses under the Lake Macquarie LEP and the Northumberland Planning Scheme. The proposed Bypass, where it is confined to the existing road reservation between Windale and Kotara, does not necessitate rezoning of the land for road purposes. Some affected land presently outside the original road reservation will require the preparation of a new local environmental plan for rezoning to arterial road.

(ii) Land Use

Land uses which have operated within the Bypass reservation under special lease arrangements will cease. It may be possible for some of these activities to arrange Crown Land leases. Land uses on either side of the Bypass will not be affected by its construction.

(iii) Community Structure

Community severence is not anticipated once the Bypass is operational. The road reservation has existed for so many years that suburbs have developed on either side of the reservation assisted by an efficient road system. All existing cross-road links will be maintained for vehicles, pedestrians and cyclists. In addition, a subway under the Bypass near Windale will maintain the existing pedestrian/cycleway. Travel by school children to various schools in the study area will not be impeded or altered in any way, nor will travel to shopping centres or workplaces. Informal walking tracks across the Bypass reservation will be interrupted by the Bypass but sufficient cross-Bypass pedestrian access will be provided.

7.10 TRAFFIC PATTERNS AND ACCESSIBILITY

Changes in traffic patterns due to anticipated residential and industrial growth in Cardiff, Wallsend and Windale will have a significant impact on the existing road network. In particular, both Pacific Highway, Ida Street and Charlestown Road will be required to carry most of the additional traffic. These roads become congested under existing traffic conditions at certain times and it is likely that some collector and local roads such as E.K. Avenue will attract some of this traffic growth.

Construction of the West Charlestown Bypass will provide a high standard north/south corridor linking the growth of these areas and reducing the traffic impact on the existing road network.

As discussed in Section 3.3, full "at grade" or "grade separated" interchanges will be provided to all of the roads severed by the Bypass except at Willow Road, Gateshead which will pass over the Bypass on a bridge. Overall accessibility of all suburbs served by these roads will be improved significantly.

Pedestrians will be accommodated at each of the "grade separated" interchanges while a pedestrian/bicycle subway will be provided near the Lake Road/Pacific Highway intersection. Cyclists will benefit also from the inclusion of a special on-road cycle way along almost the full length of the Bypass.

7.11 VISUAL APPEARANCE, LANDSCAPING AND REVEGETATION

The Bypass will affect the scenic quality of the corridor for residents with bushland and open views, which will generally change to one of a busy road. Visual appearance for the road user will be different from the existing highway routes along the Pacific highway. Ida Street and Charlestown Road. The integration of bushland and residential areas adjoining the Bypass reservation with a well designed landscaped Bypass will be an improvement to the existing congested roads.

Visual impacts associated with the construction of the Bypass have been identified by Bruce Mackenzie and Associates (Figure 7.2). Some properties in Mahogany Crescent could be affected by the Bypass which will be on 6.5m of fill above the existing ground level. The natural profile of the land may add up to another metre to the perceived height. In this location the existing vegetation has been cleared for approximately 15m behind the fence line of these houses. Regrowth of vegetation in this area should be allowed.

Proximity of the Bypass rather than its scale will cause significant visual impact to the Garden Suburb Nursing Home and to a lesser degree on Garden Suburb Public School.

Houses along the section of the Bypass from Myall Road to the Charlestown Road connection will experience most visual impact of the Bypass. Corridor width in this location is restricted, and proximity and scale of roadworks are the major impacts.

Due to time constraints the Consultant was unable to prepare a comprehensive landscape program for inclusion in this study. A further report is being prepared to suggest methods to ameliorate the adverse impacts identified and enhance visual opportunities.

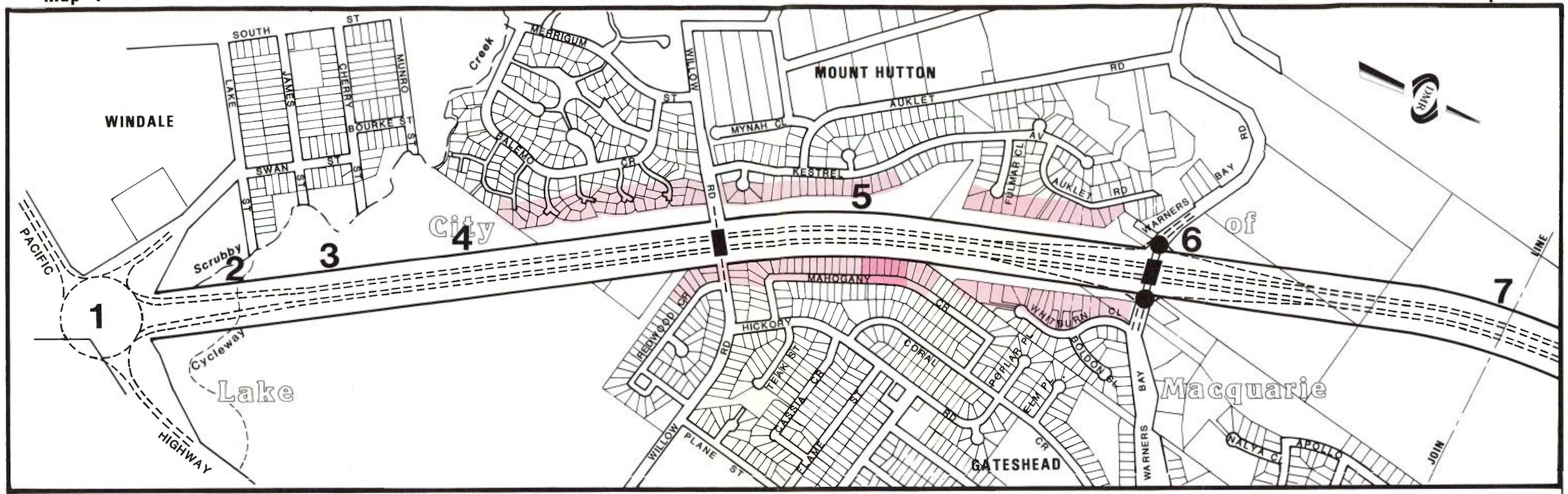
While no landscape program is available, it is the Department of Main Roads' policy to retain as much existing vegetation as possible, as a buffer between the roadway and residential areas, and to revegetate where practicable with local native plant species to assure that the aesthetic qualities of the corridor are not significantly diminished.

7.12 PUBLIC UTILITIES

A number of utility services will be intercepted or traversed by the proposed Bypass. These include power lines, water mains, sewerage and telecom plant and no significant environmental impacts will result from these works. All these and other utilities affected will be subject of consultation with the responsible Authorities during completion of final design plans.

Map 1

Map 1



Map 2

Map 2

Moderately Affected

Significantly Affected

Proposed Roundabout

Proposed Bridge

2 Landscape Area Classification (Refer To Text)

0 100 200 300 400 500 m

FIGURE 7.2
VISUAL IMPACT

7.13 ECONOMIC EFFECTS

Traditionally, concern is expressed when a bypass of an existing town is proposed. This is due to the possible loss of highway generated trade and thus a decrease in employment opportunities in businesses serving motorists.

Charlestown Chamber of Commerce was approached in the preparation of this document but unfortunately no advice has been received to indicate any impact the proposed Bypass may have on viability of Charlestown businesses. No study was commissioned to assess the economic impact of the Bypass on Charlestown, so only general comments can be proffered at this stage as to the likely impact of the Bypass.

It is considered Charlestown is in a strategic location on the Pacific Highway. As it is an important regional centre of Newcastle with further growth proposed, any potential loss of highway trade after the Bypass is completed, should be minimal. Traffic studies for this document indicate that 5% of traffic currently using the Pacific Highway, Ida Street and Charlestown Road will use the Bypass. This would be through traffic which may or may not stop in Charlestown at present. Remaining traffic is regionally generated and it would be correct to infer that no adverse economic impact will be experienced in Charlestown.

7.14 SPILLAGES OF MATERIALS IN TRANSIT

In the event of a spill becoming known to the Department before the Police or Fire Brigade are at the site, normal practice would include identifying the spilt material, and if categorised as 'dangerous' (i.e, toxic or highly flammable), referring the matter to these agencies for their action until the site is declared safe for clean-up operations to be commenced by the Department. Vehicles transporting hazardous cargos are required by law to have the appropriate substance identification placards affixed.

The Police Department is able to call on the services of the Fire Brigade on any main road in New South Wales to combat the effects of a spill and the Department's role is then to clean the pavement and restore it to a trafficable condition after the site has been decontaminated or declared safe.

Materials spilt in transit which are not toxic and/or highly flammable may be cleaned up by the Department without the aid of the Police or Fire Brigade. Depending to an extent on the magnitude and location of the spill, the following procedure will generally be adopted in those situations:

(a) Confine the spilt material, prevent it from flowing into the drainage system and prevent traffic from transferring it to other areas.

(b) Recover the spilt material for disposal, where practicable.

(c) Clean and restore the pavement to its pre-spill condition.

The normal procedure for cleaning a road involves the use of sand and a stock pavement cleaner.

7.15 CUMULATIVE EFFECTS

With the safeguard measures outlined in this Section there will be no significant cumulative impact on the environment.

8. ENERGY STATEMENT

8.1 ENERGY NEEDED TO ESTABLISH PROJECT

Over the five year construction period planned for the West Charlestown Bypass, it is estimated that construction equipment will use the following amounts and types of fuel to complete the project:

Diesel fuel oil (distillate)	2.4 million litres
Petrol	0.1 million litres

or the equivalent of 95,600 gigajoules of energy.

Once the road has been constructed only periodic maintenance will be required for continued operation.

No account has been taken of the relative energy contents of the pavement materials expected to be used. While there are differences in energy contents per tonne of the basic and prepared materials, the choice of materials eventually used in the pavement is based generally on economic and durability factors. These factors take no major account of the energy content comparisons in arriving at the eventual pavement type chosen.

8.2 ENERGY SAVINGS

When the Bypass is opened to traffic the amount of energy used during construction will be offset by savings in liquid fuel consumption due to the slightly shorter travel distance and the improved operating conditions. The journey between Windale and Rankin Park will be approximately 0.7km shorter via the Bypass, and the stop-start, slow conditions associated with traffic signals and congestion on the Pacific Highway will be avoided.

The most economic fuel consumption for operating motor vehicles is achieved when the average steady speed is maintained between 40 and 60 km/h and there is little change in speed. These ideal conditions will be possible with the Bypass. Frequent acceleration and deceleration, together with stop-start conditions on the existing route, result in an energy consumption penalty. This fuel consumption penalty can range from 10 to 50%, depending on the level of congestion.

Using the shortened distance and a 20% penalty rate. but not the benefits from improved grades, the projected 1990 traffic volumes indicate an annual saving of approximately 76,000 litres of distillate and 395,000 litres of petrol, or the equivalent of 20,000 gigajoules of energy. At this rate the liquid fuel used in constructing the Bypass would be offset by fuel savings in just under five years. Since the amount of traffic using the Bypass will increase, the rate of fuel savings will also increase with time.

8.3 ENERGY SOURCES STERILISED

As advised by the Department of Mineral Resources, conglomerate (gravel) and coal resources do occur beneath the proposed Bypass. Some of the conglomerate within the road corridor could be used in road construction. The conglomerate beds are part of the Newcastle Coal Measures exposed at the northern end of the Bypass, near Carnley Avenue.

Known open cut (surface) coal resources will be unaffected. Some potential underground coal resources underlie parts of the Bypass route but there does not appear to be any conflict with coal resource development. The opportunity to mine this resource has been severely restricted by the proximity of urban development and the associated problems of subsidence.

9. SUMMARY ASSESSMENT

In assessing the impacts associated with constructing the West Charlestown Bypass between Windale and Kotara, comparison has been made between doing nothing, instituting traffic management procedures and upgrading Ida Street and Charlestown Road. The "do nothing", traffic management procedures and upgrading of the existing State Highway 23 between Charlestown and Kotara would not relieve congestion and improve traffic flow on major roads in Charlestown. Also, the potential decrease in numbers of accidents, savings in lives and fuel consumption would not be realised. A summary of the main effects of constructing the Bypass follows.

For the natural environment, there are potential erosion problems with the soils of the area, and consequent sedimentation problems in streams leading to Lake Macquarie and Jewells Swamp. Both temporary and permanent erosion control measures will be designed into the project to address these problems.

Air pollution is not considered to be a problem in the vicinity of the proposed Bypass although several residential areas will be nearby. Prevailing winds and rain should normally prevent any concentration of pollutants. Reasonable grades and free-flowing traffic conditions will help to minimise vehicle emissions. Diversion of through traffic away from Charlestown will reduce vehicle emissions resulting from congested road conditions.

The main impact on vegetation and fauna will be the loss of approximately 60 hectares of native vegetation. Removal of native vegetation is not considered of significance on a statewide or regional basis, considering the size of the reduction and the present condition of the communities. The long term effect of clearing for roadworks will be mitigated by retention of natural vegetation wherever possible and landscaping, keeping in mind that much of the adjacent bushland will be removed for housing development.

Potential impacts on fauna species were identified as increased disturbance to habitat, traffic noise, vehicle emissions and road runoff and reduction of wildlife corridors. These impacts will be mitigated by fencing of the road boundary and retention of as much vegetation as possible together with revegetation with native locally occuring species.

For the human environment, the effects will be those of change and cannot be described as beneficial or adverse apart from noise and proximity impacts. The road reservation which has existed for many years will be used to construct the Bypass and land use planning and development can proceed in the knowledge of the exact road boundaries. Job opportunities will be created by the proposed construction. Private individuals, commerce and industry will be able to gain direct benefits from the improved accessibility within Newcastle and its environs and easier passage of through traffic. These benefits will result from reduced accident potential, improved travel times and energy savings. Calculation of the cost and benefits involved indicate benefits amounting to $7M in the first year of full operation and a benefit/cost ratio of 1.32.

It is estimated that four residences will need to be demolished in order to construct the bypass. A further 150 properties with houses would be within 100 metres of the Bypass and occupants may experience some proximity effects.

Efforts are being made in planning the location and construction of the highway to minimise adverse impacts upon both the natural and the built environments, while maximizing the community benefits to be gained. It is considered that all significant environmental effects have been identified. In summary, it is concluded that construction and operation of the proposed section of highway can be undertaken in a manner which is environmentally acceptable, and that the benefits to be gained at the local and regional levels are substantial.

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APPENDIX A

REQUIREMENTS OF THE DIRECTOR, DEPARTMENT OF ENVIRONMENT AND PLANNING

New South Wales Government

Department of Environment and Planning

Remington Centre
175 Liverpool Street, Sydney 2000
Box 3927 G.P.O. Sydney 2001
DX. 15 Sydney

Telephone: (02) 266 7111 Ext 7234

Contact: S. Jones

Our reference: 82/813

Your reference:

The Secretary,
Department of Main Roads,
P.O. Box 198,
HAYMARKET. N.S.W. 2000

Attention: Mrs. Ross

Dear Sir,

STATE HIGHWAY NO.23 -
CITIES OF LAKE MACQUARIE AND NEWCASTLE. WEST CHARLESTOWN BYPASS - WINDALE TO KOTARA. ENVIRONMENTAL IMPACT STATEMENT

Thank you for your letter of 21 July, 1986 indicating that you are consulting with the Director with regard to the preparation of an environmental impact statement (EIS) for the above development.

2. An EIS is required to be prepared where the proposal is an activity referred to in Section 112(1) of the Environmental Planning and Assessment Act, 1979. The EIS shall be prepared in accordance with clause 57 of the Environmental Planning and Assessment Regulation 1980, as amended and shall bear a certificate required by clause 59 of the Regulation (see Attachment No.1).

3. It is acknowledged that this proposal is the result of long term planning for the Newcastle Region to improve the accessibility structure of metropolitan Newcastle, as well as providing safer traffic arrangements at Charlestown. The proposal is in conformity with strategy 34 of the Hunter Regional Plan No.1, provisions of the Lake Macquarie Local Environmental Plan, 1984, and the State Government's, "Newcastle Region Road Improvement Program 1985-1992". Accordingly, the Director, pursuant to Clause 58 of the Regulation, has only the one matter listed below which should be specifically addressed in the EIS:

. possible mine subsidence

4. Attachment No.2 is a guide to the type of information most likely to be relevant to the development you propose; not all of the matters raised therein may be appropriate for consideration in the EIS for your proposal; equally, the guide is not exhaustive.

5. When an adequate EIS has been prepared for the subject proposal, as determining authority, you should then proceed with the matter in accordance with Sections 112 and 113 of the Act, and place the document on public exhibition. The procedures for public display that are to be followed by the proponent and/or determining authority are as in clauses 60 to 64 of the Environmental Planning and Assessment Regulation, 1980.

6. When the EIS is completed, three copies should be forwarded to the Secretary pursuant to Section 112(2) of the Act, as well as details of the exhibition period and public display locations. Pursuant to Clause 62(2) of the Regulation, the Department requires 20 additional copies of the EIS for the purposes of sale to the public from its Newcastle office.

7. Should any submissions be made during the period of public exhibition, it is advised that such submissions should be forwarded to the Secretary in accordance with Section 113(3) of the Act. In the event of issues of interest to the Department being raised in any submission received, the Department will advise you accordingly.

8. Should you require any further information regarding this matter please do not hesitate to contact us again.

Yours faithfully,

1/9/86

C.J. Wright
Manager, Assessments Branch
Delegate for the Director

DEPARTMENT OF ENVIRONMENT AND PLANNING
ATTACHMENT No.1

STATUTORY REQUIREMENTS FOR ENVIRONMENTAL IMPACT STATEMENTS.

In accordance with Part V of the Environmental Planning and Assessment Act,1979, an environmental impact statement (EIS) must meet the following requirements:

Pursuant to clause 57 of the Environmental Planning and Assessment Regulation,1980, as amended:

(1) An environmental impact statement referred to in section 112 (1) of the Act shall be prepared in written form and shall be signed by the person who has prepared it.

(2) The contents on an environmental impact statement refered to in subclause (1) shall include the following matters:-

(a) a full description of the proposed activity;

(b) statement of the objectives of the proposed activity;

(c) a full description of the existing environment likely to be affected by the proposed activity, if carried out;

(d) identification and analysis of the likely environmental interactions between the proposed activity and the environment;

(e) analysis of the likely environmental impacts or consequences of carrying out the proposed activity (including implications for use and conservation of energy);

(f) justification of the proposed activity in terms of environmental, economic and social considerations;

(g) measures to be taken in conjunction with the proposed activity to protect the environment and assessment of of the likely effectiveness of those measures;

(g1) details of energy requirements of the proposed development and measures to be taken to conserve energy;

(h) any feasible alternatives to the carrying out of the proposed activity and the reasons for choosing the latter;

(i) consequences of not carrying out the proposed activity.

The EIS must also take into account any matters required by the Director of Environment and Planning pursuant to clause 58 of the Regulation, which may be included in the attached letter.

The EIS must bear a certificate as required by clause 59 of the Regulation.

DEPARTMENT OF ENVIRONMENT AND PLANNING
ATTACHMENT No.2

ADVICE ON THE PREPARATION OF AN ENVIRONMETAL IMPACT STATEMENT (EIS) FOR A MAJOR ROAD DEVELOPMENT IN AN URBAN/SUBURBAN ENVIRONMENT

Pursuant to S112 of the Environmental Planning and Assessment Act,1979, where a proposal is a prescribed activity or where a proposal is likely to significantly affect the environment, a determining authority must, before deciding whether to proceed with the proposal, consider an EIS prepared in respect of the proposal.

It is the responsibility of the determining authority to decide whether an EIS is required (unless the proposal is a prescribed activity). While the site characteristics largely determine the need for an EIS to be prepared, in general major road developments in an urban/suburban environments have the potential to create problems for local residents and landholders due to land resumption/demolition, loss of access, noise generation, lighting problems, impacts on urban bushland, visual amenity, traffic arrangements during construction, local and regional traffic flows, and local commercial interests.

The purpose of this paper is to outline various issues relevant to the preparation and consideration of an EIS for such major road developments. It is intended to assist the preparation of the EIS. It is the applicant's responsibility to identify and address, as fully as possible, the matters relevant to the specific development proposal in complying with the statutory requirements for EIS preparation (see Attachment No.1).

The matters nominated in this paper are not intended as a comprehensive identification of all issues which may arise in respect of such a major road development. Some of the issues nominated may not be relevant to a specific proposal. On the other hand, there may be other issues, not included, that are appropriate for consideration in the EIS.

Information provided should be clear, succinct and objective and, where appropriate, be supported by maps, plans, diagrams or other descriptive detail. The purpose of the EIS is to enable members of the public, the determining authority and the Department of Environment and Planning to properly understand the environmental consequences of the proposed development.

1. Description of the proposal.

The description of the proposal should provide general background information on the location of the proposed road works, particularly in relation to, and compatibility with,

the arterial and local road network and any traffic management schemes in force or proposed and including the criteria used for route selection. It should provide an indication of adjacent developments, and land use activities, as well as details of the site, land tenure, zonings and relevant forward planning proposals, and any other land use constraints including natural and built environmental features sensitive to the impact of the proposal.

It may also be appropriate for the EIS to describe statutory procedures for implementing the proposal.

This section should provide specific information on the nature, intent and form of the development. Particular details that may generally be relevant include:

- The form and physical dimensions of the proposed roadworks, including locations and dimensions of bridge and elevated or subsurface structures and associated facilities including proposals for drainage and ventilation.
- Earthworks involved including details of cut and fill and balancing of volumes proposed.
- Presence of median strips, barriers to pedestrians, and grade separation proposals at intersecting roads.
- Alterations to access to adjoining properties.
- Resumptions and or demolitions required of existing development to accommodate the proposed road.
- Construction problems envisaged including staging of works, source and transport and assembly of plant and materials, employment details, access arrangements, alternative routes and traffic management proposals for local and through traffic, and hours of operation for demolition/construction works etc.
- Provision of facilities for under/over passes for pedestrians, cyclists etc.
- flood prevention measures
- Safeguards to control erosion and siltation.
- rehabilitation proposals on completion including any relevant landscape plans.

2. Description of the Environment.

This should provide details of the environment in the vicinity of the development area and also of aspects of the environment likely to be affected by any facet of the proposal. In this regard, physical, natural, social and economic aspects of the environment should be described to the extent necessary for assessment of the environmental impact of the proposed development. In particular:

- Geography, topography, geology and geotechnical data, meteorology, hydrology etc.
- Noise and air quality where appropriate for impact consideration
- Aesthetics.

. Flora and fauna including open space and urban bushland etc.
. Utilities and communications.
. Buildings having architectural/heritage significance.
. Existing traffic levels and traffic flow patterns.
. Socio economic aspects including local commercial activities.

3. Assessment of Alternative Routes.

The EIS should include a proper assessment of the alternative routes considered in the feasibility study for the proposal including the key physical and engineering constraints as well as the environmental and economic factors pertinent to same including clear reasons for rejecting such alternatives in favour of the recommended proposal. Reference should be made herein to any existing road reservations and background decisions relating to their location.

4. Analysis of Environmental impacts.

Environmental impacts usually associated with a major road development in an urban/suburban environment and related activities listed below. Where relevant to the specific proposal, these should be addressed in the EIS, taking into account the adequacy of safeguards proposed to minimise them both during construction and when in use after completion :

. Likely noise disturbance caused by the construction of the road, and by traffic operating on the completed roadway, on any nearby residential and commercial buildings. A map depicting anticipated noise contour levels in relation to residences and inhabitants involved may be necessary. Consideration should be given to both existing and proposed residential developments for such an analysis.
. Emission of air pollutants from vehicular traffic affected by the proposal, and their impact on the local and regional environment.
. Stormwater runoff and erosion and siltation potential.
. Impact on natural vegetation and faunal movement, flood plains, drainage patterns, (particularly sedimentation from construction activity).
. Subsidence potential.
. Visual impact, particularly on residential developments by both day and night taking into account the following effects of the proposed road :

    - Scale in relation to the natural landscape and adjacent residential and commercial development
    - Appearance from nearby and afar.
    - Lighting effects on existing and proposed residential/commercial buildings.

- Carriage of hazardous goods on vehicles, spillage potential and provisions for emergency clean up.
- Changes in traffic patterns and improvements to limit accident potential
- Impacts of traffic at entry/exit points.
- Impact on historic buildings and matters of heritage/ archaeological interest.
- Effect on commercial operations changes in community characteristics caused by severence.

In addition, any potential for hazard or risks to public safety and any proposal to monitor and reduce environmental impacts should be included.

5. Contact with relevant Government Authorities.

In preparing the EIS, it is suggested that authorities, such as those listed below, should be consulted and their comments taken into account in the EIS.

- The State Pollution Control Commission in regard to air, water and noise impacts and relevant pollution control legislation requirements.
- The Traffic Authority with regard to traffic and road development aspects and the Urban Transport Authority with regard to public transport aspects.
- Any servicing authorities which may be required to supply water, power, etc.
- The Heritage Council of NSW if the proposal is likely to affect any place or building having heritage significance for the State.
- Local Councils through whose areas the road passes.

It is the responsibility of the person preparing the EIS to determine those Departments relevant to the proposed development.

5. Supporting information.

The EIS should refer by suitable appendices to all relevant studies/investigations that have been carried out in support of the proposals. This supporting documentation should be made available during the period of public display of the EIS.

APPENDIX B

CONSULTATION WITH OTHER AUTHORITIES AND ORGANISATIONS

APPENDIX B

CONSULTATION WITH OTHER AUTHORITIES AND ORGANISATIONS

Various State and Local Government authorities and other organisations were contacted by letter requesting their comments on the proposed West Charlestown bypass. The comments received are summarised as follows:

ORGANISATION	COMMENTS
Board of Fire Commissioners	-
Charlestown Chamber of Commerce	-
Department of Education	The Department would like to comment on the EIS when it becomes available.
Department of Environment and Planning (Newcastle)	Regional planning investigations confirm a continuing need for improved arterial road links in this part of the Newcastle urban area. Promoted residential infill in the north eastern part of the City of Lake Macquarie together with expected intensification of activity in the Charlestown commercial centre make this stretch of the north-south bypass route an important part of an efficiently functioning urban area. The Department has recognised the general need to upgrade this corridor and provide traffic relief at Charlestown centre as part of the Hunter Regional Environmental Plan, and supports in principle the development of this route. Since the proposal is confined to the existing road reservation between Windale and Kotara South, rezoning procedures would appear not to be necessary in this proposal, which has had general public acceptance as to location for some time.
Department of Health	-

Department of Housing

The Department has a number of existing and proposed housing sites adjoining and near the proposed bypass and is interested in the bypass design.

Several matters need to be dealt with in the EIS.

i) Environmental Impacts

- Adequate noise attenuation devices and visual screening should be incorporated into the road reserve, so that the bypass does not affect Department housing seriously. Includes satisfactory noise levels at building facades, reducing visual encroachment of the bypass and maintaining privacy in adjoining backyards.

- Lake Macquarie Council requires that developments which adjoin the bypass reserve provide a 30m buffer strip between residential housing and the reserve boundary. This would be excessive if the DMR provides a buffer landscaped area within the road reserve.

- The EIS should address the problem of buffer zones, etc to avoid sterilisation of otherwise valuable residential land.

(ii) Accessibility

- Existing roads and significant pedestrian routes should be retained.

- Consideration should be given to safe pedestrian access to and from Hillsborough and Garden Suburb Public Schools.

(iii) Disposal of Stormwater

- Department is concerned with the method of stormwater disposal into its developments. Drainage falls naturally from some sites to the bypass. The Department would be concerned that disposal of stormwater from its sites into the bypass reserve is achieved at a least cost method to the Department and that allowance be made for ingress of urban stormwater onto the bypass.

(iv) Servicing Options

- Options for servicing the Department's proposed sites (eg water and sewer) are not adversely affected by the bypass.

Department of Mineral Resources

The proposed route will not adversely affect any known metallic or non-metallic mineral resources. Conglomerate (gravel) and coal resources do occur beneath the proposed route.

Consideration might be given to using some of the conglomerate as road base or fill. Conglomerate beds, part of the Newcastle Coal Measures, are exposed at the northern end of the bypass where it is proposed to join Carnley Avenue.

Open cut (surface) coal resources will not be affected. Some potential underground coal resources (within the Newcastle Coal Measures) underlie parts of the route and consultation should take place regarding subsidence at the detailed design stage. A suggested minor route change to minimise any conflict with coal resource development was made.

Department of Sport and Recreation	-
Electricity Commission of NSW	-
Heritage Council of NSW	-
Hunter District Water Board	Existing water mains cross the proposed Highway and approximate positions were shown on a plan. Need for mains to be upgraded, relocated or replaced will depend on final road design and their condition. A future main crossing will be required along Myall Road and possibly Hillsborough and Warners Bay Roads. Provision for the location of a trunk water main along the route of the highway from Park Avenue to Warners Bay Road and from Warners Bay Road to the Pacific Highway, would be of significant value to the Board. Sewer mains cross the proposed bypass route at five locations. Several sewers require amplification and all may require protection and alteration. Cost of such work will be subject to normal arrangements.
Hunter Valley Conservation Trust	Most of the proposal is outside the Trust District. It assumes that the DMR will make every effort to limit soil erosion and sedimentation by preventing disturbance to watercourses and wetlands and by minimising the loss of native vegetation.
Joint Coal Board	-

Lake Macquarie City Council

Warners Bay Road (Main Road No 325), Hillsborough Road and Myall Road are extremely important distributors to and from the urban areas at the northern end and west of the Lake and their connection to the bypass is vital and will allow better traffic distribution via Carnley Avenue to and from the Kotara/Newcastle inner city areas.

It is anticipated that access from Lake Road. Windale onto the bypass will be incorporated in the design of the junction of the bypass with the Pacific Highway. Lake Road is an important connection via Lake Street and South Street to the suburbs of Windale, Gateshead West, Tingira Heights and part of Mount Hutton.

It is requested that consideration be given to pedestrian and bicyclists movement in the planning and design of the junction of Lake Road, Pacific Highway and the bypass or by some other alternative proposal across the bypass.

Willow Road is a bus route and provides a very important connection between the newly developed area of Windale and the developing area in Mount Hutton with Gateshead and the access route to the Charlestown Shopping Centre. It is also a necessary access for school children to the various schools at Gateshead.

The drainage of the area which the bypass traverses will need to be carefully considered and co-ordinated to avoid flooding and possibly assist retention at Scrubby Creek, Winding Creek (at E K Avenue) and north of Hillsborough Road wherever possible. Some properties at the end of Lake Street, Windale, have been threatened by flooding in the past and the discharge under the bypass will need to avoid any worsening of this situation. Overall, the discharge from local drainage systems will need to be accommodated and connected where necessary into the drainage of the bypass. It is to be noted that a small retention basin exists in the Public Reserve between the bypass and Kestrel Avenue, Mount Hutton.

The proposed bypass traverses several areas zoned open space under Lake Macquarie LEP. Minimal disturbance of their margins is important within the context of Council's general interest in preserving these areas and in terms of the barrier they pose to various forms of environmental disturbance. This is especially important in the areas between Willow Road and Warners Bay Road, and behind Leroy close and Robina Drive, Hillsborough where open space reservations are particularly narrow and will afford only minor but important filtering of noise, dust and disruption of visual amenity during the construction phase and additional night-time disturbance by bypass floodlighting and vehicle headlights on completion.

Residences along Mahogany Crescent, Gateshead, Blackbutt Parade, Kotara Heights and the area southwest of the Myall Road intersection do not even have this buffer, but front directly onto the proposed bypass. The deterioration in their living environment needs to be addressed.

Variations in the quality and quantity of runoff delivered to Winding and Scrubby Creeks need to be examined carefully. The former drains into Cockle Creek and thence Lake Macquarie and Council is determined to ensure that no additional liquid or solid pollutants enter the Lake system. Scrubby Creek drains to a northern arm of Jewell's Swamp which enjoys additional protection as designated wetland No 864 under State Environmental Planning Policy No 14.

The Department might also check the status of land between the bypass and the north western portion of E K Avenue. This has previously been reserved as a potential school site by the Department of Education.

Lands Office

Attached a diagram illustrating areas of Crown Land adjoining proposal.

Has been aware of proposal and various reservations and projects (housing development) have been designed to cater for the motorway.

No special requirements need to be considered. Should there be a major deviation from the present route, the impact on the various reservations and housing projects should be addressed.

Mine Subsidence Board	A section of the proposal will require geotechnical investigations to be undertaken to determine the depth and extent of underground mine workings. The section is undermined by abandoned workings of the Newcastle Myall Colliery in the Australasian seam at very shallow depths. Road design will have to cater for the existence of these underground workings. Construction of the roadway must be approved by the Board and construction drawings must be submitted for approval prior to commencing construction.
National Parks and Wildlife Service	No aboriginal site will be affected by the proposed development. The Service has no objections on archaeological grounds to the development proceeding.
National Roads & Motorist's Association	Enclosed a brief report supporting the proposal in principle. The NRMA: . supports early construction of the bypass to freeway standards - the environmental consequences of not constructing the bypass are severe; . calls for investigation of the capacity and quality of adjoining links; . expresses its concern about the future function of Hillsborough Road; . would like to confirm that Willow Road will be maintained for through traffic.
National Trust of Australia (NSW)	No sites or items known to the Trust will be affected by the proposal.

Newcastle City Council	The proposal will separate Park Avenue from State Highway 23 but a link will still exist via Charlestown Road to both the Highway and Myall Road. These factors and the apparent lack of connection from State Highway 23 to Warners Bay Road or Hillsborough Road will reduce the attraction of the Highway - Carnley Avenue route for traffic travelling to and from Newcastle and maintain the attraction of the Park Avenue - Charlestown Road route for residents of Cardiff, Speers Point and other areas to the west. Considered desirable to provide connections to the Bypass at Warners Bay Road and Hillsborough Road.
Premier's Department	No information that would be subject to any effects by the proposed bypass.
Public Works Department	No objection to this route. The proposal results in a minor encroachment on Hillsborough Public School Site at the rear of the infants buildings. This matter should be pursued with Department of Education.
Shortland County Council	Council's 33kV, 11kV and Low Voltage mains cross the proposed bypass in five locations indicated on an attached plan. Estimates will be prepared on request if the poles and mains need to be relocated or for installation of underground mains. Any relocation or construction costs will be at the Department's cost.
Soil Conservation Service	The proposal does not directly affect, or is affected by, any works, property, activities or planning which comes under the Service's administration.

	The proposal will traverse drainage systems which flow into Lake Macquarie. There will be a critical requirement for road design to take account of land capability and erosion hazard criteria and for appropriate erosion and sediment control measures to be implemented during the construction phase.
State Pollution Control Commission	Prime concerns are the impacts of construction activities on water quality and the acoustic environment in the vicinity of residential premises. The EIS should identify where there is potential for these to be problems and the measures proposed to mitigate them. Road traffic noise control guidelines were enclosed.
State Rail Authority	No effect on operations of SRA.
Telecom	-
Tourism Commission of NSW	No aspect of the proposal would affect tourism in the area or tourist development. Continuation of the Newcastle bypass will be an asset to tourists travelling north who have no need to enter the Newcastle City area.
Traffic Authority of NSW	No specific comment to make.
Urban Transit Authority	-

Water Resources Commission	Design of the highway would be subject to the normal consultative procedures established between the Department and the Commission. The Department should advise any potential suppliers of gravel and sand that excavation of these materials from river banks or beds is subject to approval under the Rivers and Foreshores Improvement Act and the Environmental Planning and Assessment Act.

APPENDIX C

VEGETATION AND FAUNA HABITATS
SECTION 6.1.5 REFERS

TABLE 6.1 - VEGETATION COMMUNITIES OCCURRING ALONG THE PROPOSED BYPASS ROUTE

COMMUNITY	TREES			TALL SHRUBS			LOW SHRUBS			HERBS/GROUND COVER			COMMENTS
	COMMON SPECIES	Ht	% Cvr	COMMON SPECIES	Ht	% Cvr	COMMON SPECIES	Ht	% Cvr	COMMON SPECIES	Ht	% Cvr	
1													
Scribbly Gum, Smooth-barked Apple, Red Bloodwood Woodland-Open-forest	Eucalyptus haemastoma. Angophora costata, E.gummifera, E.capitellata	13-17	20-40	Juvenile tree spp.. Persoonia linearis. P.levis, Casuarina littoralis	2-5	5-10	Pea spp., Leptospermum flavescens, L.attenuatum. Banksia oblongifolia. B.spinulosa, Lambertia formosa, Lomatia silaifolia, Acacia myrtifolia, Pimelea linifolia, Epacris spp., Melaleuca thymifolia, Notolaea ovata, Xanthorrhoea sp.	1-1.5	50-80	Predominantly 1 Themeda australis, Stipa pubescens. Entolasia sp. with other ground species, such as Thysanotis tuberosis. Dampiera stricta. Scaevola ramosissima. and a number of orchid spp.		50-	Understorey 100 varies considerably according to the localised frequency and intensity of fire. Species of significance in the understorey include Tetratheca juncea and Hakea bakerana
2													
Scribbly Gum, Smooth-barked Apple, Red Bloodwood Woodland-cleared understorey	As for 1	17-20	20	Very occas-ional juvenile tree spp. or Casuarina littoralis	7	1	Very occasional Banksia spinulosa, Leptospermum attenuatum, Casuarina littoralis	1	1	Imperata cylindrica. Themeda australis between tracks Weeds present particularly in Area C			Ground cover apparently moved in Area A

TABLE 6.1 - VEGETATION COMMUNITIES OCCURRING ALONG THE PROPOSED BYPASS ROUTE

COMMUNITY	TREES			TALL SHRUBS			LOW SHRUBS			HERBS/GROUND COVER			COMMENTS
	COMMON SPECIES	Ht	% Cvr	COMMON SPECIES	Ht	% Cvr	COMMON SPECIES	Ht	% Cvr	COMMON SPECIES	Ht	% Cvr	
3													
Scribbly Gum, Smooth-barked Apple, Red Bloodwood Forest with Watercourse Elements	As for 1 plus E. piperita, E. robusta	13-17	60	Melaleuca sieberi?- juvenile eucalypts. Occasional Glochidion ferdinandi. M. linariifolia present near Western end	7	10	Leptospermum flavescens. L. juniperinum, Occasional to very occasional Banksia oblongifolia, Melaleuca thymifolia	2	0-60	Imperata cylindrica, Pteridium esculentum in patches, occasional Gahnia sp, sedges Adiantum aethiopicum and weed species such as Rubus sp., Verbena sp. Ageratina adenophora	1		Dry watercourse when surveyed - with running water only during wet periods. Generally disturbed. weed infested and severly affected by fire.
4													
Sydney Peppermint Forest	Predominantly E. piperita, with varying proportions of Angophora costata, E. gummifera, E. globoidea and Syncarpia glomulifera	17-20	40-70	Juvenile tree spp., Casuarina littoralis, Dodonaea triquetra, Pittosporum revolutum, Polyscias sambucifolia Acacia sp. Occasional Glochidion ferdinandi, Melaleuca spp. Weed spp. *	2-7	20-60	Leptospermum flavescens, L. juniperinum Pultenaea villosa, Banksia spinulosa, Weed spp. such as Verbena sp., Ageratina adenophora	1-1.5	30-40	Pteridium esculentum. Imperata cylindrica. Themeda australis, Pandorea, Pandorana. Eustrephus latifolius. Smilax glyciphylla, Lindsaea linearis Weed spp.	1-1.5	80-100	Occurs in gullies. Generally fairly disturbed. * Weed spp. such as Cinnamomum camphora. Lantana camara.

TABLE 6.1 - VEGETATION COMMUNITIES OCCURRING ALONG THE PROPOSED BYPASS ROUTE

COMMUNITY	TREES			TALL SHRUBS			LOW SHRUBS			HERBS/GROUND COVER			COMMENTS
	COMMON SPECIES	Ht	% Cvr	COMMON SPECIES	Ht	% Cvr	COMMON SPECIES	Ht	% Cvr	COMMON SPECIES	Ht	% Cvr	
5													
Sydney Peppermint forest with Watercourse elements	As for 4			Greater concentration of such species as Melaleuca sieberi?, Glochidion ferdinandi, Callistemon salignus plus Callicoma serratifolia, Ligustrum sinense Melaleuca linariifolia	5	10	Juvenile Glochidion ferdinandi Melaleuca spp. Dodonea triquetra	1.5 2	-20	Adiantum aethiopicum. Ranunculus plebeius, Viola hederacea, Polygonum sp.	1.5	80-	Very localised occurence along dry wartercourse
6													
Watercourse Community	Angophora costata, E. casuarina E. globoidea torulosa - above on edges Melaleuca linariifolia, Callistemon salignus	13-17 10	50 90-100	Callicoma serratifolia, Acmena smithii, Ficus coronata, Pittosporum revolutum plus weed species such as Ligustrum sinense and Cinnamomum camphorum	8	100	Juvenile tree and shrub spp.	1.5	10-20	Lomandra longifolia Adiantum aethiopicum Ranunculus plebeius?, plus weed spp. including Cinnamomum camphorum seedlings. Ageratina adenophoram and Tradescantia albiflora	0.3	10	Small flow of water through creek during survey period

TABLE 6.1 - VEGETATION COMMUNITIES OCCURRING ALONG THE PROPOSED BYPASS ROUTE

COMMUNITY	TREES			TALL SHRUBS			LOW SHRUBS			HERBS/GROUND COVER			COMMENTS
	COMMON SPECIES	Ht	% Cvr	COMMON SPECIES	Ht	% Cvr	COMMON SPECIES	Ht	% Cvr	COMMON SPECIES	Ht	% Cvr	
7 Degraded Water-course Community	Syncarpia glomulifera. Eucalyptus robusta, Salix * babylonica			Glochidion ferdinandi Melaleuca linariifolia. Weed species such as Lantana camara, Ligustrum sinense			Typha sp., Gahnia sp., Weed spp. such as Foeniculum vulgare						* Generally in localities outside the study corridor
8 Pastureland Grassland Regenerating Vegetation	Occasional E. gummifera, Angophora costata	13-17	5	Occasional* M. linariifolia Melaleuca spp. Acacia longifolia	5 3	1 50	Cassytha sp. M. linariifolia	1-2	50	Grass and weed spp. Typha sp. Phragmites	1-3	100	* In regenerating wet heath in Section D
9 Weed Infested Pastureland				Lantana camara, Acacia sp., Cinnamomum camphorum						Grass and weed spp.			

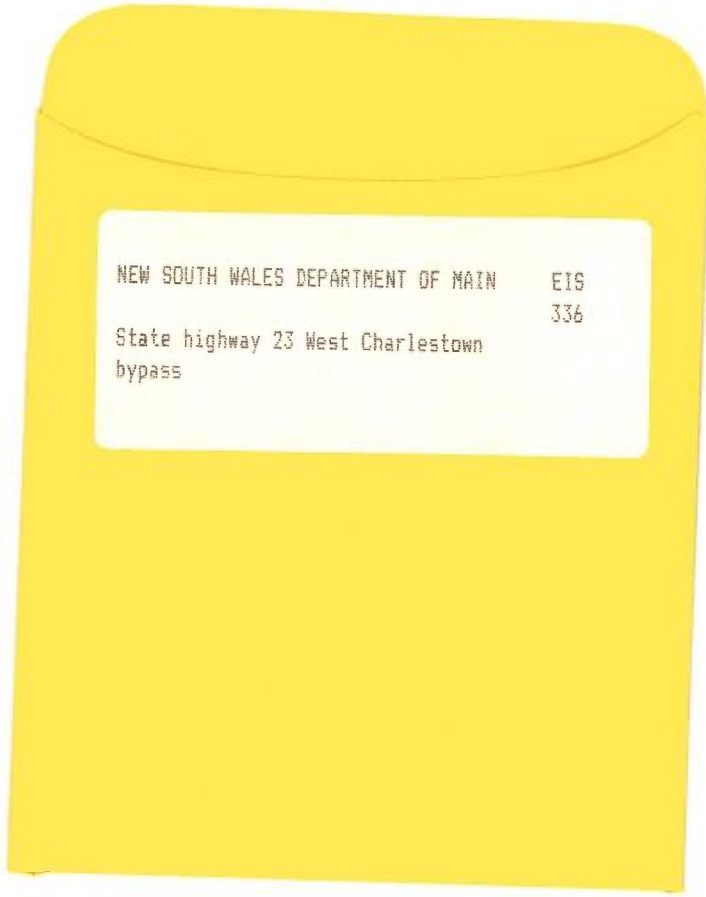
TABLE 6.2 RATING OF VEGETATION CONDITION ALONG THE STUDY CORRIDOR

VEGETATION UNIT	CONDITION	COMMENTS
SECTION A		
Immediately north and south of Myall Rd.	Poor	Understorey generally completely cleared and some areas with no overstorey
Central ridge and slope	Good	Some track and easement development but otherwise little disturbed.
Immediately north of Hillsborough Rd.	Very Poor-Poor	Either cleared or previously largely cleared and now weed infested.
SECTION B		
Immediately south of Hillsborough Rd. to Winding Creek	Very Poor-Poor	Predominantly cleared. Creek area vegetated but heavily weed infested.
In vicinity of Charlestown Golf Course to Warners Bay Road	Moderately Good - Good	Some track development, previously logged and burnt but little weed invasion or evidence of other disturbances.
SECTION C		
Immediately south of Warners Bay Road	Very Poor to Poor	Predominantly cleared.
Central Section	Moderately Good	Some clearing and track development.
Immediately north of Willow Road	Poor	Disturbed area with trees felled, dumped car bodies and tracks. Recently burnt.
SECTION D		
Immediately south of Willow Road	Poor	Partially cleared with extensive track development and weed infestations. Appears regularly burnt. Immediately east of the study corridor, the vegetation condition is moderately good.
Immediately adjacent to Pacific Highway	Poor	Cleared or partially cleared. Small wetland area weed-infested.

TABLE 6.3

FAUNA HABITATS OCCURRING ALONG THE PROPOSED BYPASS ROUTE

MAJOR HABITAT TYPE	CHARACTERISTICS	MICROHABITATS
1. Dry Sclerophyll Forest with Predominantly Heath Understorey	Overstorey of Eucalypts and Angophoras with very small proportion of old or dead trees. Low understorey comprising heath shrubs and grasses- very dense in patches. Ground debris generally sparse. Habitat subject to numerous fires, much of it just prior to field surveys.	-Damper sectors supporting shrub species tolerant to such conditions and damp under-foot after rain
2. Watercourse Areas	Variable overstorey- in less disturbed areas comprising Eucalypts and other tree species. Often a dense mid-understorey. Some water present in drainage courses.	-Dense mid-understorey
3. Cleared/Semi cleared Areas	Some areas with scattered Eucalypt/Angophora over-storey. Very little understorey unless weed-infested. Ground cover of grasses, weeds (amidst tracks in some areas).	-Dense weed infestations of shrubs such as Lantana. -Areas supporting a woodland over-storey. -Patches of very disturbed wetter areas/ drainage courses. -Regenerating wet heath


NEW SOUTH WALES DEPARTMENT OF MAIN
EIS
336
State highway 23 West Charlestown
bypass

NEW SOUTH WALES DEPARTMENT OF MAIN

EIS

336

State highway 23 West Charlestown bypass

Borrower's name	Date	Ext

RAECO