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Eastern Distributor

Working Paper No. 3

Traffic and Transport

Environmental Impact Statement

From the Cahill Expressway, Woolloomooloo to Mill Pond Road, Botany

RTA
Roads and Traffic Authority
Sydney Region

RUST PPK
Environment & Infrastructure

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ED.9

Eastern Distributor Environmental Impact Statement

Working Paper No. 3 Traffic and Transportation


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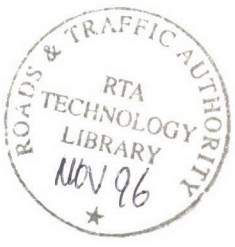
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A NATA Certified Quality Company

November 1996 Rev*
58G162D-003 Syd/606
ISBN 0 7310 5466 0



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CHAPTER 1 OVERVIEW OF PROPOSAL

1.1 BACKGROUND

In 1985 a proposal for an Eastern Distributor was developed to provide an improved connection from the Cahill Expressway at Woolloomooloo to Anzac Parade, South Dowling Street and Moore Park Road. An environmental impact statement (EIS) was prepared and a determination made in November 1985 that the proposal could proceed. Construction of the proposal was to be undertaken in three stages. Stage 1, involving the construction of an underpass for southbound traffic on Palmer Street beneath William Street was completed, however, due to funding limitations Stages 2 and 3 involving construction to the north and south of William Street was not undertaken.

The NSW State Road Network Strategy (Roads and Traffic Authority, 1994a) identifies the Eastern Distributor as part of the hierarchy of major road routes servicing the northern, eastern and south-eastern areas of Sydney. The Eastern Distributor was also identified as being a part of an important metropolitan ring road or orbital road network. In addition, it would provide high standard road access to Sydney (Kingsford Smith) Airport and Port Botany and improve traffic flow during peak periods in the inner eastern suburbs. *Figure 1.1* shows the regional context of the Eastern Distributor.

The Eastern Distributor would form part of a direct link providing uninterrupted traffic flow between the Sydney Harbour Bridge/Tunnel and General Holmes Drive. Such a link would assist in satisfying the strategic objective identified in the NSW Government's Integrated Transport Strategy (Department of Transport, 1995) of supporting central Sydney as a primary activity centre.

1.2 PREVIOUS STUDIES AND CONCEPTS

The idea of developing an eastern bypass of central Sydney has existed since 1945. Several developments and studies have had a major influence on the development of the proposal including:

- the *County of Cumberland Planning Scheme, 1951* established a plan for a system of motorways and regional roads radiating from central Sydney, connected by a series of bypass routes surrounding the City. The Eastern Distributor was one of these routes and although many of the extensive motorway corridors proposed by the scheme have now largely been abandoned, the concept and need for a bypass route on the eastern side of the City still has broad support;

- the *Eastern Distributor Study* (De Leuw, Cather and Jackson Teece Chesterman Willis, 1978) investigated the need for the Eastern Distributor and examined approximately 30 options for dealing with north-south traffic on the eastern side of the City. Following consideration of existing and future traffic movements the study concluded that an Eastern Distributor should be constructed;

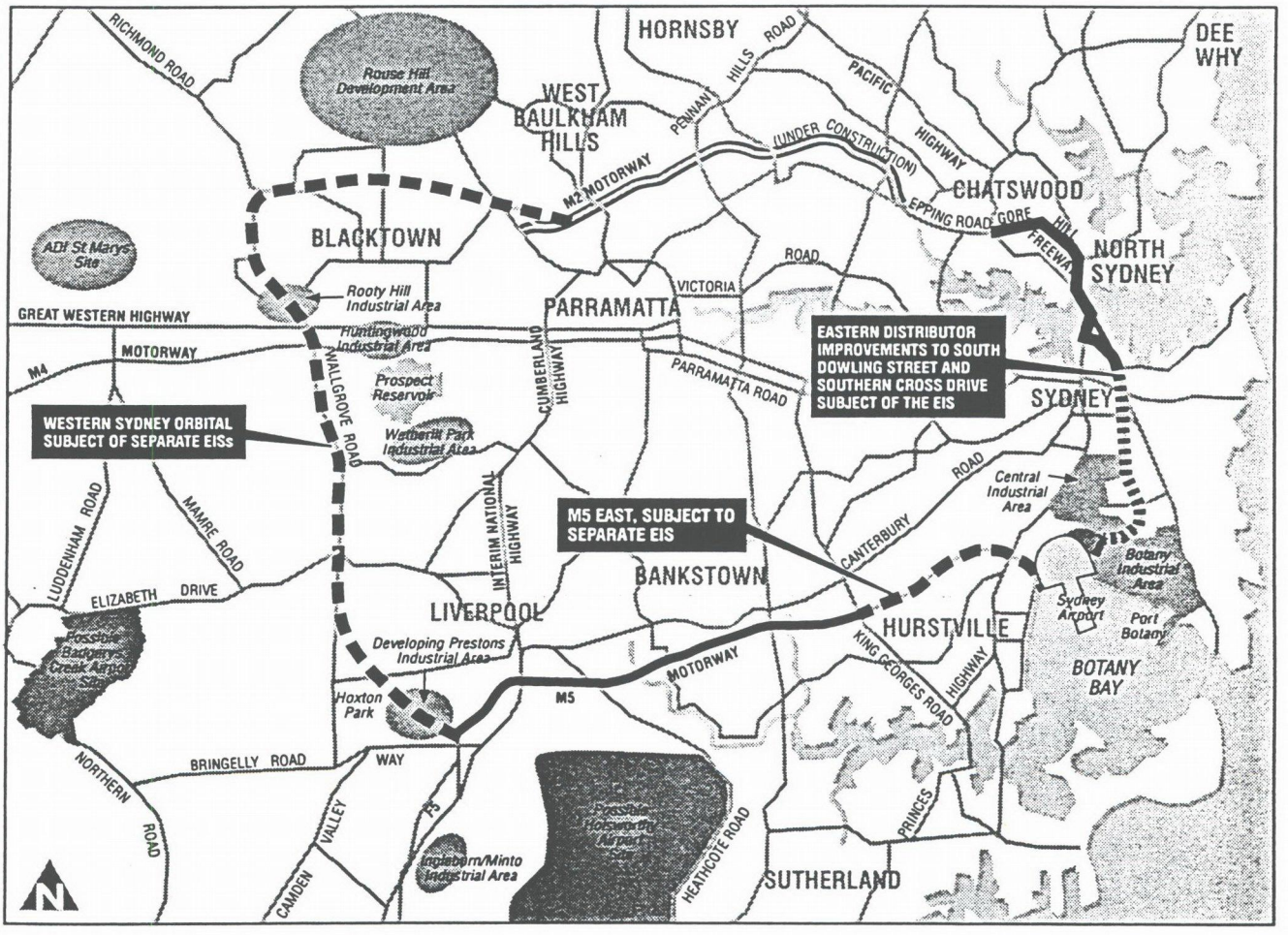


Figure 1.1
Sydney Orbital Strategy

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Scale Km

- the 1980 *City of Sydney Strategic Plan* (Council of the City of Sydney, 1980) called for the immediate construction of the Eastern Distributor to reduce through traffic in residential areas of East Sydney and Surry Hills;

- in 1985 an EIS (Department of Main Roads, 1985) for the Eastern Distributor was prepared and approved. The proposal involved the construction of twin tunnels in stages from just north of William Street to South Dowling Street, Anzac Parade and Moore Park Road. Only Stage 1 of the 1985 proposal, involving an underpass at William Street has been constructed;

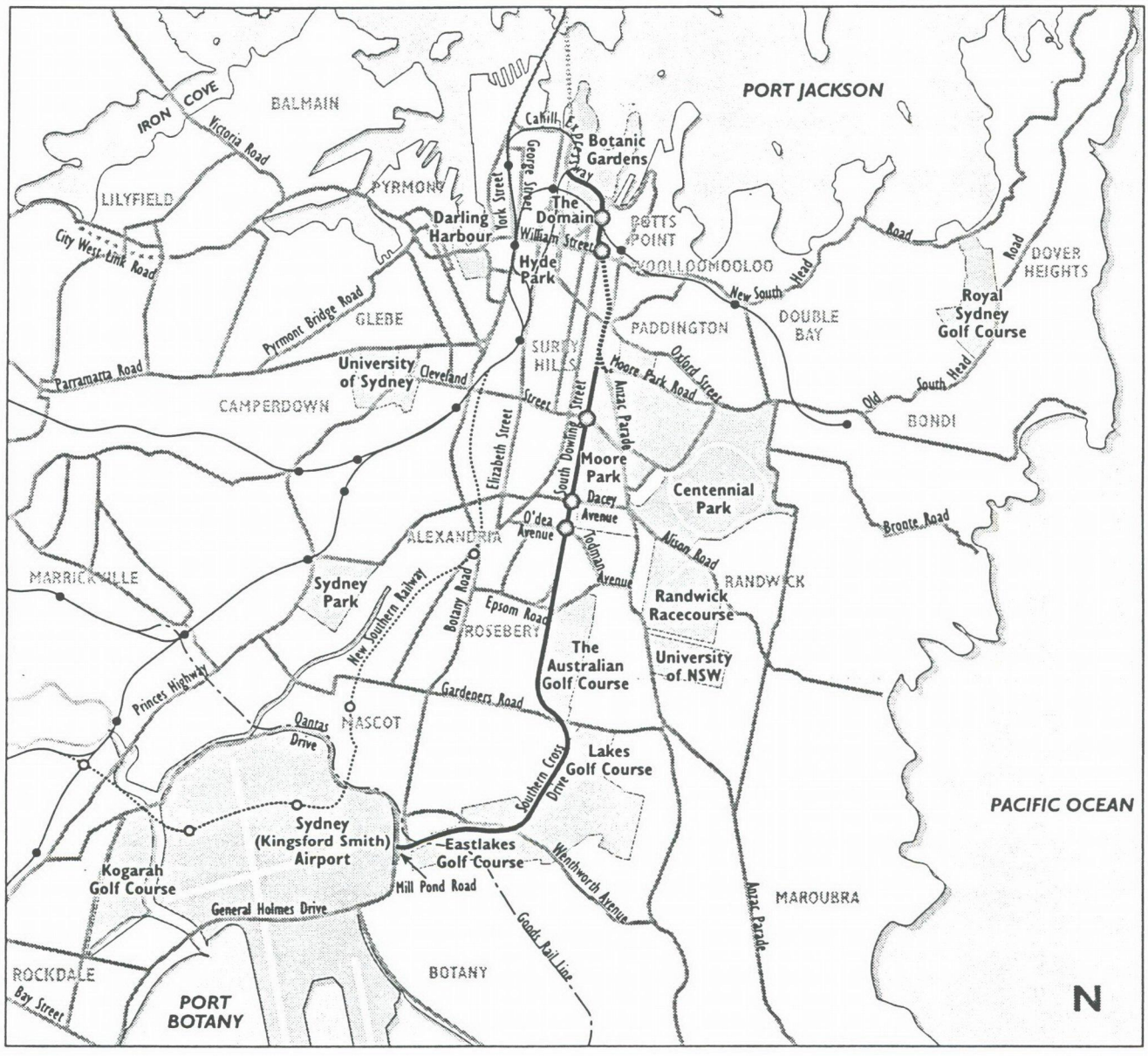
- *Cities for the 21st Century* (Department of Planning, 1995a), which represents the current metropolitan strategy for Sydney's developing land use, transport and environmental systems, recognises the strategic importance of road network enhancements between central Sydney and Sydney (Kingsford Smith) Airport and the central industrial area, as well as the role the Eastern Distributor would play in supporting economic growth; and

- the *Integrated Transport Strategy* (Department of Transport, 1995) identifies a number of transport corridors as having key strategic opportunities, one of which links the Sydney Harbour Bridge and the airport.

1.3 THE PROPOSAL

The proposal which is the subject of this EIS involves the development of a motorway standard road with limited access between the Cahill Expressway, Woolloomooloo and Epsom Road, Zetland, to provide uninterrupted traffic flow, in addition to road improvements on Southern Cross Drive and at the intersection of Botany Road and Mill Pond Road, Botany. An overview of the Eastern Distributor proposal is shown in *Figure 1.2*.

A grade separated (multi-level) intersection would be provided where the Cahill Expressway meets Sir John Young Crescent allowing an unimpeded connection of the Domain Tunnel and Macquarie Street to the proposed main carriageways of the Eastern Distributor. Direct access for vehicles travelling south from the Cahill Expressway to William Street would be provided via an off-load ramp. Access from William Street to Sir John Young Crescent and then to Macquarie Street and the Domain Tunnel would be provided via Palmer Street. Toll plazas would be provided on the motorway between Sir John Young Crescent and the bridge at Art Gallery Road. Only northbound traffic would be tolled, but this would exclude traffic travelling north from



Major Intersection Improvements

Road Improvements Including New Lanes

Tunnels

Roads

Rail

Proposed Rail

Landmarks

Figure 1.2

N Overview of Eastern Distributor

0 1 2 3

Scale Km

William Street to either the Cahill Expressway, the Sydney Harbour Tunnel or Macquarie Street.

The entrance to the main tunnel for southbound traffic would be located just north of Cathedral Street, while the exit for northbound traffic from the tunnel would be located approximately 50 metres north of William Street. Access from William Street to the southbound tunnel would be available from Bourke Street. A northbound off-load ramp with two toll gates would allow direct access to William Street from the main tunnel for northbound traffic.

Two three lane tunnels would extend from just north of William Street to South Dowling Street with a single lane exit for southbound traffic to Anzac Parade and Moore Park Road. For most of its length the northbound tunnel would sit on top of the southbound tunnel in a piggy-back arrangement. The tunnels would generally follow the alignment of Bourke Street and Flinders Street passing under Taylor Square at Oxford Street. An entry and exit would be provided within South Dowling Street, with an entry for traffic from Moore Park Road and Anzac Parade located in Drivers Triangle, and exits provided in Moore Park Road and Anzac Parade.

From Drivers Triangle, South Dowling and Dowling Streets would be upgraded to provide four motorway lanes extending south from the main tunnels. On the outside of the four motorway lanes would be lanes for local and other traffic, and traffic wishing to enter and exit the motorway. South Dowling and Dowling Streets would be widened which requires some acquisition of land from the Centennial Park and Moore Park Trust, private land on the corner of O'Dea Avenue and South Dowling Street, and land from the Department of Defence. Underpasses for the motorway lanes would be provided at Cleveland Street and from north of Lachlan Street/Dacey Avenue to south of O'Dea Avenue/Todman Avenue.

Southern Cross Drive would be upgraded from the Link Road to Mill Pond Road by adding one traffic lane in each direction to provide a six lane divided carriageway. Improvements would also be made to the intersections of Mill Pond Road with Botany Road and General Holmes Drive.

Environmental mitigative measures are proposed such as noise attenuation measures, provision for pedestrian and cyclist access to minimise community severance and other measures such as the installation of water quality control devices. The proposal would also be subject to a detailed environmental management plan if a decision to proceed to construct the proposal is made.

1.4 NEED FOR AN EASTERN DISTRIBUTOR

The Eastern Distributor proposal assists in meeting a number of specific needs that have been identified for the eastern and south-eastern region of Sydney. Broadly, these needs involve providing improved access from northern and central Sydney to Sydney (Kingsford Smith) Airport, including the facilitation of public transport, commercial and freight movements to the airport, Port Botany and the Central Industrial Area. The Eastern Distributor would support economic activity and employment, particularly in the corridor extending from Chatswood to Port Botany, central Sydney and its fringe areas.

The need for a more efficient transport link through service improvements and road network enhancements is identified in *Cities for the 21st Century* (Department of Planning, 1995a) as part of an integrated approach to land use, environmental and transport planning. This latest metropolitan strategy and the associated strategic planning documents, the *Integrated Transport Strategy* (Department of Transport, 1995) and the *NSW State Road Network Strategy* (Roads and Traffic Authority, 1994a) are consistent in identifying the need for transport infrastructure improvements as part of an emerging orbital road system throughout metropolitan Sydney.

The Eastern Distributor would, by placing significant north-south traffic flows within the tunnels between William Street and Moore Park, relieve heavily trafficked roads in eastern Sydney as well as greatly improve access through central Sydney to the northern and southern suburbs of the metropolitan region. Major opportunities to improve public transport would be created with the potential to reduce the demand for private road transport through road-based public transport initiatives. Those improvements would occur to east-west bus movements across the Eastern Distributor corridor, be created by the opportunity to have express bus services through the Eastern Distributor tunnels, and allow the creation of bus priority lanes on surface streets. Significant improvements to the quality of life for many residents, workers and visitors to the inner eastern areas of Sydney would also result from the operation of the Eastern Distributor.

Managed and well designed urban consolidation in the established areas of Sydney is an ongoing commitment of the State Government. Urban redevelopment initiatives at Ultimo, Pyrmont and Green Square (city south) and projected population growth in eastern Sydney generally, will require a transport system with good arterial road links for access to jobs, housing and recreational facilities. Development of the New Southern Railway would be complemented by the network improvements provided by the Eastern Distributor.

Air passenger movements at Sydney (Kingsford Smith) Airport are expected to grow from 18.1 million in 1995 to the adopted planning limit of 30 million by

approximately 2006 to 2007 (Federal Airports Corporation, 1990; Federal Airports Corporation, 1995). In addition, it is envisaged that an additional 20,000 jobs are to be created at Sydney (Kingsford Smith) Airport during this period. The development of Sydney's Second Airport is presently the subject of a separate EIS. Both the timing and location of the development of the airport is yet to be determined. One option may involve the construction and operation of a two runway airport, with support facilities capable of handling up to 360,000 aircraft movements and 30 million passengers annually, either at Holsworthy or Badgerys Creek (Commonwealth Environment Protection Agency, 1996). Regardless of the type and timing of the development of Sydney's Second Airport, Sydney (Kingsford Smith) Airport will continue to be an important component of the economic fabric of Sydney and NSW.

Overall the Eastern Distributor, in conjunction with the upgrade of South Dowling Street, Dowling Street and Southern Cross Drive, has the potential to provide a wide range of benefits to the eastern region of Sydney. The most important of these are to:

- complete an important link in Sydney's emerging orbital road network, which would provide a greatly improved transport route for passenger, freight and commercial movements and enhance economic efficiency at a National, State and Regional level;
- remove traffic conflict in the inner eastern suburbs with improved traffic flow and safety for pedestrians, cyclists and motorists;
- improve public transport and cyclist opportunities, while providing support for urban development and renewal initiatives and increased employment in and around the central industrial area and Sydney (Kingsford Smith) Airport;
- support State Government transport and land use strategies; and
- provide potential for improved environmental amenity of residents in the areas above the tunnel.

1.5 PRIVATE SECTOR INVOLVEMENT AND TENDERING PROCESS

In April 1993 the RTA invited the private sector to submit concept design proposals, incorporating innovative concepts and private financing initiatives for the improvement of the inner eastern suburbs road system. The private sector advanced proposals similar to the RTA's 1985 approved Eastern Distributor project as a solution to the traffic needs of the area. These proposals also indicated that an Eastern Distributor was viable as a toll road.

The RTA then invited the East Link Consortium to undertake a feasibility study into the opportunities to develop Government landholdings on the Eastern Distributor corridor and investigate entry and exit ramps and toll plaza options. The RTA also initiated a program of consultation to seek the community's view as to whether the proposal should proceed in the short term as a tollroad or wait until government funds become available in the future. From the consultation the RTA was satisfied that there was support for the proposal to proceed as a tollroad.

Preliminary proposals were invited in September, 1994 from the private sector for an Eastern Distributor toll road. Proponents were also invited to submit a supplementary proposal to improve South Dowling Street to provide for uninterrupted traffic flow. Five preliminary proposals were received from:

- Baulderstone Hornibrook Engineering Pty Ltd/Bilfinger and Berger Bausktiengesell Schaft;
- The Eastern Gateway Consortium;
- Airport Motorway Pty Ltd;
- Transfield Holdings Pty Ltd/Kumagai Gumi Co Ltd; and
- Bonpara Pty Ltd.

Based on the assessment of the preliminary proposals, three proponents were invited to submit a detailed proposal incorporating improvements to South Dowling Street. In August 1996 Airport Motorway Pty Ltd was announced as the preferred proponent to finance, design, construct, operate and maintain the Eastern Distributor as a toll road. The design and construction methodology of the Eastern Distributor put forward by Airport Motorway has been reviewed as part of this environmental assessment process. As a result of this process the proposal as described in this EIS differs from the Airport Motorway proposal in the following ways:

- modified entrances and exits at the southern end of the main tunnels;
- modified design of South Dowling and Dowling Streets improvements;
- modified facilities for pedestrians and cyclists; and
- additional improvements to Southern Cross Drive and the intersection of Botany Road and Mill Pond Road.

Airport Motorway's proposal for the Eastern Distributor would be constructed and operated at no cost to the Government. The land on which the proposal

would be constructed would be leased to Airport Motorway by the RTA. The term of the lease is referred to as the concession period. Airport Motorway would not be authorised to commence construction until after the determination of the EIS, subject to approval being given. Further, the agreement with Airport Motorway would not restrict the Government from investing in separate public transport initiatives in the region. At the end of the concession period, the Eastern Distributor would be transferred to the RTA at no cost.

Airport Motorway would be required to prepare an environmental management plan for the construction and operation of the Eastern Distributor and would be required to comply with the conditions of the agreement and all necessary environmental approvals. Both Airport Motorway and the RTA would be required to comply with the measures outlined in the EIS through the preparation of an environmental management plan.

1.6 OBJECTIVES FOR THE DEVELOPMENT AND OPERATION OF THE EASTERN DISTRIBUTOR

Objectives for developing and operating the Eastern Distributor were presented at a Planning Focus Meeting conducted in August, 1996 which was attended by representatives of the RTA, other State Government authorities, relevant local Councils and representatives of organisations such as the Royal Botanic Gardens.

The proposal objectives are:

- support the NSW Government's objectives for the integration of land use, transport and environmental planning;
- support the developing integrated transport strategy for Sydney;
- support the economic development of Sydney especially employment generating activities in the central industrial area and those associated with the gateways of Sydney (Kingsford Smith) Airport and Port Botany;
- create opportunities to improve the quality of life for residents, workers and visitors to the eastern area of Sydney;
- develop an affordable proposal in an environmentally and socially acceptable manner;
- improve safety for pedestrians, cyclists and other road users; and

- assist in removing through traffic from central Sydney.

1.7 THE PRINCIPLES OF ECOLOGICALLY SUSTAINABLE DEVELOPMENT

The exact nature and definition of the principles of ecologically sustainable development has been a matter of debate for some time. The most relevant reference for the purpose of this EIS is contained within the guideline for the preparation of EISs in the Environmental Planning and Assessment Regulation 1994. Under this guideline ecologically sustainable development is based on the following four interrelated principles:

- the precautionary principle, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;

- social equity, which includes both inter-generational equity and intra-generational equity. Inter-generational equity is concerned that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations. Intra-generational equity is concerned that the present generation should ensure that improved well being and welfare are accessible to all sectors of society within Australia and that this does not result in decreased welfare in other nations;

- the conservation of biological diversity and ecological integrity;

- the use of improved valuation, pricing of environmental resources and incentive mechanisms.

The RTA seeks to ensure that major road proposals do not infringe any of the principles of ecologically sustainable development and that environmental assessments provide sufficient and unambiguous scientific information to satisfactorily assess the performance of the proposal against the adopted principles. The principles of ecologically sustainable development have been applied in the development of this proposal.

CHAPTER 2 PURPOSE OF THIS WORKING PAPER

2.1 OBJECTIVES

The objectives of this working paper are:

- to describe the land use and transport planning context for the Eastern Distributor project in relation to metropolitan land use and transport planning strategies;
- to identify traffic and transport opportunities in relation to local area traffic management, public transport and provisions for pedestrians and cyclists;
- to examine the impacts of the Eastern Distributor project on traffic and transport in eastern and south-eastern Sydney, both during construction and operation of the Eastern Distributor;
- to examine the future transport needs of eastern and south-eastern Sydney, both with and without the Eastern Distributor;
- to describe the benefits of the project to the road network and examine the consequences of not building the Eastern Distributor; and
- to undertake an economic analysis of the Eastern Distributor to describe the economic performance of the proposal.

2.2 SCOPE AND STRUCTURE

The Traffic and Transport Working Paper describes the existing road network in the eastern Sydney area. It is based on a series of investigations into the traffic and transport characteristics of the area. These investigations were carried out to identify those roads most likely to experience changes in traffic conditions due to the Eastern Distributor, the types of vehicles using these roads, the characteristics of road traffic at different times of the day and the ability of major intersections to cope with existing and future traffic volumes.

The matters addressed in this working paper are determined by reference to Clause 84 of the *Environmental Planning and Assessment Regulation*, 1994 and the requirements for the proposal issued by the Director of the Department of Urban Affairs and Planning. Matters raised by the Department and the Environment Protection Authority are listed in *Table 2.1*. Other traffic and

transportation related matters raised by other stakeholders consulted are documented in *Working Paper No. 1* (1996a).

TABLE 2.1 TRAFFIC AND TRANSPORT MATTERS TO BE ADDRESSED IN THIS WORKING PAPER

Matters to be Addressed	Authority	Where Found in Working Paper
Examination of the opportunities for the proposal to facilitate public transport.	Department of Urban Affairs and Planning	Chapters 4.2, 5.4 and 6.2
Identification of alternative non-toll routes and routes for dangerous goods movement.	Department of Urban Affairs and Planning	Chapters 8.2 and 8.3
Detailed traffic impacts assessments, including traffic redistribution within the road network and predictions of future traffic volumes and characteristics.	Department of Urban Affairs and Planning	Chapter 5
Impacts on pedestrian and bicycle traffic and means of providing for their safe movement.	Department of Urban Affairs and Planning	Chapters 4.3, 6.3, 7.4 and 8.5
Potential cumulative environmental impacts of the proposal with other transport development within the region including the M5 East and New Southern Railway both during construction and operation stages.	Department of Urban Affairs and Planning	Chapters 3, 4 and 5
Specific Requirements		
Justification for the proposal and its relationship with relevant State and Regional Planning, environmental and transport strategies, including: ▪ State and Regional Plans; ▪ Metropolitan Strategy for the Sydney Region; ▪ State Road Network Strategy; ▪ Integrated Transport Strategy; ▪ Sydney 2000 Olympics Planning; and ▪ RTA's Public Transport Improvement Program.	Department of Urban Affairs and Planning	Chapter 3
Examination of opportunities for: ▪ provision of bus priority lanes, transit lanes, bus bays along the route and within the road network to be affected;	Department of Urban Affairs and Planning	Chapters 5.4 and 6

TABLE 2.1 CONTINUED

Matters to be Addressed	Authority	Where Found in Working Paper
▪ opportunities for new bus routes; ▪ implementation of any public transport facilitating traffic management plans in the effected network; ▪ provision of road crossing and other facilities to improve access to public transport routes; ▪ toll strategies to encourage public transport; and ▪ potential to compete with or complement the New Southern Railway.		
Description of features included in the proposal to facilitate public transport and any future plans to utilise the remaining opportunities.	Department of Urban Affairs and Planning	Chapter 6
Concepts for regional and local traffic management plans, in particular due to sharing of roads by local and through traffic, heavy vehicles and passenger cars/bicycles; conflicts of north-south and east-west traffic movements at intersections; weaving movements; and plans to minimise use of local roads by through traffic and heavy vehicles.	Department of Urban Affairs and Planning	Chapters 5, 6 and 8
Assessment of traffic redistribution in the local and regional road networks; performance of roads and intersections with and without the proposal.	Department of Urban Affairs and Planning	Chapter 9.2
Assessment of the potential increase in traffic growth rates due to improved traffic conditions as a result of the proposal an increase in traffic due to urban and economic renewal in the City south region.	Department of Urban Affairs and Planning	Chapters 3 and 5
Identification of alternative toll free routes, in particular routes for port related and other heavy vehicle traffic.	Department of Urban Affairs and Planning	Chapters 8.2 and 8.3
Identification of alternative routes for dangerous goods movements and other large vehicles.	Department of Urban Affairs and Planning	Chapters 6 and 8.3

TABLE 2.1 CONTINUED

Matters to be Addressed	Authority	Where Found in Working Paper
The predicted cost of any toll and any plan to remove the toll in the future.	Department of Urban Affairs and Planning	Chapters 8.2 and 9
Provisions for and impacts on cyclist and pedestrian movements and safety both during and after construction, including barriers to existing movement, pedestrian and cyclist access routes to public transport, routes/stations/stops and regional centres; existing and potential bike routes; and pedestrian safety and security.	Department of Urban Affairs and Planning	Chapters 8 and 9
Details of any proposed bike lane, off road bicycle path running parallel with the road, underpass/overpass, on/off ramp and other features to facilitate and encourage safe bicycle use.	Department of Urban Affairs and Planning	Chapters 6.3 and 8

This working paper has been divided into four parts. Part A provides an overview of the project and describes the purpose of this working paper. Part B identifies the existing road network and future transport needs of the eastern and south-eastern area of Sydney. Part B also identifies traffic and transport opportunities for local area traffic management, public transport improvements and provisions for pedestrians and cyclists. Part C assesses the traffic and transport impacts of the project. Part D contains the economic analysis for this project.

2.3 OTHER RELEVANT DOCUMENTS

The Traffic and Transport Working Paper supports the EIS. A number of specialist and related working papers have assisted in the preparation of the EIS. Those studies relevant to the preparation of this working paper include:

- Working Paper No. 1: Eastern Distributor, Environmental Impact Statement, Consultations, prepared by Rust PPK (Rust PPK, 1996a);
- Working Paper No. 2: Eastern Distributor, Environmental Impact Statement, Planning, Land Use and Social Impact, prepared by Rust PPK and BBC Consulting Planners (Rust PPK and BBC Consulting Planners, 1996);

- Working Paper No. 4: Eastern Distributor, Environmental Impact Statement, Noise, prepared by Acoustic Logic Consultancy (Acoustic Logic Consultancy, 1996); and

- Working Paper No. 5: Eastern Distributor, Environmental Impact Statement, Air Quality, prepared by ANW Consultants (ANW Consultants, 1996).

2.4 STUDY TEAM

This working paper was prepared by Rust PPK Pty Ltd in association with Transportation and Traffic Systems and RTA Technology. The following personnel participated in this study:

Rust PPK

Mark Keogh	Project Manager
Greg Milford	Project Coordinator
John Haynes	Principal Transport Infrastructure Planning
John Jenkins	Senior Transport Engineer
Wendy Adam	Principal Transport Planner
Margaret Starrs	Transport Economist
Brian Smith	Senior Transport Planner
Julie Quach	Transport Engineer
Jason Scoufis	Transport Engineer
Bibiana Lin	Transport Engineer

Transportation and Traffic Systems

Grant Smith
David Robinson

RTA Technology

Matthew Wilson
Mark ~~Diazla~~ Diazli

2.5 RELATED PROGRAMS AND INITIATIVES

There are a number of issues of broader concern to the eastern suburbs community which are not integral to the final determination of the EIS. Three separate programs of consultation are being run in conjunction with the

preparation and determination of this EIS. The approach is illustrated in *Figure 2.1*. The main areas for investigation and consultation are:

- Eastern Distributor Environmental Impact Statement;
- Eastern Distributor, Local Area Improvement Program;
- Landscape Master Plan for South Dowling Street; and
- Access Improvement Program.

2.5.1 LOCAL AREA IMPROVEMENT PROGRAM

The Local Area Improvement Program would be carried out in conjunction with Sydney City, South Sydney, Botany, Randwick and Woollahra Councils. The purpose of this program is to examine ways to take advantage of the potential opportunities created by the Eastern Distributor.

The strategy adopted to achieve these objectives is described in the EIS. The outcomes of the program would include:

- various measures to calm traffic in presently busy local streets and improve the safety and amenity of those areas;
- possible street closures; and
- various measures to improve the appearance of local streets including landscaping and widening of footpaths.

Final decisions on the outcomes of the Local Area Improvement Program would be made by the RTA and local Councils in consultation with relevant communities. The RTA would assist in facilitating the program and would provide some funding for the measures adopted.

2.5.2 LANDSCAPE MASTERPLAN FOR SOUTH DOWLING STREET

A Landscape Masterplan is being developed for South Dowling Street which has the following aims:

- to define an appropriate urban landscape masterplan and demonstrating particular elements, including earthworks and land shaping, street furniture and artworks and other appropriate improvements to the streetscape that would improve the environmental amenity of this street; and
- prepare a strategy for the implementation of these works.

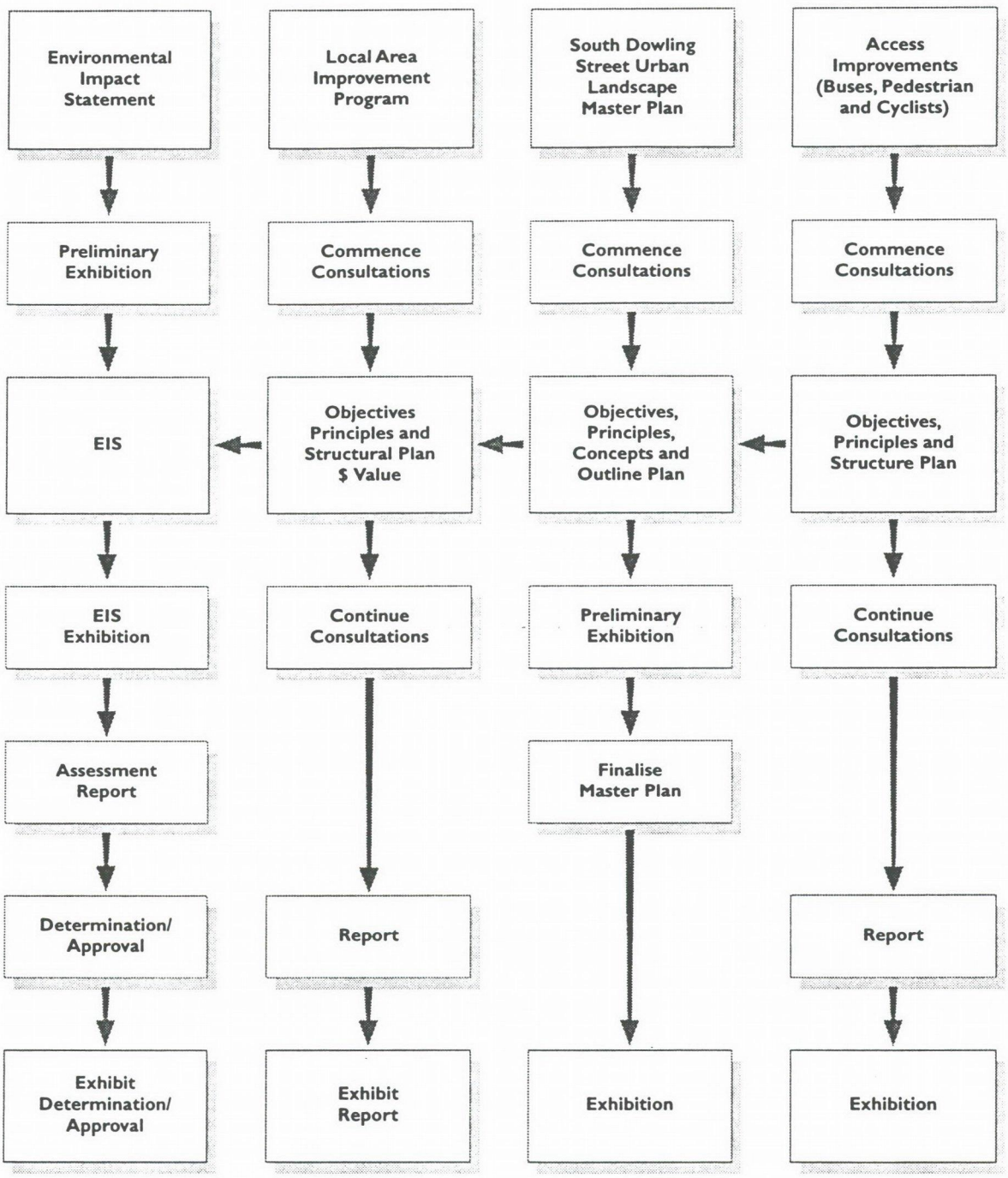


Figure 2.1
Eastern Distributor Consultation Programs

The preparation of the masterplan is being managed by the Moore Park and Centennial Park Trust and would form a key part of the detailed design of the proposed upgrade of South Dowling Street as part of the Eastern Distributor. The broad concepts and principles for the masterplan are included in the EIS. Plans, artist's impressions and models of the various elements of the masterplan will be available for public comment in late 1996.

2.5.3 ACCESS IMPROVEMENT PROGRAM

The construction of the Eastern Distributor would remove significant amounts of traffic from some residential and commercial streets in Surry Hills, Darlinghurst, Paddington and Woolloomooloo. This would create the opportunity to improve public transport services, pedestrian safety and cycle access.

The NSW Government will establish a committee to help turn these opportunities into reality. This committee will be made up of representatives from various Government agencies and local Councils. Throughout this process the committee will also seek the views of the broader community and interest groups.

The objectives and principles adopted by the committee for improving public transport, pedestrian and cycle access within the inner eastern areas of Sydney are described in the EIS. The final outcomes of the Committee's work are expected to be made available to the public by mid-1997. This would allow detailed planning to begin for the implementation of adopted strategies once the Eastern Distributor is completed in the year 2000.

CHAPTER 3 STRATEGIC CONTEXT

3.1 SYDNEY'S METROPOLITAN PLANNING STRATEGY

In 1995, the then Department of Planning published the most recent strategy for the greater metropolitan region. *Cities for the 21st Century* (Department of Planning, 1995a) promotes an integrated approach to urban management which is characterised by:

- an emphasis on dynamic decision making processes rather than rigid blue prints;
- management by "whole of government" by linking budgeting processes with the co-ordination of urban development; and
- recognition of Newcastle and Wollongong as part of a wider urban system and subsequently included in the Sydney region and called the *Greater Metropolitan Region*.

The 1995 metropolitan strategy projects the population for the Sydney region to be around 4.48 million by 2021, 10 years later than anticipated in the 1988 metropolitan strategy (Department of Planning, 1988), with Newcastle reaching 556,000 and Wollongong reaching 409,000. The three key principles upon which planning for this growth will be based are:

- more compact cities;
- an ecologically sustainable region including the integration of land use and transport planning; and
- effective implementation of the strategy.

The principle of compact cities places much greater reliance than previous strategies on redevelopment and infill of established areas as a means of slowing urban sprawl, that is the rate of development of the outer metropolitan fringe. Further redevelopment is to be encouraged in those parts of Sydney with access to services, particularly transport. Achieving the principle of the compact city will require approximately one-third of new dwellings to be built in established areas.

The principal concentrations of new housing and employment in the eastern area of Sydney are:

- City West, a residential and mixed use urban redevelopment centred on Ultimo-Pyrmont served by a light rail system, potentially housing 13,500 additional residents and a workforce of 50,000 within a planning timeframe of 20 to 30 years (Department of Planning, 1991); and

- City South, an urban planning strategy which aims to take advantage of opportunities arising from construction of the new Southern Railway envisaging up to 30,000 new residents at Waterloo/Zetland and the potential creation of 15,100 additional jobs in airport related zones around Sydney (Kingsford Smith) Airport (Department of Planning, 1994).

These major urban redevelopments will be supported by continued multi-unit development throughout eastern Sydney and the whole Sydney region. Despite these redevelopments the *Metropolitan Strategy* adopts the position that most population growth should continue to be in the release areas of outer Sydney.

Overall, central Sydney, containing 180,000 jobs, and the fringe areas of Darlinghurst, Woolloomooloo, Surry Hills, Central-Redfern and Ultimo-Pyrmont, with 75,000 jobs, are seen as a major part of Australia's economy, and also being the major financial and business centre of the nation. Promotion of central Sydney as a corporate headquarters and financial centre; managing the development of fringe areas, such as City West, to complement the role of the central business district; and the development of the region's transport system to support the role and functions of central Sydney are some of the key policy directions designed to support the benefits central Sydney delivers to the region. In addition, the proximity of significant concentrations of employment to central Sydney within the central industrial area (54,000 jobs), Sydney (Kingsford Smith) Airport (approximately 12,000 jobs) and Port Botany and its immediate surroundings (11,000 jobs) emphasise the concentration of employment and economic activity in the eastern region of Sydney (Department of Planning, 1995a).

While it is recognised economic growth needs to be carefully managed to avoid degradation of the environment, it also contributes to the financial capacity of the city to make environmental improvements. Such improvements could include creating road based public transport opportunities and improving environmental amenity by providing a more efficient arterial road network.

The State Government has announced the development of a new masterplan to manage Sydney's growth and coordinate the delivery of infrastructure and services. The *Urban Infrastructure Management Plan* (Office of the Minister for Urban Affairs and Planning, 1996) will determine:

- total infrastructure needs (both physical and social) of the greater metropolitan region over the medium term;
- responsibility of each individual department and agency to provide infrastructure;
- alternative ways of meeting infrastructure needs other than by government agency provision;
- translation of these alternatives into actual projects, with summaries of cost-benefit studies and socio-economic analysis;
- cost estimates for the projects where possible; and
- projected sources of funding for individual new facilities, including the need for private financing.

Responsibility for implementing the Masterplan will rest with the Urban Management Committee of Cabinet.

3.2 INTEGRATING LAND USE AND TRANSPORT

3.2.1 INTEGRATED TRANSPORT STRATEGY

The *Integrated Transport Strategy for the Greater Metropolitan Region* (Department of Transport, 1995) was prepared in conjunction with the 1995 metropolitan strategy *Cities for the 21st Century* (Department of Planning, 1995a). The purpose of this joint process was to bring land use and transport planning into a comprehensive strategy so that they could be mutually supportive and work towards common goals.

The three main elements of the *Integrated Transport Strategy* are:

- integration of transport and urban development as a means of promoting a more "compact city" which is one of the key principles of the metropolitan strategy;
- development of an effective, efficient and environmentally responsible transport system by integrating transport planning, capital investment decisions and service improvements; and
- establishment of effective management processes supporting the development of a co-ordinated and consistent approach to urban management consistent with the whole of government approach established by the metropolitan strategy.

The *Integrated Transport Strategy* proposes the development of a transport corridor framework as shown in *Figure 3.1* which identifies central Sydney and the city fringe as the primary activity centres in eastern Sydney. Sub-regional employment centres such as North Sydney, St Leonards, Chatswood and Sydney (Kingsford Smith) Airport, in addition to the central industrial area are promoted in support of central Sydney's national and international role. The corridors supporting central Sydney are:

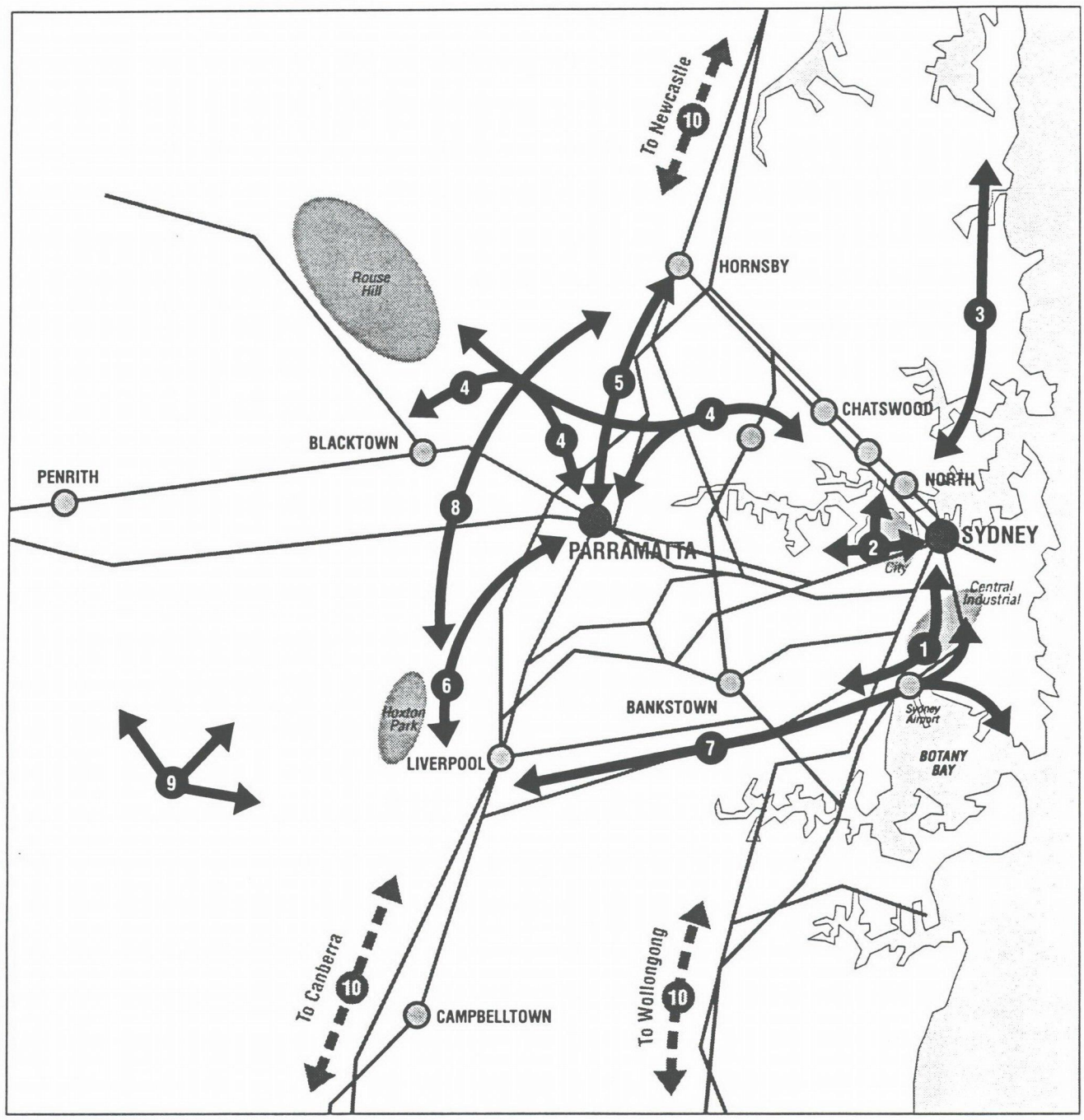
- Airport-Central Sydney corridor (corridor 1 on *Figure 3.1*);
- Inner West corridor (corridor 2 on *Figure 3.1*); and
- Warringah corridor between central Sydney/Lower North Shore and the Warringah Peninsula (corridor 3 on *Figure 3.1*).

Corridors identified as supporting employment and economic efficiency objectives include:

- south-west (M5) link (corridor 7 on *Figure 3.1*);
- access to the Second Sydney Airport (corridor 9 on *Figure 3.1*); and
- inter-city corridors between Sydney and Canberra, Wollongong and Newcastle (corridor 10 on *Figure 3.1*).

The *Integrated Transport Strategy* identifies the transport corridor from Sydney (Kingsford Smith) Airport to central Sydney as an opportunity to support metropolitan, employment and economic efficiency objectives for central Sydney (Department of Transport, 1995). Construction of the New Southern Railway will provide a direct connection by rail between the central business district and the domestic and international terminals at Sydney (Kingsford Smith) Airport extending to the East Hills Line at Turrella. Extension of the East Hills Line to the proposed airport site at Badgerys Creek via Glenfield would also provide a direct connection between Sydney (Kingsford Smith) Airport and the Second Sydney Airport should it be located at Badgerys Creek. The proposed airport site at Holsworthy would also be able to be connected to the rail system.

The *Integrated Transport Strategy* does not nominate a particular transport solution for each strategic corridor. Focus is placed on achieving the greatest transport efficiencies which support the residential and employment concentrations of the metropolitan strategy. The Eastern Distributor would support the economic activity of central Sydney by providing an efficient road link from Sydney (Kingsford Smith) Airport and Port Botany to the central business district and the sub-regional centres in northern Sydney at North Sydney, St Leonards and Chatswood.



Corridors:

Airport-Central Sydney	1
Inner West	2
Warringah	3
Macquarie-Parramatta-Castlereagh	4
Parramatta-Hornsby	5
Hoxton Park	6
South West Link	7
Liverpool-Hornsby	8
Sydney West Airport access	9
Inter-city	10

Major roads

Railways

Residential/ employment growth

Primary activity centres

Secondary activity centres and other employment nodes

Strategic transport opportunities Enhanced existing corridors

Figure 3.1

N Integrated Transport Strategy

Source: "Integrated Transport Strategy for the Greater Metropolitan Area" Department of Transport

3.2.2 SUPPORTING TRANSPORT STRATEGIES

Within the framework for population growth and employment distribution described in the 1995 metropolitan strategy, the role of the *Integrated Transport Strategy* is to establish a strategic approach for the more detailed operational strategies and plans of the individual transport providers. Several of the agency-based strategies are currently under public discussion. They are the *Draft State Road Network Strategy* (Roads and Traffic Authority, 1994a) released by the RTA, the *State Rail Strategy for 1995-2016* (State Rail Authority, 1994) released by CityRail and *Sydney Ports into the 21st Century* (Maritime Services Board, 1995) released by the Maritime Services Board (Office of Marine Safety and Port Strategy). All of these documents are aimed at achieving the three main objectives of integrated transport planning which are economic efficiency, environmental protection and social equity.

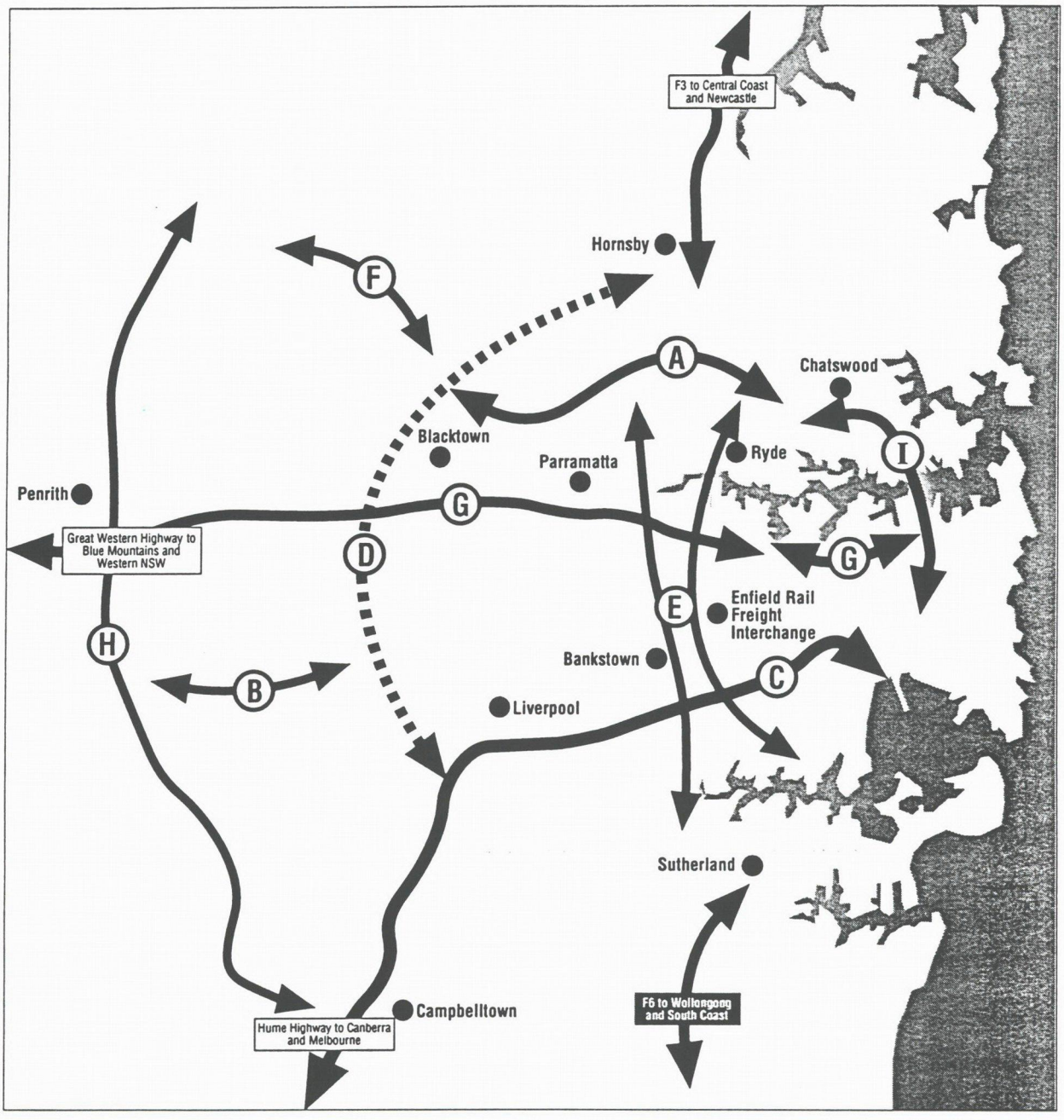
The *Draft State Road Network Strategy* sets out a framework for the future planning and management of the use, development and maintenance of the State's road network. The Strategy is a first release document for public discussion and has not yet been finalised. The main themes are to:

- facilitate and support State and regional economic development;
- moderate traffic growth, rather than strive to satisfy unrestrained demand for travel; and
- progress towards achieving ecologically sustainable development objectives.

The Strategy recognises the strategic transport opportunities identified in the *Integrated Transport Strategy*. These opportunities are translated into road concepts where relevant. The Airport-Central Sydney corridor is addressed by the Gore Hill Link-Sydney Harbour Tunnel/Bridge-Eastern Distributor shown as Link 1 by the *Strategic Road Network* as shown in *Figure 3.2*. The completion of the Gore Hill Freeway and the Sydney Harbour Tunnel and the upgrading of General Holmes Drive have provided some of the components of a high standard route between the northern areas of Sydney and Sydney (Kingsford Smith) Airport and Port Botany. The present links between the Sydney Harbour Bridge/Tunnel and Southern Cross Drive through east Sydney are heavily trafficked, particularly during peak periods. The Eastern Distributor would be capable of providing a consistent motorway standard route to these important destinations.

3.2.3 SYDNEY'S AIRPORT NEEDS

The Commonwealth Government is intending to develop the Second Sydney Airport as a "two-runway" airport based on two widely spaced parallel



Strategic corridors for development
National Highway metropolitan link under investigation

North West Link (M2)	A
Badgerys Creek (Elizabeth Drive)	B
South West Link (M5)	C
National Highway metropolitan link under investigation	D
King Georges and Silverwater corridor (Routes 33 and 45)	E
North West Sector (Windsor and Old Windsor Roads)	F
City-West corridor (Western Distributor-City West Link-M4)	G
Northern Road Peripheral:	
Campbelltown-Penrith-Windsor/North Wes Sector	H
Gore Hill Link-Harbour Tunnel/Bridge-Eastern Distributor	I

Figure 3.2
Strategic Road Network

Source: Draft State Road Network Strategy
Roads and Traffic Authority

runways and supporting facilities capable of handling up to about 360,000 aircraft movements and 30 million passenger movements per year (Commonwealth Environment Protection Agency, 1996). Badgerys Creek was originally selected as the site for Sydney's second airport by the Commonwealth Government in 1986. In May 1996 the Federal Cabinet decided that an environmental impact statement would be prepared for the construction and operation of a major airport at either Badgerys Creek or Holsworthy.

Both the timing and location of the development of the airport are yet to be determined. It is difficult to precisely estimate passenger movements at the Second Sydney Airport during nominated years in the future due to a number of factors that include:

- the rate of growth of passengers which will be flying into and out of Sydney;
- capacity constraints that exist or may be imposed on Sydney (Kingsford Smith) Airport; and
- the overall viability and acceptance of the Second Sydney Airport proposal by major airlines.

The *Sydney Airport Draft Planning Strategy* (Federal Airports Corporation, 1990) adopts a 30 million annual passenger level as a planning target for Sydney (Kingsford Smith) Airport. This *Draft Planning Strategy* also indicates that the Sydney Basin would be economically able to support two commercial airports only when annual passenger traffic reaches 25 million, expected to be reached by 2005. The ultimate capacity of Sydney (Kingsford Smith) Airport has been capped at 80 aircraft movements per day, which is equivalent to 353,000 aircraft movements per year.

In the year ending 30 June, 1995 a total of 260,970 aircraft movements and a total of 18.1 million passenger movements occurred at Sydney (Kingsford Smith) Airport (Federal Airports Corporation, 1995). The most recent projections for the Sydney basin from the Department of Transport and Regional Development are shown in *Table 3.1*. These forecasts are based on a projected average growth rate of 6.4 percent, and five percent per annum for international and domestic passengers, respectively. Beyond 2000 international passenger growth is forecast to be six percent per annum up to 2007 and 5.5 percent to 2010. Domestic passenger growth is forecast to be 3.25 percent, consistent with current economic growth rates.

TABLE 3.1 FORECAST TOTAL AIRCRAFT AND PASSENGER MOVEMENTS, SYDNEY BASIN

Year[1]	Aircraft Movements[2]	Passenger Movements
1995	260,970	18.1 million
2000	292,200	23.1 million
2005	319,800	28.4 million
2010	351,200	34.8 million

Notes: 1. Year ending 30 June.
2. Central scenario.

Source: Department of Transport and Regional Development, July 1995.

3.2.4 NEW SOUTHERN RAILWAY

The New Southern Railway is an underground passenger railway linking Central Station to the domestic and international terminals at Sydney (Kingsford Smith) Airport and the East Hills Line. Stations are to be constructed at Green Square, Mascot, domestic and international terminals, Wolli Creek and Turrella. The New Southern Railway is expected to commence operation in the year 2000 and is anticipated to attract up to 65,000 passenger trips per day by 2013 (Kinhill, 1994).

The Department of Urban Affairs and Planning has prepared an urban planning strategy for the area influenced by the New Southern Railway to guide redevelopment and land use change over the next 30 years (Department of Planning, 1994). The strategy envisages up to 13,000 new dwellings at Waterloo/Zetland leading to an additional population in this area of approximately 30,000 persons. It is also envisaged that an additional 15,100 jobs could be created in airport related zones around Sydney (Kingsford Smith) Airport, in addition to the predicted 20,000 jobs to be created at the airport itself. A further 800 jobs could be created at Waterloo/Zetland due to the new railway stations. The planning strategy suggests that major road proposals, such as the Southern Arterial, M5 Motorway and Bourke Street link, would need to be implemented to satisfy the transport task associated with the projected population and employment increases. The Southern Arterial as currently proposed would consist of the extension of the paired one-way roads south of Henderson Road, Alexandria.

3.2.5 ROAD TRANSPORT INITIATIVES

M5 East

The M5 East is proposed as an eastern extension of the existing M5 Motorway, involving provision of an additional lane in each direction between Fairford Road and King Georges Road and a new four lane freeway between King Georges Road and General Holmes Drive. Twin, two lane road tunnels would run from Bexley Road to Marsh Street, with ramps to and from the Princes Highway and Marsh Street. The road would then link to General Holmes Drive north of Cooks River.

The M5 East is part of a south-west link between Sydney Kingsford Smith Airport, Port Botany and the western and south-western areas of Sydney, including the Second Sydney Airport. The south-west link (identified as corridor seven on *Figure 3.1*) would have a freight and commercial focus.

Market Street Tunnel

Sydney City Council has been investigating the feasibility of constructing a cross city east-west tunnel. The tunnel would follow the alignment of Market Street accessed in the west from the Western Distributor. Options considered for eastern access include Boomerang Street, William Street, the Kings Cross Tunnel and a direct connection to the Eastern Distributor Tunnel.

The objectives identified for the Market Street tunnel include:

- removing through traffic and service vehicles from the retail core by providing connections for commercial vehicles to key retail buildings below grade;
- providing an alternative to the Cahill Expressway;
- providing short term car parking for 1,000 spaces underneath Castlereagh Street; and
- improving pedestrian amenity and reducing pedestrian/vehicular conflict in the retail core of Central Sydney.

Southern Arterial/Bourke Road Extension

This is a long standing proposal to improve the arterial network from the southern part of the Central Business District to Sydney (Kingsford Smith) Airport. The original scheme consisted of parallel one-way pairs along Regent/Botany and Gibbons/Wyndham Streets terminating at Green Square, plus widening of botany Road to Mascot. An alternative to widening Botany

Road south of Green Square would be a one-way pairing of O'Riordan Street and Bourke Road, including a new section of road adjacent to the proposed Mascot railway station. There is currently no funding commitment to this proposal.

3.2.6 DEMAND MANAGEMENT

For some time the RTA has recognised that demand management is an appropriate means of addressing traffic issues in Sydney, to be used alongside or in place of new road construction at relevant locations. This has been documented in RTA Corporate Plans, annual reports, the *Road Transport Future Directions Study* (Roads and Traffic Authority, 1994b) and the *State Road Network Strategy* (Roads and Traffic Authority, 1994a).

Managing the demand for private road transport on a metropolitan-wide scale is essentially a policy issue, which requires a range of actions across all regions. In the case of a specific project such as the Eastern Distributor, demand management is considered locally.

The continued creation of jobs at Sydney (Kingsford Smith) Airport and the opportunities for new housing and jobs in the Central Industrial Area as part of the *New Southern Railway Urban Planning Strategy* (Department of Planning, 1994) will create additional demand for road access and therefore increase pressure on the existing network. The construction of the New Southern Railway will be a factor in reducing the demand for vehicle trips in this area.

The main measure to manage demand for this project is to promote opportunities for road based public transport, and to support the initiatives of others to take advantage of those opportunities. These demand management initiatives specific to the Eastern Distributor include:

- location of interchanges to give preference to the needs of industrial and commercial needs, major freight routes, and existing major arterial roads;
- limiting access to the motorway to those locations where demand warrants;
- facilitating local area traffic management schemes to reduce capacity for through traffic on inappropriate roads;
- recognising the following priorities for the Eastern Distributor:
  - need for road network enhancements between Central Sydney and Sydney (Kingsford Smith) Airport/Port Botany;

- need to provide for freight and commercial traffic;
- the role of the Eastern Distributor as one part of the link which would form part of the strategic orbital road network through metropolitan Sydney;
- using "spare" road capacity created by the Eastern Distributor for public transport, cyclists and amenity improvements rather than increased private vehicle capacity; and
- tolling all private traffic on the Eastern Distributor, but not public sector buses.

3.2.7 INDUCED TRAFFIC

It is a view held by many individuals that the provision of improved road facilities gives rise to the phenomenon of induced traffic. In simple terms it is felt that the presence of additional road space will result in the generation of more trips than would have otherwise been the case.

This is an extremely complex hypothesis which has defied detailed investigation resulting in a high level of uncertainty concerning both the existence of the phenomenon and, if it does exist, its significance. Partially this is a problem of definition.

Several behavioural responses can occur to the opening of a new road within the context of a fixed matrix of person-trips per day without any new trips being induced. These could be:

- as is currently modelled, some drivers choosing to divert from old roads in the network to the new - change of route;
- more people choosing to travel in the peak period - change of timing;
- some people choosing to go by car rather than by bus or train - switch of modes; and
- some car passengers deciding to use their own cars for the journey rather than sharing - decrease of vehicle occupancy.

While all these involve existing trips, some could result in induced traffic. Journeys previously made by bus, when made by car, add traffic to the network. In this case there are no induced trips because they were being made anyway. There is, however, induced traffic.

The possibility that induction of trips might result from the provision of new major roads has been investigated in great detail by the *Standing Advisory Committee on Trunk Road Assessment of the United Kingdom Department of Transport* (HMSO London, 1994). It should however be noted that this took

place within the context of existing appraisal procedures for trunk road projects in the United Kingdom which, while having a number of similarities with Australian practice, is highly systematised and in some areas is very different from local procedures.

The main conclusions of the Standing Advisory Committee were as follows:

- it is possible that the induction of trips does exist, but the evidence is not strong enough to be certain;
- its scale is relatively small in relation to the base levels of existing traffic;
- it can have an effect, however, on economic assessment (as undertaken in the United Kingdom) in terms of the erosion of user benefits; and
- due to the uncertainties still attached to this issue it was recommended that additional before and after monitoring of traffic flows was required in an attempt to identify such an effect if it exists.

All these recommendations relate to roads with free access. It is recognised in the report that the tolling of roads has the effect of suppressing demand and that this would tend to counteract any possible induction of trips if that may result from the development of the Eastern Distributor. This remains a highly complex issue which will require substantially more investigation before its effects, if any, can be included in future transport modelling processes.

3.3 LOCAL LAND USE AND PLANNING

3.3.1 LOCAL PLANNING INITIATIVES

Both Sydney City and South Sydney Councils have prepared new draft planning instruments aimed at consolidating existing plans and strategies. In the case of South Sydney the *Draft South Sydney Development Control Plan* (South Sydney Council, 1996) advances the concept of urban villages which reinforce and enhance the existing character of the area. The metropolitan strategy (Department of Planning, 1995a) for Sydney promotes the strategy of increased housing stock in established areas which are located at transport nodes, such as railway stations, within existing commercial centres or along transport corridors. In terms of the future development of South Sydney and surrounding Council areas this is likely to result in further infill and consolidation of existing urban areas rather than large scale redevelopment leading to significant increases in population.

The exception to this trend will be the *City South Urban Planning Strategy* (Department of Planning, 1994) which envisages up to 30,000 new residents at Waterloo/Zetland arising from construction of the Green Square station on the New Southern Railway. Other major developments in the area either underway or planned which have the potential to influence existing land use patterns include:

- the development of the Woolloomooloo Bay/Finger Wharf and associated development of Wharf 11 at Woolloomooloo Bay;

- the revival in planned residential units on underutilised commercial sites in Woolloomooloo, targeted as an urban village by South Sydney Council;

- general residential redevelopment in the Redfern East area including the Moore Park Gardens redevelopment on the former Reschs Brewery site comprising some 590 dwellings; and

- the availability of a number of large sites for redevelopment, such as the ACI site and the Department of Defence Navy Supply Centre at Zetland associated with City South.

Other proposals relevant to the Eastern Distributor include:

- relocation of Royal Agricultural Showground and Royal Easter Show to Homebush Bay by 1998;

- the proposed use of the vacated Royal Agricultural Showground area by Fox Studios for the purpose of a film studio and entertainment complex comprising 144,000 square metres of floorspace and separate public parking for approximately 1,300 spaces within the site;

- the plans by the Centennial Park and Moore Park Trust for the following:

  - removal of all on grass parking from Moore Park;
  - the re-establishment of Grand Drive as a formal entrance to Centennial Park by road upgrading, tree planting and limited access to Robertson Road/Cook Road;
  - closure of Robertson Road at Anzac Parade providing a single point of access to Centennial Park at Grand Drive;
  - consideration of the opportunity of closing Gregory Avenue and Macarthur Street to vehicular traffic following the removal of on grass parking on Moore Park;

- upgrading of the Moore Park Golf Course to achieve a Group 1 status (par 72), including the redevelopment of the Club House in 1997/1998;
- pursuit of commercial uses of the former grass skiing area at Mount Steele near the intersection of Cleveland Street and South Dowling Street; and
- the possible relocation of the Mackay Sports Ground from Centennial Park to Moore Park, adjacent to Sydney Boys and Sydney Girls High School;

- continued and possible increasing use of the Sydney Football Stadium and Sydney Cricket Ground which attracted 1.4 million people and held 71 events during 1995 (Department of Public Works and Services, 1996); and

- the intention to use the Sydney Football Stadium as a venue for soccer events during the Sydney 2000 Olympics.

A masterplan is being developed by a private group, the William Street Taskforce Inc, which aims to re-establish William Street as one of Australia's premier boulevards. Key elements of the upgrading include:

- the construction of a tunnel under William Street between the Kings Cross Tunnel and the Eastern Distributor, together with a 1,500 space, four level carpark; and

- the greening of The Boulevard with a footpath widening, tree planting, paving, street furniture and street lighting.

3.3.2 MAJOR EVENTS MANAGEMENT

The Moore Park, Centennial Park, Sydney Cricket Ground, Sydney Football Stadium and Royal Agricultural Showground areas (the Moore Park Precinct) accommodates sporting and recreational facilities of regional significance attracting approximately seven million visitors to the area each year. Residential uses, schools and local sporting activities also occur within the precinct. The staging of major events generating high volumes of traffic exacerbates the limitations of the existing road network, the poor provision of public transport and the reliance on the private car for access. The concentration of activity and the conducting of major events within the precinct is an ongoing cause of conflict. Major events are characterised by coordination and planning difficulties between the relevant authorities and the general inadequacy of facilities to support the movement of traffic and crowds.

During major events buses are used to transport crowds between Central Station and the facilities within the Moore Park Precinct. Additional bus

services are provided to and from Wynyard, Circular Quay and Bondi Junction stations and city based parking stations during the Royal Easter Show. An estimation of the transport mode of a crowd of 40,000 persons attending a typical major event at the Moore Park Precinct is provided in *Table 3.2*. A typical event may include more than one activity at any one of the main venues.

TABLE 3.2 TRANSPORT MODE TO TYPICAL MAJOR EVENT

Mode	Persons	Percentage
Car	34,500	86
Bus	4,000	10
Foot, cycle, taxi, coach	1,500	4

Source: Rust PPK, 1995.

Traffic arrangements during major events include:

- Police control of important intersections;
- special bus movement arrangements and priorities;
- access constraints on Drivers Avenue, Gregory Avenue and Macarthur Avenue;
- additional kerbside parking restrictions; and
- provision of parking on grassed areas of Moore Park with a total capacity of 7,300 spaces, with an additional 2,000 spaces situated within the Royal Agricultural Showground.

Major events are where possible organised to avoid peak traffic periods on the surrounding arterial roads.

A Moore Park Traffic Management Committee was established in 1996 to develop, amongst other things, general transportation strategies in order to establish an efficient practical approach to event management and general transport related issues in the precinct (Department of Public Works and Services, 1996). The Committee is in the process of developing a transport strategy which is aimed at:

- coordinating planning and event management;
- managing existing and future demands for parking;

- giving priority to public transport access to the precinct on existing road systems;
- developing a public transport interchange or interchanges within the precinct;
- managing traffic movements within the precinct by responding to the type and mix of events; and
- reducing reliance on the motor car and on-grass parking.

The RTA, along the State Transit Authority and South Sydney Council, is represented on the committee.

CHAPTER 4 TRAFFIC AND TRANSPORT IN EASTERN AND SOUTH-EASTERN SYDNEY

4.1 EXISTING ROAD NETWORK

The existing road network within eastern and south-eastern Sydney consists of a limited number of major corridors notably William Street/Park Street/Druitt Street providing a link from the eastern suburbs across the Central Business District to the west via the Western Distributor; the George Street/Broadway connection from the Central Business District to Parramatta Road and the M4; links to the south along the Cahill Expressway/Bourke/Flinders Streets and via South Dowling Street towards Sydney (Kingsford Smith) Airport; and Anzac Parade to Randwick and Port Botany; and links to the north via the Sydney Harbour Bridge and Tunnel.

This network is complemented by a series of secondary roads running roughly east-west and north-south. On the whole these streets were not expected to accommodate the volumes of traffic that currently use them. As a result, heavy traffic is experienced for considerable periods each day, especially at key intersections. The local environment is degraded over large areas due to the presence of heavy traffic. Examples of such routes are Oxford Street, Fitzroy/Foveaux Streets, Cleveland Street and Dacey Avenue providing east-west links, and Crown and Bourke Streets which are the main north-south links.

The important roads in the area are classified as either State Roads or Regional Roads. Selected State and Regional roads are shown in *Figure 4.1*. Maintenance and improvement of State Roads is fully funded by the RTA. Regional Roads also attract State Government funding.

The State and Regional roads in the area have many intersections which limit their through-route capacity. The only roads without property access or many intersections are the Cahill Expressway, Southern Cross Drive, Anzac Parade (north of Alison Road), Dacey Avenue and General Holmes Drive (north of Bestic Street). Part of Flinders Street, South Dowling Street and Southern Cross Drive have divided carriageways but the remaining State and Regional roads in the corridor of the proposed Eastern Distributor generally have carriageways separated only by linemarkings with four, occasionally six, traffic lanes, some of which are used for kerbside parking. A number of important north-south routes including Crown and Bourke Streets are one-way. Existing network restrictions are shown on *Figure 4.2*.

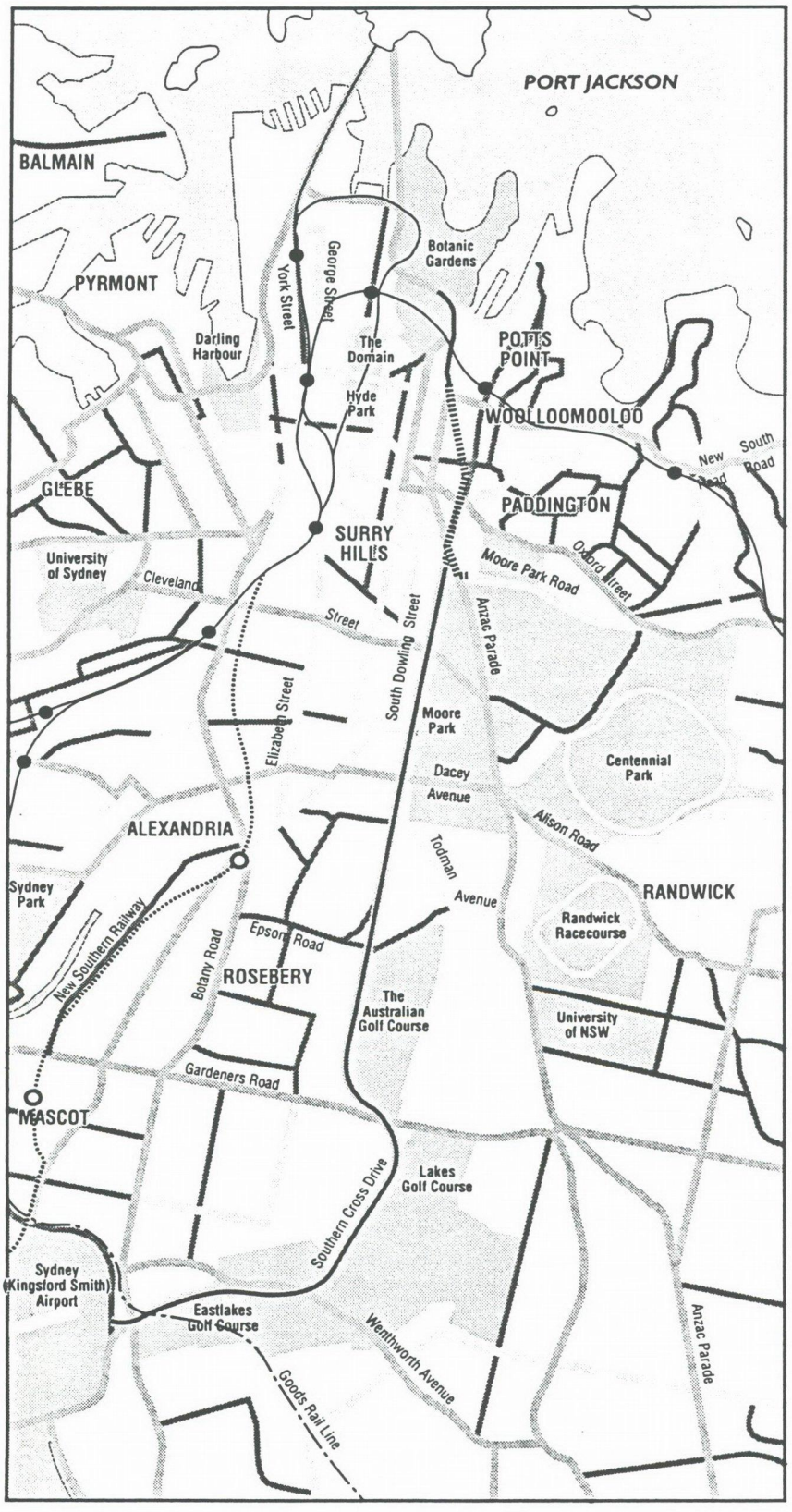


Figure 4.1

Selected State and Regional Roads

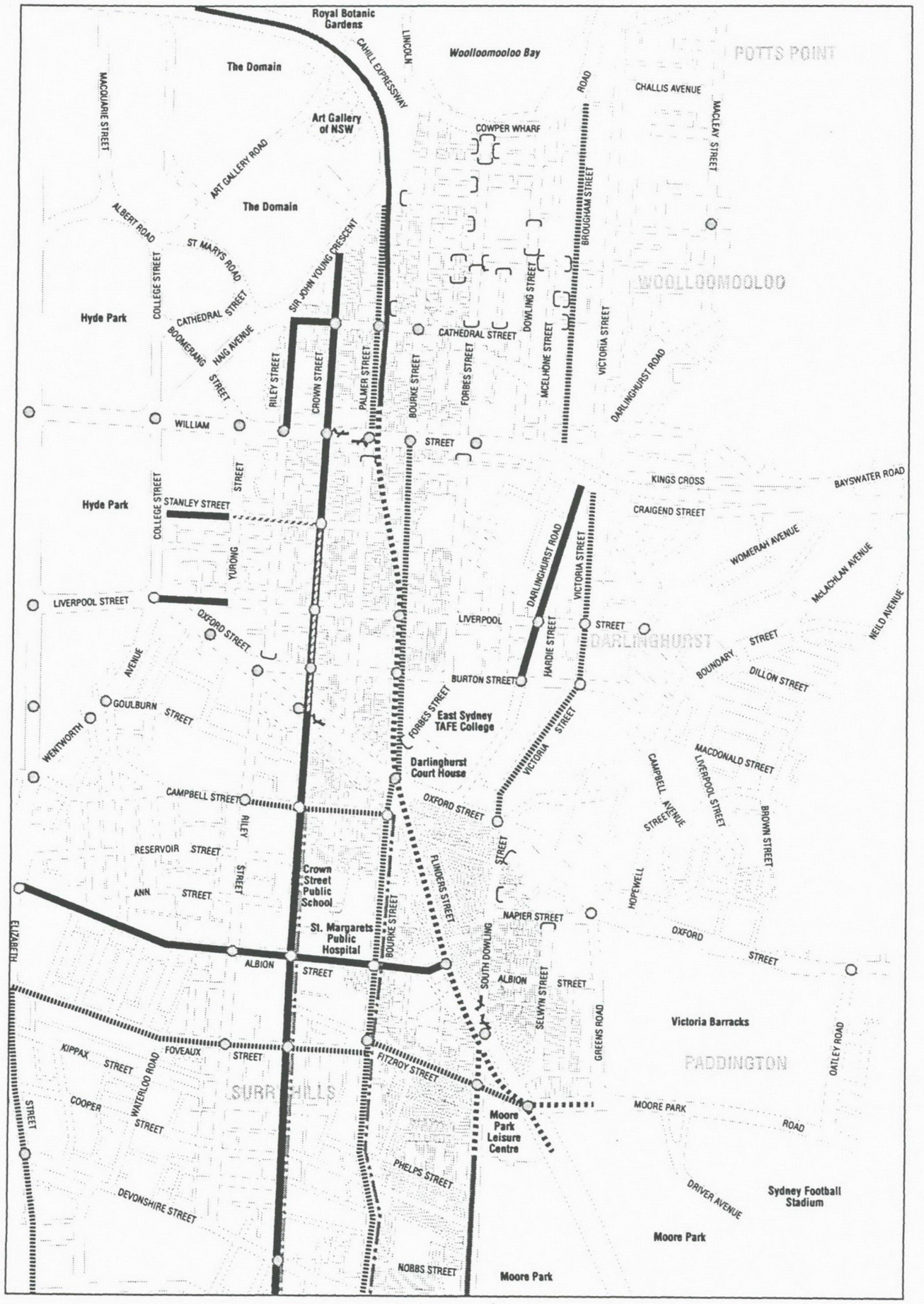


Figure 4.2a
Network Restrictions

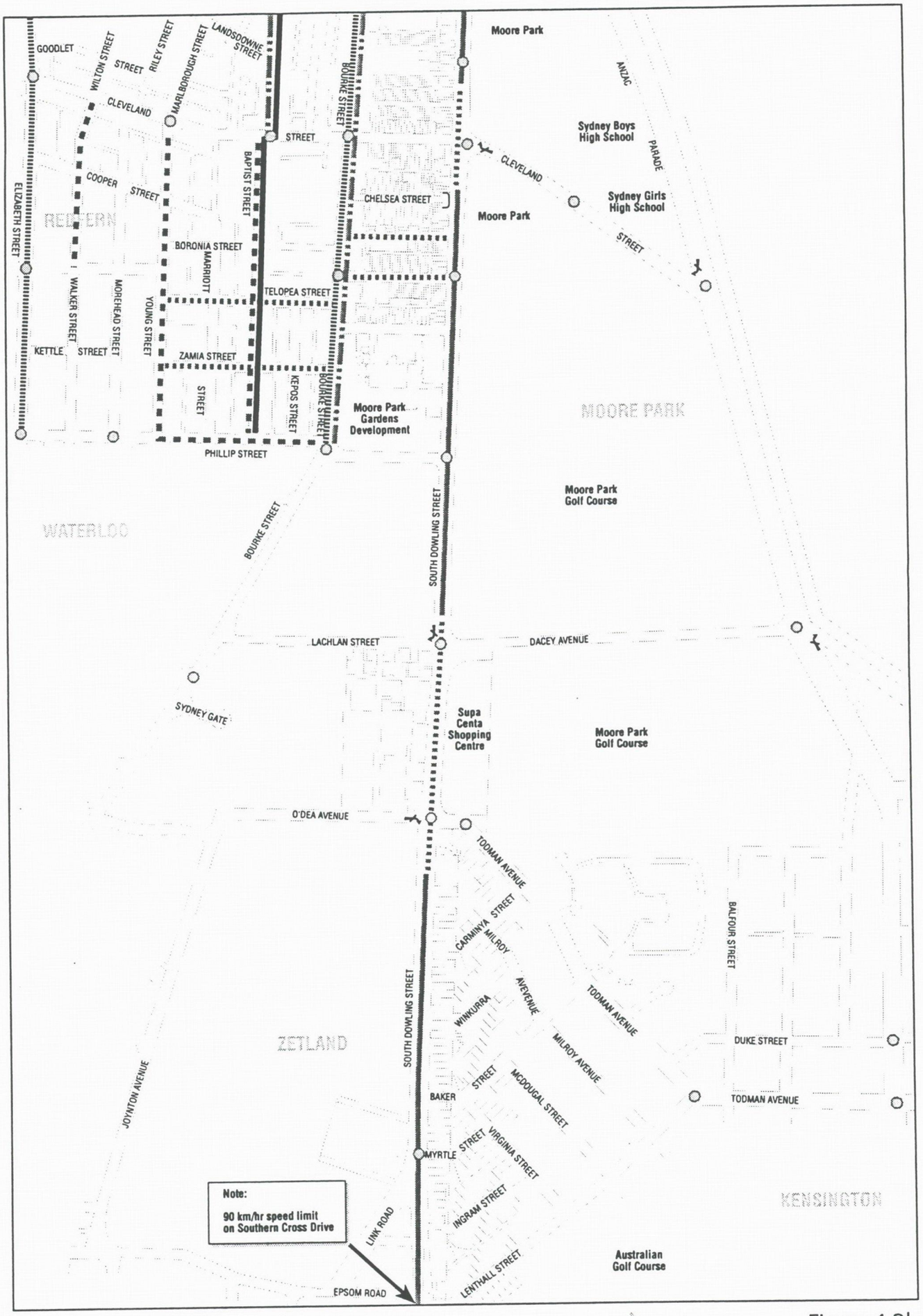


Figure 4.2b
Network Restrictions

Lack of road capacity and an inappropriate road hierarchy results in longer travel times, congestion at intersections and degradation of local amenity and safety.

The road system can be characterised as follows:

- congested State and Regional roads operating at or near capacity in the morning and evening peak periods, thereby impeding road based public transport and other traffic;
- heavy through traffic particularly on local residential streets which are used as through routes by commercial traffic and container vehicles;
- continuing traffic growth on all major roads;
- projections of further growth by the year 2011 that will cause existing deficiencies in the State and Regional road network in the corridor to become substantially worse. The results of these deficiencies can often be a degradation of urban amenity;
- heavy truck usage in the southern half of the corridor (South Dowling Street and Fitzroy/Foveaux Streets) and in the Central Industrial Area;
- poorly performing intersections with long delays in the peak hour periods; and
- slow travel speeds on major parts of the State and Regional road network in the area.

Over the next 15 years, container movements through Port Botany are expected to double and commercial traffic movements are expected to grow by about 45 percent. Passenger traffic through Sydney (Kingsford Smith) Airport will increase substantially as will associated commercial vehicle movements. Increasing activity in the Central Industrial Area is expected to result in an additional 25 percent commercial vehicle movements and urban redevelopment in the corridor will add some 25,000 people to the area, with an associated increase in personal travel demand (Sinclair Knight, 1994a).

Substantial transportation improvements are needed to support economic growth and social and environmental quality in the region and to reduce the loss of amenity resulting from the intrusion of heavy traffic onto roads not suited to it.

If road traffic grows without significant investment in new facilities and improvements to the existing network, more traffic will tend to use back routes through residential areas which are not designed to accommodate heavy

vehicles or high volumes of traffic. The results are additional congestion leading to increased costs of operation and further degradation of local amenity. Growing pressure increases the need to relieve residential areas of the effects of through traffic.

4.2 EXISTING TRAFFIC

Traffic volumes on State and Regional roads and adjacent to the Eastern Distributor corridor are typified by heaviest flows in the weekday morning and evening commuter peak periods with moderately reduced flows in business hours between the peaks. Night time and weekend flows are considerably lower, except when special events are taking place at the Sydney Showground, Sydney Football Stadium, Sydney Cricket Ground or Moore Park. In general, off peak travel has increased at rates exceeding or similar to growth in the peak period over the last decade.

Traffic volumes on State and Regional roads in the network have been growing steadily, increasing by 30 percent over the last 10 years. Traffic growth on a number of selected links is shown in *Table 4.1*.

TABLE 4.1 GROWTH IN TRAFFIC ON SELECTED LINKS

Link	Traffic Volumes (AADT)[1]			
	1981	1985	1989	1993
North-South				
Sydney Harbour				
Bridge	166,400	178,200	182,000	138,400
Tunnel	-	-	-	67,500
Crown Street (north of Cleveland Street)	14,000	14,900	17,500	N/A
Bourke Street (north of Cleveland Street)	13,700	13,900	18,700	N/A
Flinders Street (south of Albion Street)	44,500	46,000	N/A	N/A
South Dowling Street (north of Cleveland Street)	34,900	31,500	44,600	N/A
Anzac Parade (north of Day Street)	29,400	32,900	38,000	39,400
Southern Cross Drive (at Gardeners Road overbridge)	41,700	43,200	60,300	71,500
General Holmes Drive (southern end of tunnel)	64,400	64,600	75,800	82,800
East-West				
William Street (east of Forbes Street)	61,300	63,300	79,800	N/A
Oxford Street (west of Ocean Street)	48,700	50,900	56,700	59,700
Albion Street (east of Bellevue Street)	7,800	9,500	N/A	N/A
Fitzroy/Foveaux Streets (east of Elizabeth Street)	15,600	13,000	16,000	N/A
Moore Park Road (west of Driver Avenue)	19,300	21,900	N/A	N/A
Cleveland Street (west of Pitt Street)	35,000	32,100	40,300	44,300

Note: 1. AADT means Average Annual Daily Traffic.
Source: Roads and Traffic Authority, County of Cumberland Traffic Counts.

Many links in the network currently carry heavy volumes of traffic. A few of these are capable of accommodating such traffic levels while others have been adapted to provide as much capacity out of the available road space as possible. In many cases, development along these streets are not compatible with high traffic volumes resulting in a variety of conflicts and degraded amenity.

Table 4.2 provides the result of a series of traffic counts on selected links in the network. This also shows the proportion of traffic using these streets during the night.

TABLE 4.2 EXISTING TRAFFIC VOLUMES ON SELECTED LINKS, 1995/96

Link	Total Volumes		Percent of Traffic at Night
	24 hours	10 pm-6 am	
Cahill Expressway			
north of Lincoln Crescent	49,806[4] (northbound)	4,844	9.7%
Crown Street			
south of Cathedral Street	15,289	1,063	6.9%
north of Fitzroy Street	15,807	1,800	11.4%
Bourke Street			
south of Arthur Street	14,768	1,481	10.0%
north of Lachlan Street[1]	17,122	NA[2]	-
Flinders Street			
south of Albion Street	37,246 (low count)[3]	5,044	13.5%
South Dowling Street			
north of Flinders Street	14,220	1,991	14.0%
south of Fitzroy Street	56,805	3,928	6.9%
Anzac Parade			
south of Moore Park Road	38,163	3,504	9.2%
between Carlton and Goodwood Streets[1]	36,368	n/a	-
Southern Cross Drive			
at O'Connor Street	84,889	7,784	9.2%
Oxford Street[1]			-
east of Glenmore Road	31,133	NA	
Moore Park Road			
east of Oatley Road	20,803	1,954	9.4%
Lachlan Street[1]			
between Bourke and Amelia Streets	12,337	n/a	-
Gardeners Road[1]			
at Southern Cross Drive	36,962	n/a	-
east of Botany Road	24,304	2,505	10.3%

Notes:
1. Counts undertaken between 21 August 1996 and 23 September 1996. The remainder were taken in between 17 November 1995 and 15 December 1995.
2. NA means not available.
3. Low count due to southbound kerb lane not included in count.
4. Low count on particular day undertaken.

Source: Traffic and Transport Surveys.

Capacity is mainly a function of intersection capacity within urbanised areas, including the extent of uncontrolled right turning movements and other street uses.

At midblock locations a reasonable level of service is maintained during the morning peak with the exception of some sections of William Street and South Dowling Street which are over capacity in the inbound direction (towards the city). High levels of congestion are experienced in these locations at this time.

The level of congestion occurring in certain parts of the network can be indicated by assessing existing travel times and speeds as provided in *Table 4.3*.

TABLE 4.3 TRAVEL TIME DATA FOR SELECTED NETWORK LINKS, 1996

Link	Distance (km)	AM Peak		Business Hours		PM Peak	
		Time (Min)	Speed (km/hr)	Time (Min)	Speed (km/hr)	Time (Min)	Speed (km/hr)
Cahill Expressway							
Domain Tunnel to Sir John Young Crescent	1.10 (1.00)[1]	2.26 (0.92)	29 (65)	1.20 (1.04)	55 (58)	2.21 (1.00)	30 (60)
William Street							
Riley Street to Forbes Street	0.38 (0.30)	NA[2] (2.01)	NA (9)	0.66 (0.42)	16 (26)	0.54 (-)	20 (-)
Flinders Street							
Moore Park Road to Oxford Street	0.63 (0.63)	3.82 (3.55)	10 (11)	2.71 (1.47)	14 (26)	3.76 (2.83)	10 (13)
Bourke Street							
Liverpool Street to Oxford Street	0.30	1.61	11	1.20	15	1.63	11
Campbell Street							
Bourke Street to Crown Street	0.19	0.53	22	0.63	18	0.60	19
Crown Street							
Campbell Street to Sir John Young Crescent	1.12	4.02	17	2.84	24	3.55	19
South Dowling Street							
Oxford Street to Link Road	3.03 (2.65)	7.42 (6.36)	25 (25)	4.83 (5.69)	33 (28)	5.16 (7.92)	31 (23)
Southern Cross Drive							
Link Road to Foreshore Road	5.95 (5.90)	4.11 (5.67)	87 (62)	3.83 (4.35)	93 (81)	4.97 (3.87)	72 (91)
Anzac Parade							
Bunnerong Road to Moore Park Road	4.43 (4.43)	7.01 (8.00)	38 (33)	7.44 (6.90)	36 (39)	9.18 (7.98)	29 (33)

Note:
1. The figures in brackets relate to the journey in the opposite direction, that is, AM peak speed southbound from Domain Tunnel to Sir John Young Crescent is 29 kilometres per hour, and northbound from Sir John Young Crescent to Domain Tunnel is 65 kilometres per hour.
2. Not available.

Source: Roads and Traffic Authority

Differences between journey times across the day are indicative of peak hour congestion while consistently low speeds on long links in the network (one to three kilometres) suggest that the road system is not performing well.

The efficiency of a heavily loaded road network is determined primarily by the operation of its intersections. These are assessed in relation to the level of service provided and the average delay experienced by traffic using them.

An analysis has been undertaken of 14 key intersections on the network using the SCATES computer program. This was carried out for existing traffic counts and a model of the existing road network.

A number of the intersections are operating at a poor level of service with high degrees of saturation. These are as follows:

- Anzac Parade with Alison Road/Dacey Street, and with Moore Park Road;
- South Dowling Street with Lachlan Street, Cleveland Street and Flinders Street;
- Oxford Street with Bourke Street.

Further analysis of the impacts of the proposed Eastern Distributor would be undertaken during detailed design of the motorway.

4.3 HEAVY VEHICLE MOVEMENTS

Twenty four hour classification counts were carried out at the locations described in *Table 4.4*.

The proportion of heavy vehicles in the total traffic mix varies across the day. This has implications for urban amenity if a high proportion of these trips is made on roads not designed to accommodate them. Other conclusions that can be drawn from the classification counts are:

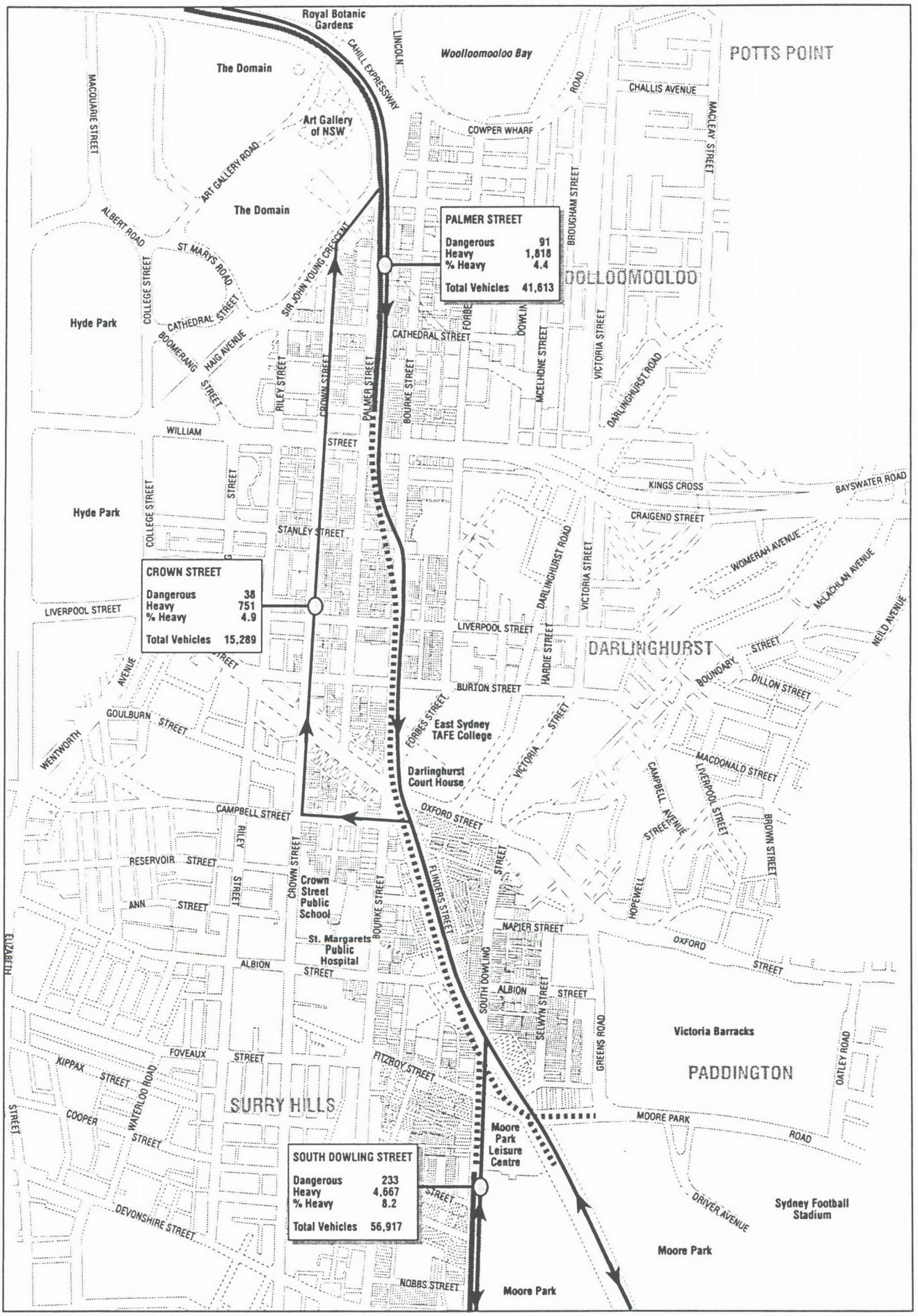
- rigid trucks and semi-trailers make up substantially higher proportions of general traffic during business hours than during peak periods;
- heavy commercial vehicles make up a relatively high percentage of all traffic from 8.00 am to 10.00 pm; and
- trucks carrying hazardous goods represent between 0.1 and 0.4 percent of all traffic throughout the day, making up less than five percent of all heavy vehicles.

Routes most commonly used by heavy goods vehicles are shown in *Figure 4.3*. Routes for dangerous goods are not prescribed but could be considered to be the same as the routes for heavy goods except where these routes contain tunnels.

TABLE 4.4 PROPORTION OF HEAVY VEHICLES ON SELECTED LINKS, 1996

Locations		1996 Modelled Traffic Volume (AADT)[1]	Heavy Vehicles in 24 hours (% of AADT)	Heavy Vehicles between 10 pm and 7 am (% of 24 hour heavy vehicles)
Cahill Expressway				
West of Art Gallery Road	n/b	60,060	3.9	13.4
	s/b	65,430	4.0	5.7
Palmer Street				
north of Cathedral Street		51,770	4.4	4.4
Sir John Young Crescent				
west of Palmer Street		61,540	4.0	5.7
William Street				
east of Palmer Street		72,730	5.1	13.5
Crown Street				
north of Oxford Street		28,540	6.3	8.0
Bourke Street				
south of Oxford Street		19,000	5.9	9.0
Flinders Street				
north of Albion Street		49,480	8.8	12.0
Bourke Street				
south of Fitzroy Street		16,400	5.9	9.0
Crown Street				
south of Foveaux Street		21,700	6.3	8.0
Moore Park Road				
east of Anzac Parade		19,070	5.7	11.2
South Dowling Street				
north of Cleveland Street		48,500	7.8	12.7
south of Cleveland Street		57,860	7.8	12.7
Cleveland Street				
west of South Dowling Street		30,840	12.5	14.0
Todman Avenue				
east of South Dowling Street		14,810	5.7	7.8
Southern Cross Drive		86,820	5.9	13.2

Note: 1. AADT's are calculated from am peak period modelling data, and are indicative only.
Source: Percentages calculated from 24 hour classification counts (Traffic and Transport Surveys, 1995).



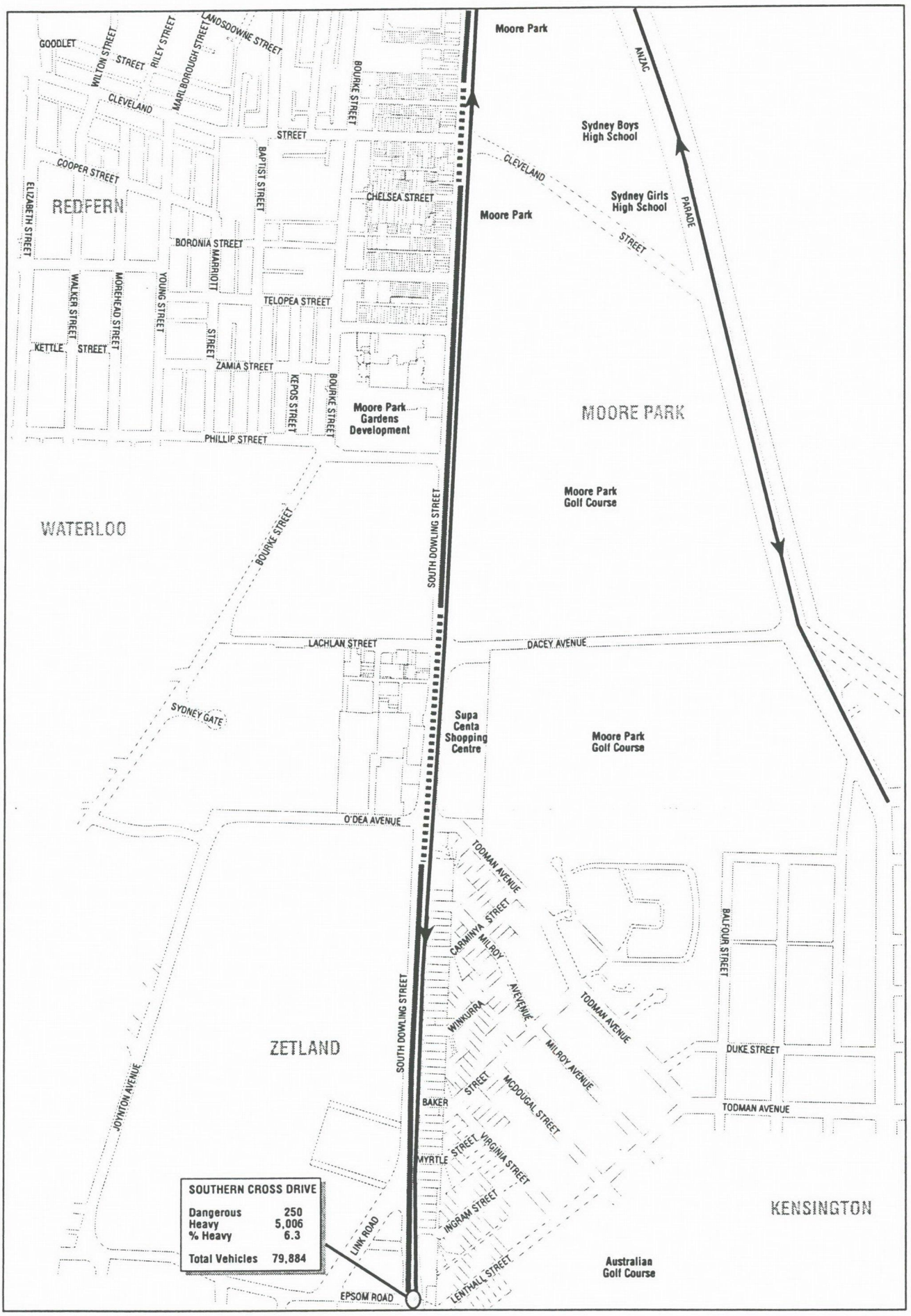
Source: Traffic and Transport Surveys

Proposed Eastern Distributor
Heavy and Goods Routes

Note: Counts are for a 24-hour period.

Figure 4.3a
Routes most commonly used by Heavy Vehicles

N 0 100 200 300 400 500 Metres



Source: Traffic and Transport Surveys

Proposed Eastern Distributor
Heavy and Goods Routes

Note: Counts are for a 24-hour period.

Figure 4.3b
Routes most commonly used by Heavy Vehicles

N

0 100 200 300 400 500
Metres

The transportation of dangerous goods through Sydney's existing road tunnels is currently restricted by the NSW Motor Traffic Regulations. Dangerous goods include:

- explosives;
- gases which are compressed, liquefied or dissolved under pressure;
- flammable liquids;
- flammable solids;
- oxidising agents and organic peroxides;
- poisonous (toxic) and infectious substances;
- radioactive substances; and
- corrosives.

In addition, many hazardous goods, such as agricultural poisons and industrial waste, are also transported by road. These have the potential to cause damage to the natural environment.

The dangerous goods that would represent the most common risk are inflammable liquids, such as petrol, which is carried by 75 percent of all dangerous goods vehicles in the area. Liquid petroleum gas and toxic gases such as chlorine would also represent a high risk. The former makes up approximately three percent of all dangerous goods vehicles on NSW roads and the latter about two percent. The only toxic gas likely to be transported through the eastern suburbs of Sydney is chlorine.

4.4 ACCIDENTS

The number and type of accidents which occurred along the corridor of the Eastern Distributor between May 1992 and December 1995 are provided in *Table 4.5*.

TABLE 4.5 ACCIDENTS ON THE EASTERN DISTRIBUTOR CORRIDOR (MAY 1992 TO DECEMBER 1995)

Section		Accident Type					No. of Accidents
		Tow Away	Fatal	Admitted	Treated	Not Treated	
Palmer Street/Bourke Street from Lincoln Crescent to Burton Street	Intersection	36	0	4	20	2	52
	Midblock	9	0	1	7	0	16
	Total	45	0	5	27	2	68
Bourke Street/Flinders Street/South Dowling Street from Burton Street to Todman Avenue	Intersection	108	0	18	71	13	185
	Midblock	63	1	5	21	5	82
	Total	171	1	23	92	18	267
South Dowling Street from Todman Avenue to Wentworth Avenue	Intersection	14	0	1	6	6	20
	Midblock	9	0	0	2	3	13
	Total	23	0	1	8	9	33
Southern Cross Drive from Wentworth Avenue to Mill Pond Road	Intersection	22	0	4	27	3	45
	Midblock	0	0	0	0	0	0
	Total	22	0	4	27	3	45
Campbell Street/ Crown Street from Flinders Street to Burton Street	Intersection	20	0	2	19	5	46
	Midblock	2	0	0	3	0	5
	Total	22	0	2	22	5	51
Crown Street from Burton Street to Sir John Young Crescent	Intersection	44	0	2	19	5	70
	Midblock	12	0	0	5	0	17
	Total	56	0	2	24	5	87
Area Total		**339**	**1**	**37**	**200**	**42**	**551**

Source: Roads and Traffic Authority.

4.5 PUBLIC TRANSPORT

Public transport in the corridor of the proposed Eastern Distributor is dominated by buses which operate trunk services for commuters over a large part of eastern Sydney in the absence of a rail network in the area. This will change to some degree in 1999 when construction of the New Southern Railway is completed. It will serve a large part of the study area to the west of the Eastern Distributor corridor. The area to the east will not be similarly

served for the foreseeable future. Existing public transport facilities are shown on *Figure 4.4*.

4.5.1 NEW SOUTHERN RAILWAY

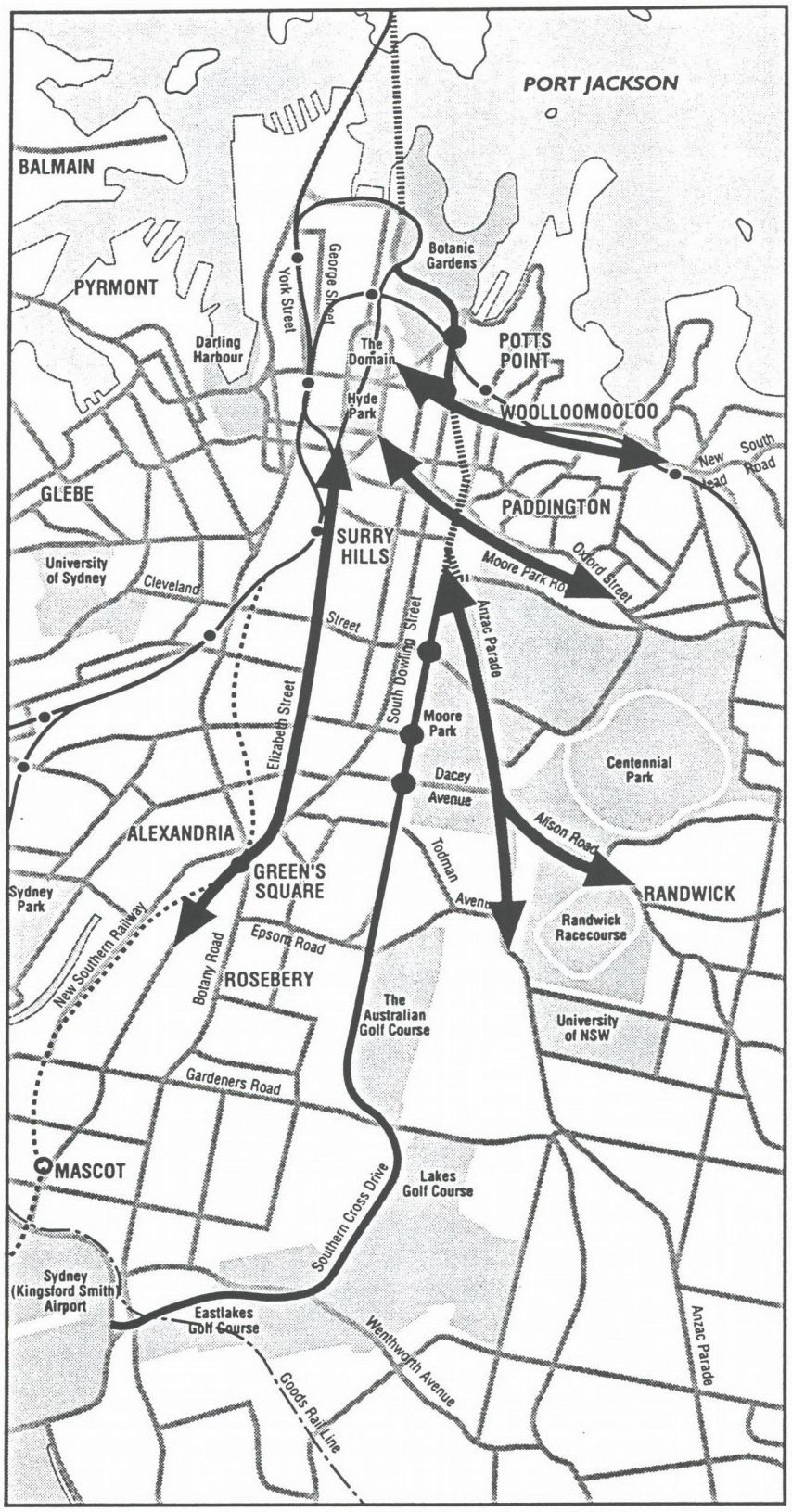
The New Southern Railway was introduced to achieve a number of objectives. Predominant among these is the necessity to increase rail capacity in the south-west Sydney region by removing capacity limitations at Sydenham and achieving a rail link between the Central Business District and the airport. Additional considerations focussed on the prospect of providing a rail link between Sydney (Kingsford Smith) Airport and the Second Sydney Airport, and supporting future urban consolidation initiatives in south Sydney. The route of the New Southern Railway and the location of the stations is shown on *Figure 4.4*.

The New Southern Railway will provide direct rail services between Sydney Central Business District and Sydney (Kingsford Smith) Airport with stations at Green Square, Mascot, Domestic and International Terminals, Wolli Creek and Turrella. It is forecast to attract up to 65,000 passenger trips per day in 2013 (Kinhill, 1994). The trip to Central Station from the International Terminal will take about 10 minutes.

The proponents expect that the New Southern Railway will result in a significant diversion to the train from other modes for travellers and employees bound for Sydney (Kingsford Smith) Airport. Public transport modes (bus and taxi) would be most affected with up to 80 percent of business travellers and 61 percent of leisure travellers who presently use buses diverting to the train to the Airport. For travellers presently using taxis, the diversion figures are 11 and 21 percent respectively, while some eight percent of business users and seven percent of leisure travellers are expected to divert to the train from private cars. For Airport employees 16 percent of current car travellers and 50 percent of bus travellers are expected to divert to the train (Kinhill, 1994).

In summary, the New Southern Railway is likely to have a significant impact on the viability of bus services to the airport, and may result in a reduction in private car trips to that location. Very small increases in road speed (in the order of 0.23 kilometres per hour) are expected as a result of the diversion of airport passengers to the rail link (Kinhill, 1994).

The New Southern Railway is also likely to result in some redistribution of bus routes to provide feeder services to the new stations at Mascot and Green Square. The railway will offer good travel times to the Central Business District and superior transfer conditions for onward travel to rail-based destinations in the north, when compared with the alternative bus/rail journey.



Main bus corridors
Rail
Rail (Under Construction)
Major Intersection Improvements
Proposed Eastern Distributor
Tunnels
Roads
Landmarks

N

1.0 2.0 Km

Figure 4.4
Existing Public Transport Facilities

The New Southern Railway EIS (Kinhill, 1994) indicates that bus-rail interchanges will be provided at Green Square and Mascot stations to cater for this demand. Car-rail interchanges (kiss and ride facilities) will also be provided at both stations, but this would be limited to kerbside pick up and set down spaces in the form of short term parking.

It is considered that Mascot station would have the greatest potential as a bus-rail and car-rail interchange, given its connections to the Kingsford/Kensington area. Sydney Buses routes 309-310, 343 and 301 could be expected to divert to serve the station, and may become feeder services terminating at Mascot station instead of their current status as trunk services to the Central Business District (although this was considered unlikely by State Transit Authority in its 1994 letter nominating issues to be considered in the EIS for the New Southern Railway).

There would be no off-street commuter car parking provided at stations on the New Southern Railway.

4.5.2 BUSES AND COACHES

Sydney Buses operates an extensive network of services in eastern Sydney, generally east of the Illawarra railway line, and from Miranda and La Perouse in the south, to Watsons Bay in the north. The principal bus corridors are shown on *Figure 4.4*.

The bus route network is essentially radial, based on the Sydney Central Business District, although some cross-regional services are provided. The lack of a heavy rail system south of Bondi Junction means that buses fulfil a trunk public transport function, meeting the needs of commuters for their whole journey. This is in contrast to the bus network in much of the rest of Sydney where buses mostly provide feeder services to rail stations.

Consequently, the network's principal characteristic relevant to the environmental assessment of the Eastern Distributor is that bus routes are dispersed through residential areas in the eastern and south eastern limits of the area to collect and distribute passengers, but converge on State and Regional road corridors to maximise directness for the transit component of their journey. The effect of this is to concentrate large numbers of buses on major arterial road approaches to the City.

The most significant corridors in terms of bus flows are Anzac Parade and Oxford Street.

Anzac Parade is the only bus corridor where bus priority is provided, and then only for part of the corridor. An exclusive bus roadway (a remnant tram corridor) parallels Anzac Parade broadly from North Kensington to Moore Park

Road. Not all bus services make use of this resource however. Since the temporary closure of the facility resulting from a double pedestrian fatality involving a bus, only about half of the buses that could benefit from the bus roadway have returned to it.

Crown, Bourke and Riley Streets are also important bus routes. Buses face severe traffic congestion on these corridors. A 1994 study of bus performance concluded that the average speed of inbound (to the City) buses on both corridors was poor, particularly on the approaches to Taylor Square (TEC Consulting, 1994). Anzac Parade bus services were travelling at an average speed of 13 kilometres per hour, and Oxford Street services at 12 kilometres per hour between 8.00 am and 12.00 noon. The target average speed of buses recommended in the study was 30 kilometres per hour.

Specific problem areas for bus services on the Anzac Parade corridor are focused around the Moore Park Road intersection, where vehicles in Moore Park Road queue across Anzac Parade at peak times, blocking the intersection. General traffic congestion in Flinders Street between Moore Park Road and Taylor Square affects buses, especially inbound to the City.

Oxford Street buses experience problems in both directions (to and from the City), associated with general traffic congestion, particularly around Taylor Square. In addition, cars parked along Oxford Street (often double parked in Paddington) cause delays to buses. At Taylor Square, vehicles in Flinders and Bourke Streets sometimes queue across Taylor Square, blocking the intersection.

Even in the face of severe traffic congestion, patronage on Sydney Buses' eastern services continues to grow strongly. Patronage of services along Anzac Parade/Flinders Street are growing at some 10 percent per annum, with Oxford Street services recording passenger growth in the order of 15 percent in the past year.

Eastern Sydney is also a focus for private coach operators serving a growing market for inbound tourism, with a number of major coach operators maintaining depots in the Botany area. Regular shuttle services travel between Sydney (Kingsford Smith) Airport and hotels and hostels in Sydney Central Business District, eastern Sydney and the northern suburbs serving the needs of tourist transfers.

4.5.3 OTHER PUBLIC TRANSPORT SERVICES

The corridor between the Central Business District and Sydney (Kingsford Smith) Airport is heavily used by taxis, hire cars and motor cycles (couriers employed by companies serving the airport). Taxis provide an important component of the total volume of public transport trips in the corridor between

the Central Business District, the eastern suburbs and Sydney (Kingsford Smith) Airport. The most important routes are:

- Central Business District/William Street/eastern suburbs;
- North Sydney/Cahill Expressway/Palmer Street/Bourke Street/Flinders Street/South Dowling Street/Sydney (Kingsford Smith) Airport; and
- George Street/Regent Street/Botany Road/Sydney (Kingsford Smith) Airport.

4.6 PEDESTRIANS AND CYCLISTS

4.6.1 PEDESTRIAN MOVEMENTS AND FACILITIES

The main pedestrian and cycle routes in the area are shown on *Figure 4.5*.

Existing pedestrian flows can be broadly divided into four types, namely:

- those following main desire lines generally along heavily used and popular streets such as Oxford Street. In such cases the streetspace is shared with traffic and conflicts can occur at cross streets;
- random movements along and across streets (the latter usually at controlled crossing points) and through the urban area for a particular purpose. Flows are usually low and these kind of movements do not demand specific facilities apart from those usually provided;
- high volume movements moving to and from major attractions. These often take place along clearly defined corridors and can have a disruptive, albeit short term impact; and
- movement across defined barriers such as roads carrying high volumes of traffic or railways where unaided crossing is potentially dangerous. Pedestrians are usually unable to cross such barriers unless a controlled or grade separated crossing is available.

Pedestrian crossings of South Dowling Street are restricted to the light controlled intersections at Cleveland, Crescent and Lachlan Streets, and Todman Avenue and the mid-block crossing adjacent to Nobbs Street. There is a proposal to introduce an additional crossing by ramped bridge as part of the residential development being undertaken between Madison and Crescent Streets. This crossing was a condition of Council consent for the development and would replace the adjacent controlled crossing.

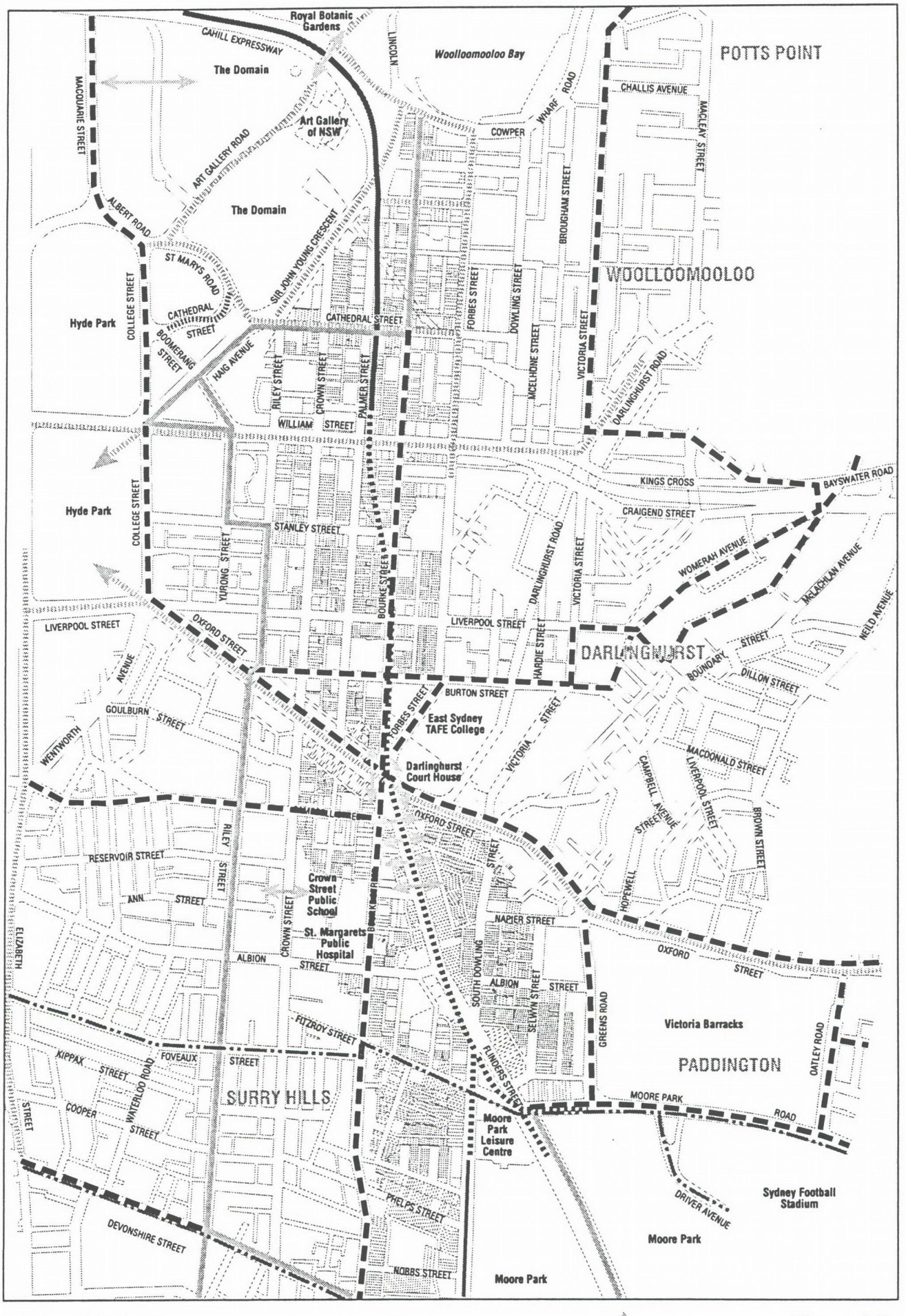


Figure 4.5a

Main Pedestrian and Cycle Routes

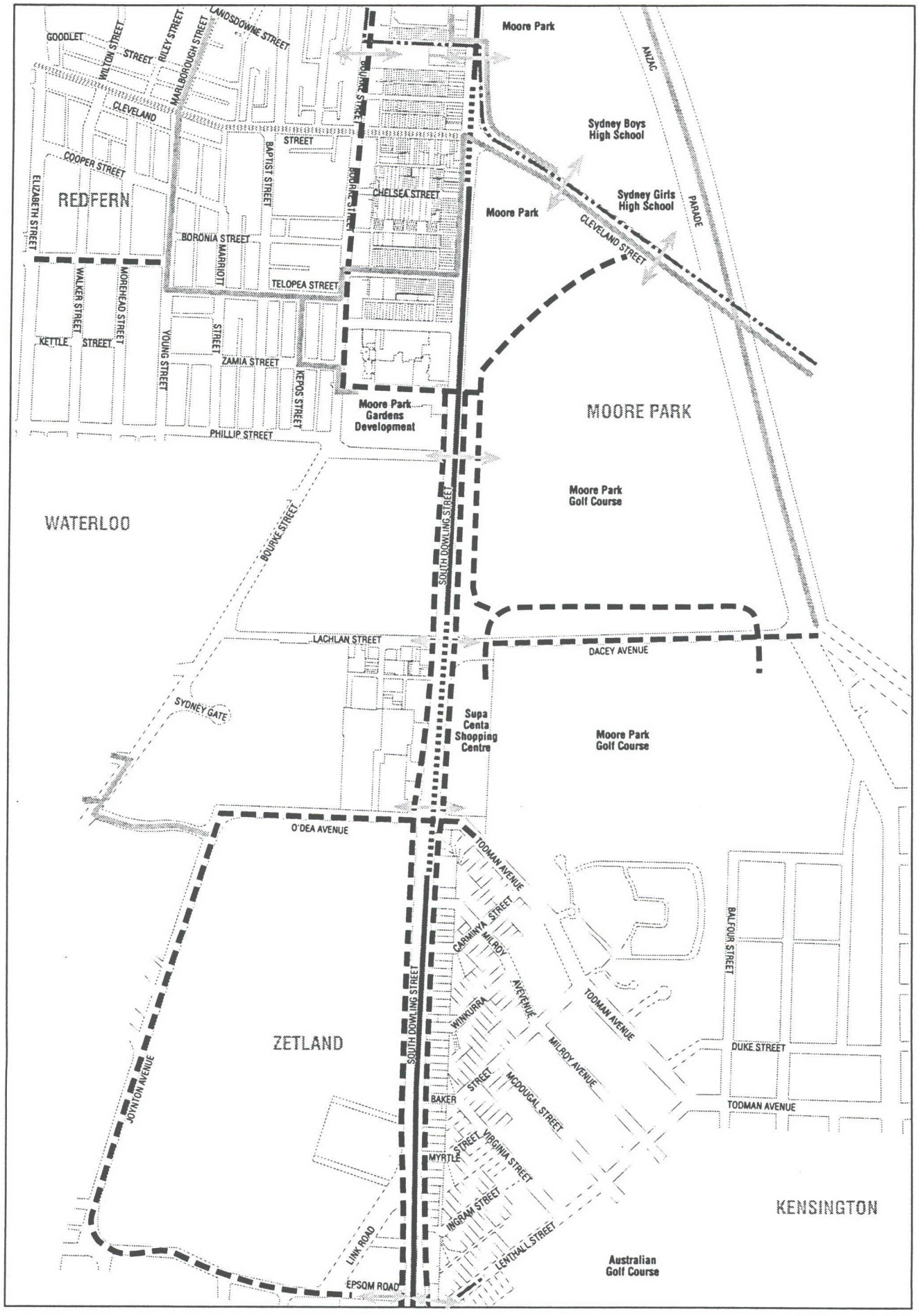


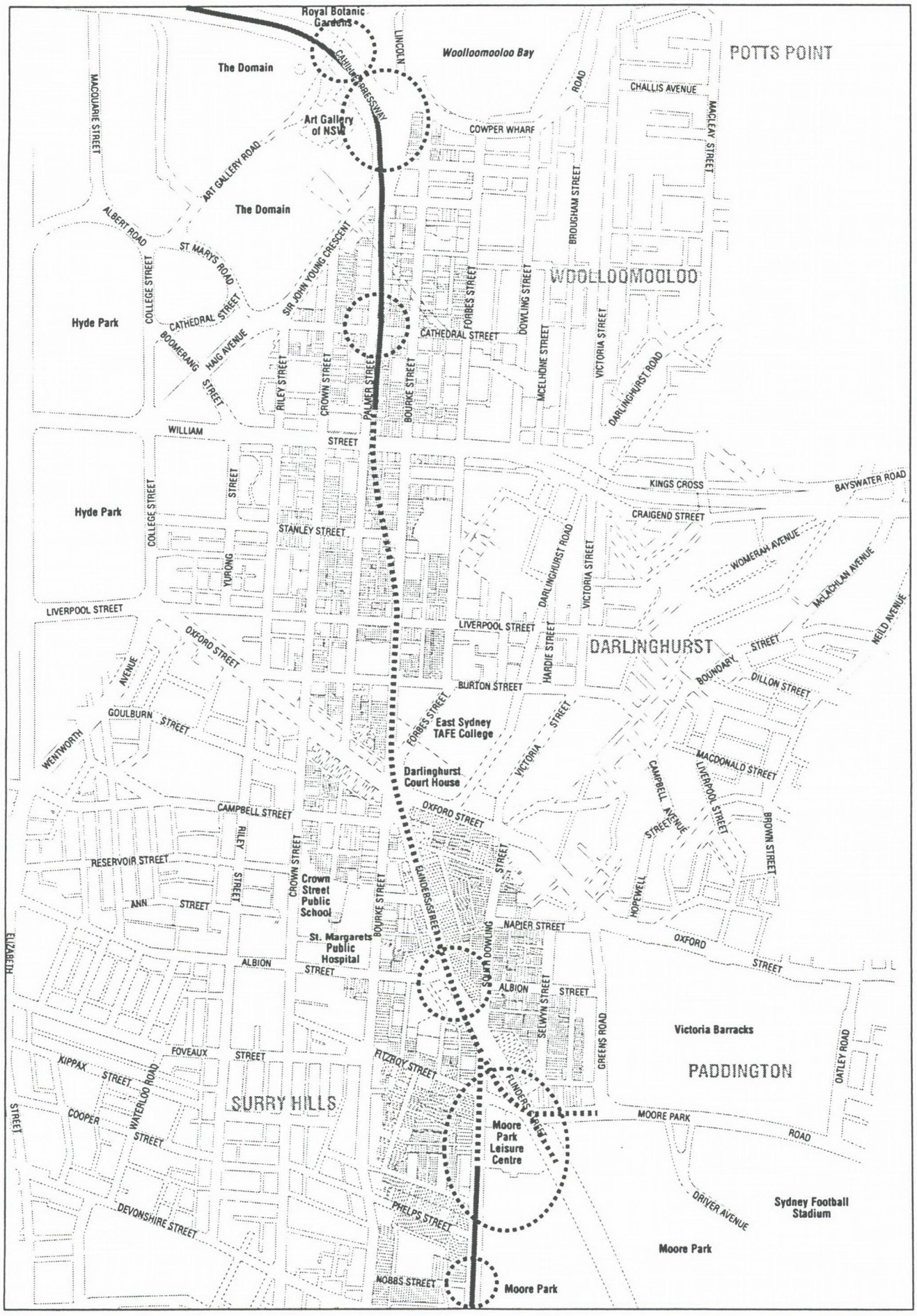
Figure 4.5b
Main Pedestrian and Cycle Routes

A series of pedestrian counts has been undertaken to assess existing movements within the corridor. The results are provided in *Table 4.6* and their location shown on *Figure 4.6*.

TABLE 4.6 PEDESTRIAN VOLUMES AT SELECTED LOCATIONS, 1996

Location	Pedestrians		
	Sunday 10 am to 5 pm	Tuesday 7 am to 12 noon	Tuesday 12 noon to 5 pm
Art Gallery Road			
To Woolloomooloo	483	97	281
From Woolloomooloo	719	732	419
Sir John Young Crescent	126	73	37
Cahill Expressway	478	287	223
Palmer Street	212	109	93
Lincoln Crescent	483	262	227
Flinders Street			
South Dowling Street to signalised crossing	57	49	44
Signalised crossing	211	255	207
South Dowling Street			
Fitzroy to Phelps	275	47	51
Phelps to signalised crossing	262	119	76
Signalised crossing	179	125	161
Signalised crossing to Cleveland	35	22	10
Crown Street			
North of Cathedral Street	224	281	368
South of Cathedral Street	156	198	256
Cathedral Street			
East	74	149	183
West	70	108	132
Drivers Triangle			
Flinders Street	44	22	19
Moore Park Road	97	85	77
Anzac Parade	133	72	58
Fitzroy Street	154	100	82

Source: Traffic and Transport Surveys.



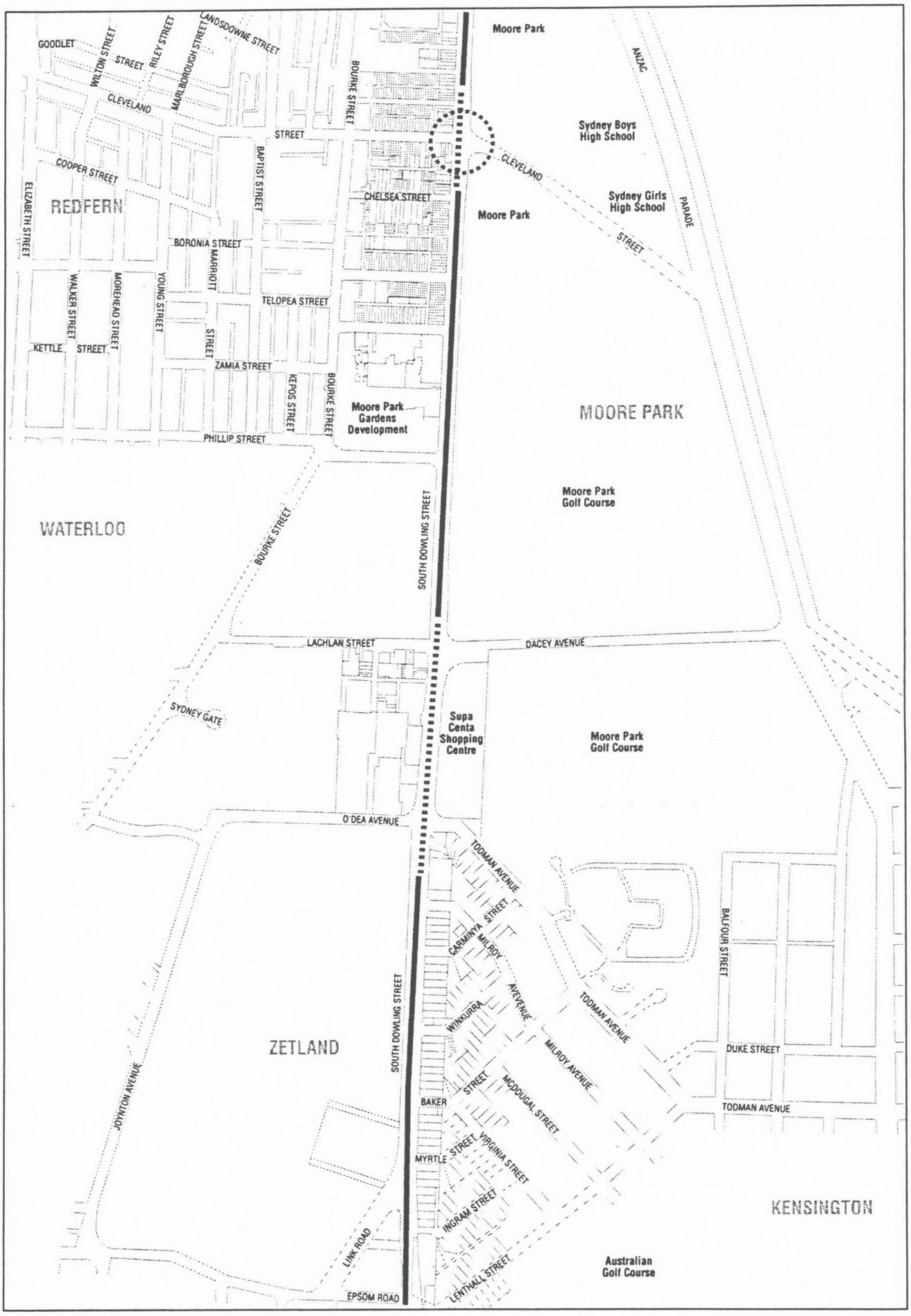
Proposed Eastern Distributor

Pedestrian Count Locations

N

Figure 4.6a
Location of Pedestrian Counts

0 100 200 300 400 500
Metres



Proposed Eastern Distributor

Pedestrian Count Locations

N

Figure 4.6b
Location of Pedestrian Counts

0 100 200 300 400 500
Metres

Difficulties for pedestrians occur where space is shared with high volumes of traffic or where pedestrian desire lines are severed by footways adjacent to major roads or roads carrying rapidly moving vehicles.

Areas which may be considered to have unsatisfactory conflicts between pedestrians and traffic are:

- Domain/Woolloomooloo area where east-west pedestrian movements cross Palmer Street and the intersection of the Cahill Expressway, Cowper Wharf Road and Sir John Young Crescent. Heavy north-south flows on Palmer and Crown Streets are also a deterrent to pedestrian movement;

- combinations of heavy traffic volumes and substantial pedestrian movements along and across William Street create conflicts at peak periods and for substantial periods during the remainder of the day;

- heavy north-south traffic flows on Bourke and Crown Streets between William and Oxford Streets inhibit east-west pedestrian movement in East Sydney which has a relatively large population of older residents;

- traffic and pedestrian volumes in the Taylor Square area produce high levels of conflict resulting in unsatisfactory conditions for both. The same circumstances apply along Flinders Street and at Drivers Triangle; and

- peak volumes of pedestrian and vehicle movement associated with special events in the Moore Park/Centennial Park area exacerbates existing problems at Drivers Triangle and along Flinders Street. These are one-off events, however, which usually take place outside peak traffic periods. As such they can be treated separately.

4.6.2 CYCLISTS

Bicycle movements can be broadly divided into two categories:

- recreational movements which can be informal including the use of both streets and open spaces, or organised in the case of road racing which is unlikely to take place on city streets except on special occasions; and

- commuter movements which are similar to other journeys to work.

Some of these movements can be clearly defined and facilities put in place to cater for them. Others simply make use of the available space and do not require any special provision.

Sydney's south-eastern suburbs provide a focus for cycling activity. Important recreational areas which generate cycling activity including Centennial Park and Moore Park are located close to the Eastern Distributor proposal. Off-road cycle paths run parallel to Anzac Parade in Moore Park and Oxford Street is an important corridor for cyclists providing access to the city.

Two issues are of particular relevance, namely:

- access to Moore Park, Centennial Park and the Showground area for recreational cyclists;
- provision for commuter cyclists on the main approach routes to and from the Sydney Central Business District, the Green Square Railway Station, Sydney (Kingsford Smith) Airport, University of New South Wales and the south-eastern and southern suburbs; and
- commuter and sporting cyclists using Southern Cross Drive.

CHAPTER 5 FUTURE TRANSPORT NEEDS

5.1 STRATEGIC BACKGROUND

A principal conclusion derived from current State Government transport and planning policies and strategies is the need to service the important zones of economic activity formed by Port Botany, Sydney (Kingsford Smith) Airport and the Central Industrial Area.

5.1.1 PORT BOTANY

Port Botany generates substantial heavy commercial vehicle and rail traffic. This is forecast to grow strongly to the year 2011 with cargo volumes expected to grow by 60 percent over present levels. Approximately 25 percent of containers are moved by rail either to and from Port Botany. This is expected to increase to about 35 percent following improvements to the rail system. A reduction in the proportion of freight carried on roads will result, but this still amounts to an increase from about 2,000 to 3,000 vehicle movements a day, an increase of 50 percent by 2011 (Sinclair Knight, 1990).

5.1.2 SYDNEY (KINGSFORD SMITH) AIRPORT

Sydney (Kingsford Smith) Airport presently handles about 260,000 aircraft movements and over 18 million passengers a year. By 2005 aircraft movements are expected to reach about 320,000 a year carrying freight and over 28 million passengers (Department of Transport and Regional Development, July 1995). These forecasts are presently under review and future activities at Sydney (Kingsford Smith) Airport will depend on the development and role of Sydney's second airport which is currently the subject of a separate EIS.

Air cargo is expected to total 690,000 tonnes per annum by 2011, an increase of 92 percent over current volumes (Sinclair Knight, 1990). In parallel with this growth in usage, the number of airport employees is expected to increase to 40,500 by 2011, double current levels. Traffic generated by Sydney (Kingsford Smith) Airport is expected to grow over the next 15 years at a rate commensurate with the growth in passengers and employment. This is predicted to reach 7,760 vehicles per hour by 2000 rising to about 11,000 per hour by 2011. At present, 77 percent travel by private car, 12 percent by taxi and 11 percent by bus, coach or hire car. The completion of the New Southern Railway is expected to result in the diversion of between 20 to 25 percent of these trips away from road transport. This will be mainly at the expense of the existing bus services (Kinhill, 1994). It is expected that between 75 and 80 percent of all airport related trips will still be undertaken

by road, placing an additional 4,700 trips per hour onto the network in the morning peak by 2011. In association with the substantial growth in freight movements at the airport, the additional road traffic will result in significant increases in congestion in the vicinity of the airport if improvements to the road network are not implemented.

5.1.3 THE CENTRAL INDUSTRIAL AREA

Employment is expected to grow in this area as redundant industrial areas are redeveloped mainly in response to airport related pressures. Total employment is expected to increase from about 154,000 to 181,000 by 2011 (Sinclair Knight, 1990). Even with the New Southern Railway in place it is still expected that the road system will need to accommodate an additional 2,650 vehicles per hour into the area in the peak period.

5.1.4 OTHER MAJOR DEVELOPMENTS IN THE STUDY AREA

The development of a new medium to high density residential area in Waterloo/Zetland as proposed in the *New Southern Railway Urban Planning Strategy* (Department of Planning, 1994) will introduce between 23,000 to 27,000 new residents who will place substantial additional demands on the road network even though the new station at Green Square will be located at the western edge of the site. This area is expected to generate 7,500 additional trips during the peak, approximately 2,600 (35 percent) would be by car. The majority of these trips are likely to focus on South Dowling Street and the proposed Southern Arterial at Green Square (Department of Planning, 1994).

These estimates of growth have major implications for future investments in transport infrastructure. Appropriate application of resources is necessary to achieve predicted regional economic benefits and to manage and improve local amenity and safety for the large number of residents affected by the results of that growth.

Transport infrastructure provides a vital link between residential populations, employment and services. Road based transport is a key element of that infrastructure. Traffic volumes in the eastern and south-eastern suburbs of Sydney are presently high and are expected to become higher by 2011.

5.2 FUTURE TRAFFIC

5.2.1 THE STRATEGIC MODELLING PROCESS

The traffic modelling process involves the use of limited and sometimes inconsistent data to produce a trip matrix which is then applied to a simulation

of the road network to assign traffic. Ideally, an accurate matrix of current trips applied to a perfect road network would produce a traffic assignment that accurately matches the average of traffic movements (which themselves are variable) perfectly for the time period covered by the model. Invariably, the results do not completely correspond to existing conditions and are even more variable for future conditions.

Traffic generation and distribution in the future depends upon:

- future population and employment patterns;
- other land use factors, such as recreation and entertainment patterns, airport passenger movements and university activity;
- vehicle trip generation influences, including the relative cost of travel by competing modes and the effectiveness of public transport and non-motorised travel initiatives;
- the availability of petroleum based fuels and the cost or attractiveness of alternative energy sources;
- the influence of technology on travel demand and system capacity; and
- policy issues associated with pricing, traffic management and traffic demand management.

Where future traffic figures are quoted in this EIS a range is provided. This reflects a considered viewpoint about uncertainty in travel in the year 2011. The range is drawn from data from traffic models produced for particular and sometimes varying purposes. In assessing the scale of key elements of the Eastern Distributor, the full range has been considered together with safety aspects such as lane balances, traffic weaving and interchange connections. For noise and air quality assessment the "worst case" aspects of the range have generally been adopted in order to provide conservative responses. This same conservatism has been applied to the economic performance where a traffic model with a low trip generation overall, and with an assumed high level of toll sensitivity, has been used to assess vehicle kilometres and vehicle travel times for build and no-build scenarios.

The EIS Study team had access to three traffic network models. In combination the available model data is adequate for design and assessment purposes provided it is viewed collectively, its limitations understood and it is interpreted by experienced designers and traffic planners. It is appropriate in these circumstances to select data from all available sources and provide ranges of traffic data where absolute numbers could be misleading.

Key elements of the Eastern Distributor design have been based on an assessment of a combination of model data. In certain instances, the design has been determined by other influences such as road safety considerations where this involves lane continuity, weaving, merging and diverging. In other cases, property acquisition has influenced the design of intersections. Here, capacity has been constrained by external factors and the proposal does not automatically satisfy unconstrained demand.

A description of the modelling process used for the EIS and the outputs of that process is documented in Working Paper No. 3 (Rust PPK, 1996c). Modelling work was undertaken for Airport Motorway by Symonds Travers Morgan using the EMME/2 traffic model. As a comparison Rust PPK undertook a modelling exercise using a combination of the TRACKS and EMME/2 models. To allow a range of potential impacts to be assessed, the TRACKS model used lower overall trip generation and a higher diversion of motorists from the motorway. Results of both models are presented below.

5.2.2 FUTURE TRAFFIC

The range of results of the traffic modelling under two scenarios are summarised in *Table 5.1*. This sets out annual average daily two-way traffic volumes (one-way where appropriate) for a representative selection of links in the network as shown in *Figure 5.1*. Comparison of these figures allows an assessment to be made of the expected traffic impacts of future conditions in comparison with those pertaining now. Alternatively assessments can be made of the continuing growth in traffic volumes and their distribution in a situation with or without the Eastern Distributor.

TABLE 5.1 MODELLED TRAFFIC ESTIMATES (AADT)

	1996	2011 Low Travel Demand[1]		2011 High Travel Demand[1]	
	Existing[1]	Without Proposal	With[2] Proposal	Without Proposal	With Proposal
Figure 5.1a Cahill Expressway to William Street					
1	3,700	7,100	10,000	11,400	13,800
2	62,000	64,000	66,000	62,000	74,000
3	60,000	65,000	25,700	64,000	51,000
4	NA	NA	44,100	NA	31,700
5	NA	NA	45,100	NA	57,000
6	NA	NA	33,700	NA	63,000
7	NA	NA	20,700	NA	16,300

TABLE 5.1 CONTINUED

	1996	2011 Low Travel Demand[1]		2011 High Travel Demand[1]	
	Existing[1]	Without Proposal	With[2] Proposal	Without Proposal	With Proposal
8	9,400	9,300	22,400	20,500	21,200
9	NA	NA	11,100	NA	Low Flow
10	NA	NA	7,300	NA	6,100
11	25,000	31,700	4,600[3]	37,800	11,400
12	16,900	16,700	200	19,400	2,900
13	64,000	67,000	42,500	48,300	33,500
14	64,000	66,000	49,800	41,600	34,500
15	73,000	75,000	85,000	62,000	60,000
16	73,000	75,000	85,000	62,000	60,000
Figure 5.1b Stanley Street to South Dowling Street Area					
1	28,500	33,800	9,400[3]	46,000	14,200
2	43,300	41,500	Low Flow	39,300	Low Flow
3	NA	NA	40,900	NA	69,000
4	37,900	47,600	41,800	34,200	29,800
5	32,100	40,200	31,000	35,800	33,300
6	NA	NA	5,600	NA	57,000
7	49,500	53,000	23,700	60,000	26,900
8	19,000	19,500	6,900	17,000	10,700
9	58,000	62,000	24,700	67,000	37,100
Figure 5.1c Fitzroy Street to Cleveland Street Area					
1	22,800	23,200	21,400	29,500	23,000
2	NA	NA	13,200	NA	21,300
3	28,900	35,800	11,200	42,500	21,500
4	46,600	50,000	24,600	48,400	34,600
5	NA	NA	800	NA	3,100
6	19,700	21,700	27,700	28,500	30,400
7	19,700	21,700	26,900	29,700	32,400
8	37,200	38,400	39,700	44,300	43,800
8	NA	NA	42,300	NA	43,100
10	24,500	25,100	18,100	32,100	19,500
11	24,000	28,400	3,400	26,900	6,600
12	NA	NA	49,400	NA	52,000

TABLE 5.1 CONTINUED

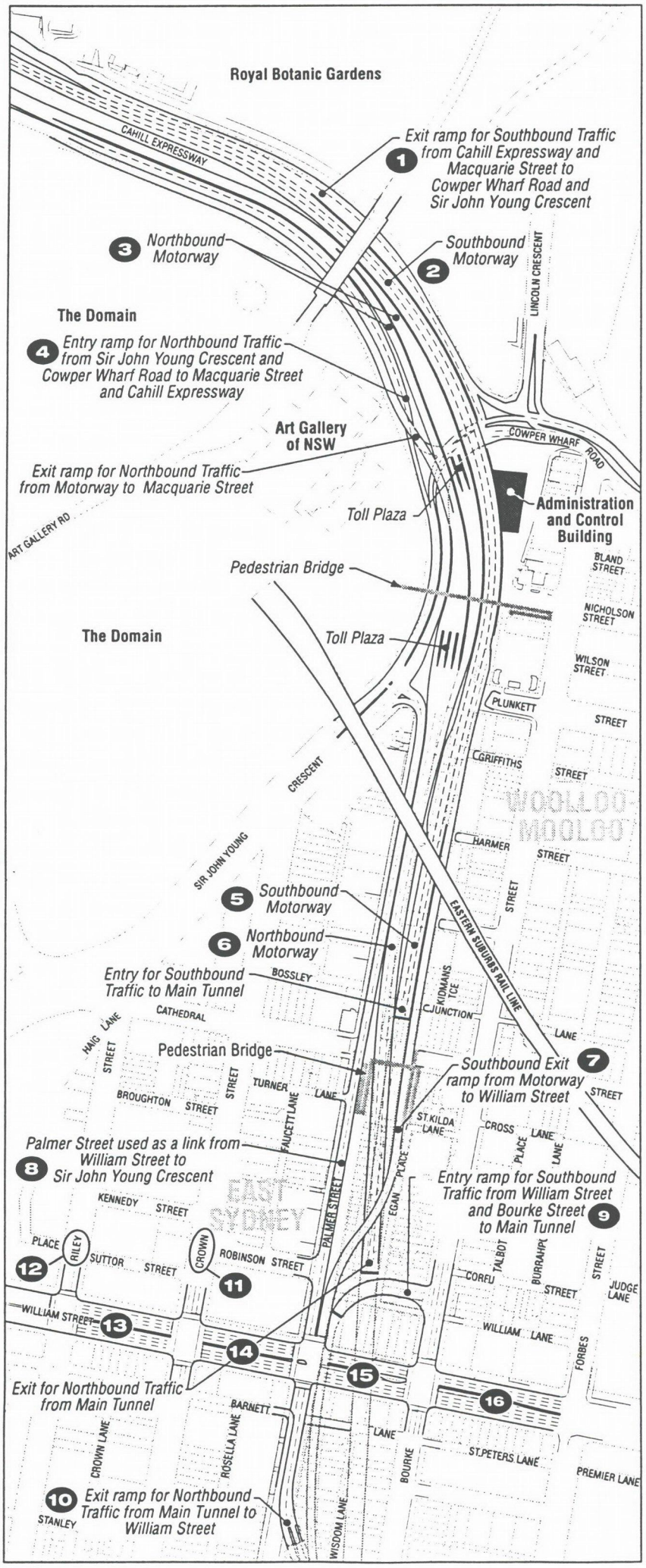
	1996	2011 Low Travel Demand[1]		2011 High Travel Demand[1]	
	Existing[1]	Without Proposal	With[2] Proposal	Without Proposal	With Proposal
13	NA	NA	27,700	NA	47,400
14	24,500	25,100	22,200	32,100	26,500
15	30,900	32,300	36,800	35,300	31,100
16	30,100	30,700	29,800	39,400	29,300
17	NA	NA	48,400	NA	52,000
18	NA	NA	23,500	NA	40,100
19	24,800	28,700	1,600	36,300	8,500
20	33,100	33,900	34,300	34,300	26,900
Figure 5.1d Cleveland Street to Todman Avenue Area					
1	15,900	16,600	22,000	23,100	20,100
2	NA	NA	29,900	NA	33,500
3	25,100	26,800	21,100	26,300	27,500
4	44,900	44,500	22,800	35,800	18,900
5	NA	NA	49,700	NA	57,000
6	7,200	13,100	21,600	38,900	38,900
7	29,500	29,600	29,100	39,700	36,400
8	36,000	37,300	20,800	30,500	22,300
9	46,600	52,000	28,900	37,000	20,400
10	NA	NA	49,700	NA	57,000
11	NA	NA	29,900	NA	33,500
12	14,800	13,300	16,000	19,000	25,400
13	16,500	16,500	16,400	22,400	20,600
Figure 5.1e Dowling Street Area					
1	44,900	52,000	16,200	42,800	12,000
2	33,800	35,300	11,500	31,700	10,500
3	NA	NA	29,900	NA	44,000
4	NA	NA	46,600	NA	63,000
5	17,300	29,400	12,800	13,500	10,300
6	18,100	21,100	19,400	15,400	18,800

TABLE 5.1 CONTINUED

	1996	2011 Low Travel Demand[1]		2011 High Travel Demand[1]	
	Existing[1]	Without Proposal	With[2] Proposal	Without Proposal	With Proposal
Additional Roads					
Crown Street (Between Devonshire and Foveaux)	21,700	27,300	4,800[3]	16,700	13,600
Bourke Street (between Devonshire and Foveaux)	16,400	17,100	13,400[4]	18,800	14,200[4]
Elizabeth Street (between Devonshire and Foveaux)	9,100	15,100	9,000	18,900	14,600
Ocean Street (between Albert and Trelawney)	NA	NA	NA	26,100[5]	27,000[5]
Southern Cross Drive (south of Wentworth Avenue)	70,000	89,000	85,000	86,000	109,000

Notes

1. With some exceptions related to one-way roads annual average daily traffic (AADT) flows have been calculated from two hour morning peak values derived from the TRACKS model by applying the factor 13/1.8 and from a 1 hr peak period with a factor of 13 from the EMME/2 model. However these factors will vary depending on the nature of the road and the traffic carried by it with significant peak spread changes.
2. The toll sensitivity in the TRACKS modelling is much higher than likely to occur.
3. The TRACKS numbers on Crown Street are lower than may be achievable through local area traffic management therefore the high travel demand traffic flows are considered more likely.
4. The numbers on Bourke Street betwen Devonshire and Foveaux are higher than may be achievable through local area traffic management.
5. Actual flow volumes on Ocean Street, depending upon location, range from 15,000 to 22,000 vehicles per day.
6. TRACKS modelling data has been used as the basis for Existing (1996) and Low Travel Demand (2011). Modelling data from Symonds Travers Morgan has been used as the basis for High Travel Demand (2011). Generally, the Year 2011 TRACKS model has fewer vehicle tirps thatn the Year 2011 STM model. They reflect the variabilityof future travel predictions as explained in Section 5.2.1. On particular links in the network the Year 2011 TRACKS model may still assign higher vehicle flow rates than the Year 2011 STM model.
7. NA means not applicable or not available.



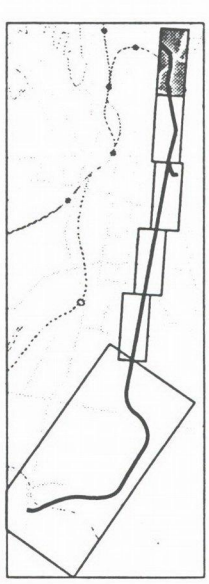


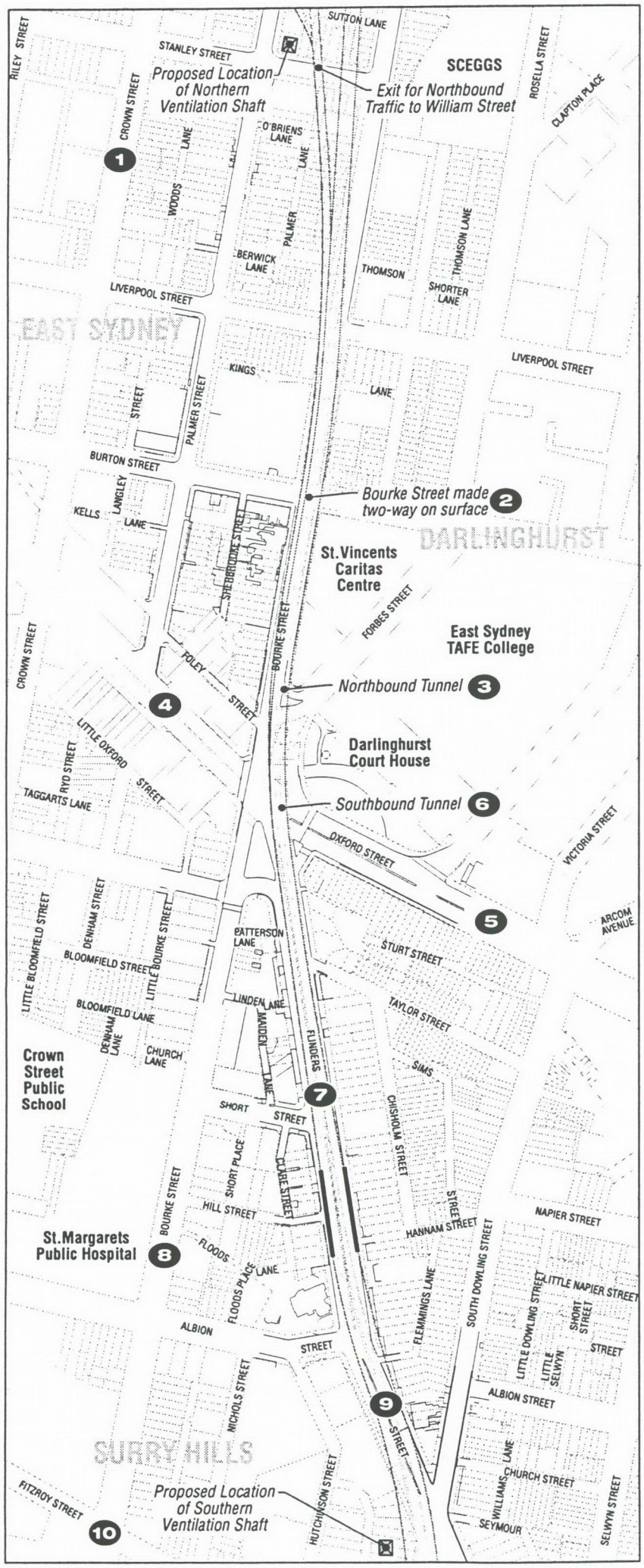
Figure 5.1a

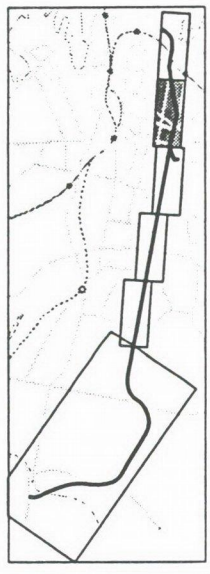
Selected Annual Average Daily Traffic Volumes

N

0 40 80 120 160 200

Scale: 1: 4000 Metres





Double Decker Tunnel

Figure 5.1b

Selected Annual Average Daily Traffic Volumes

N

0 40 80 120 160 200

Scale: 1: 4000 Metres

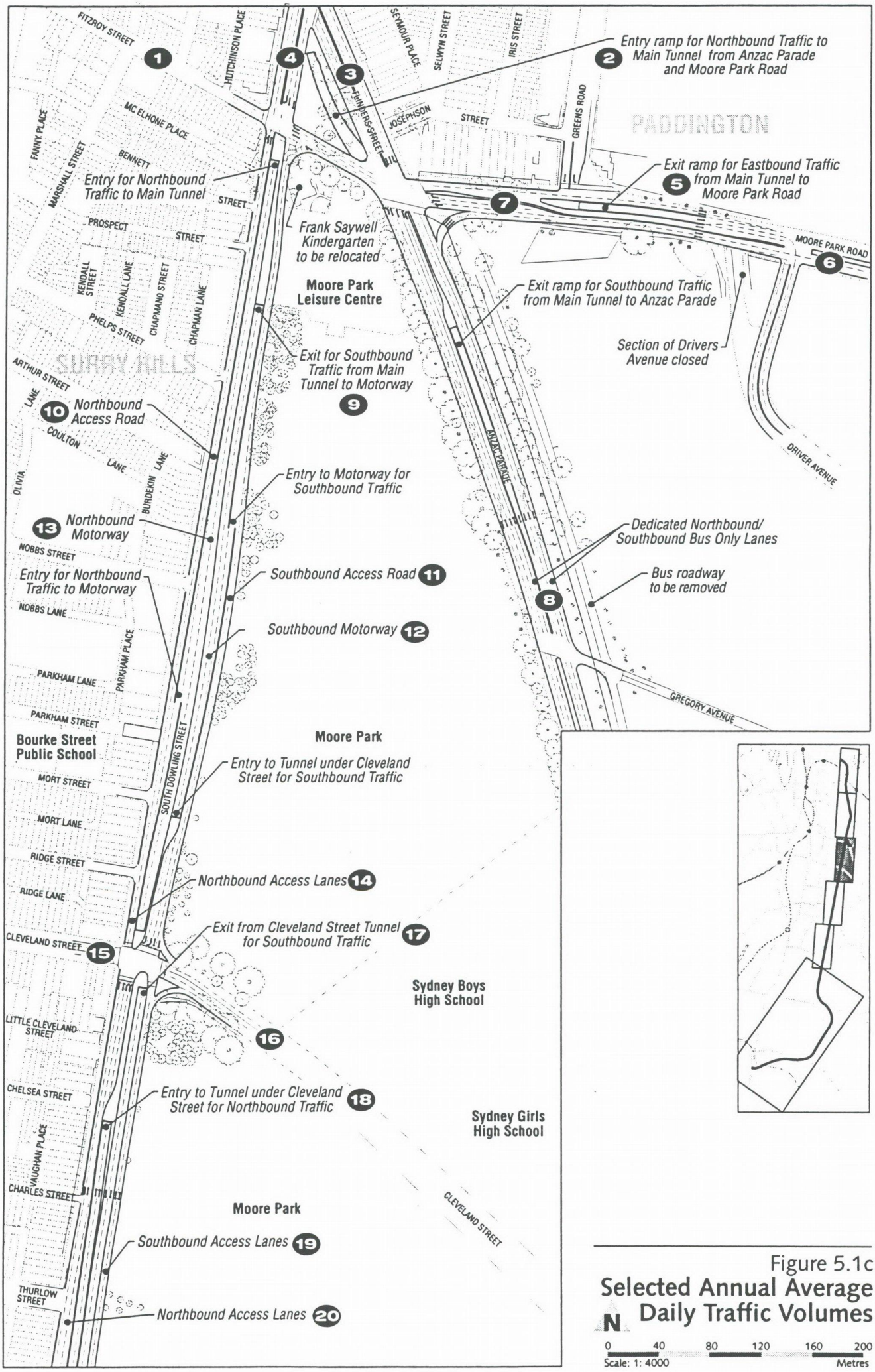
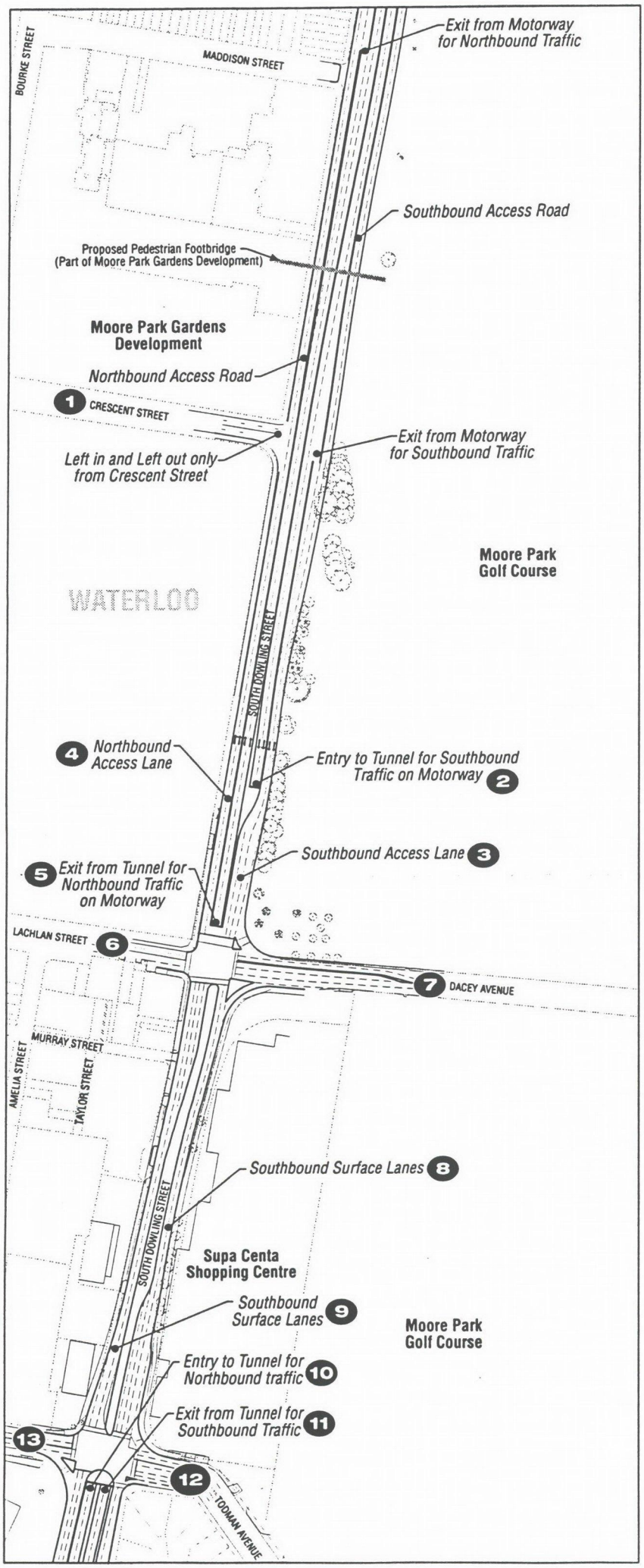


Figure 5.1c

Selected Annual Average Daily Traffic Volumes



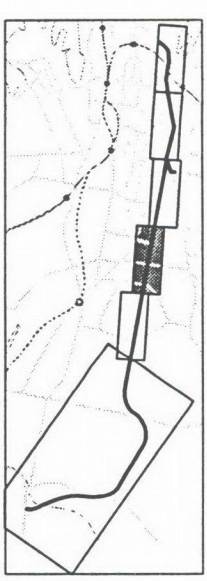


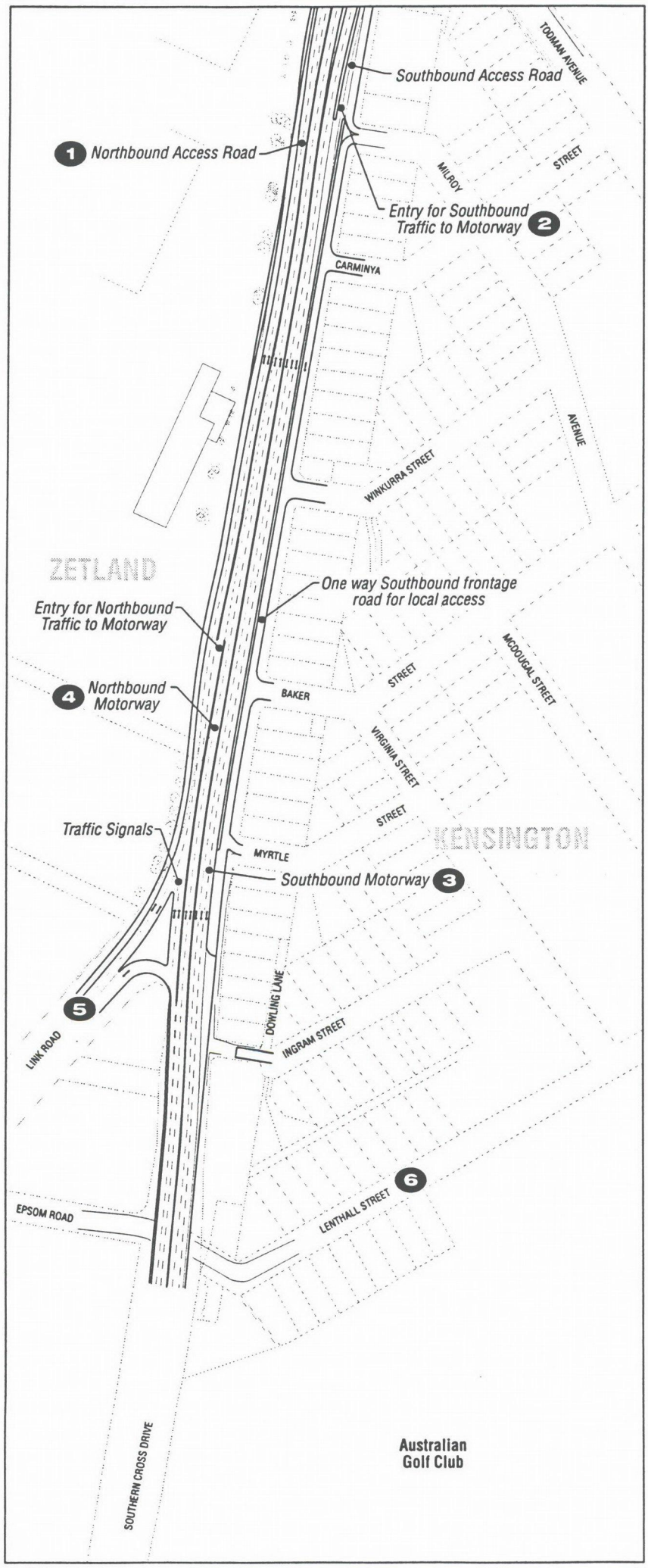
Figure 5.1d

Selected Annual Average Daily Traffic Volumes

N

0 40 80 120 160 200

Scale: 1: 4000 Metres



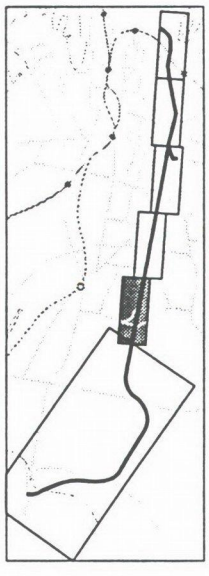


Figure 5.1e
Selected Annual Average Daily Traffic Volumes

N

0 40 80 120 160 200
Scale: 1: 4000 Metres

In the absence of the Eastern Distributor traffic volumes will continue to grow on the existing network leading to increased delays, longer travel times, the spreading of the peak periods into intervening business hours, deteriorating services on public transport and poor safety and amenity as increasing volumes of traffic seek to avoid congested areas by using streets not designed to carry such a heavy vehicle load.

The main road network in the study area is already heavily loaded. As a result traffic increases are fairly uniformly spread although somewhat higher on the north-south links. Increases on Southern Cross Drive are likely to exceed 25 percent by 2011 with somewhat lower levels on other parallel routes.

East-west routes in general, are not expected to experience traffic growth of this magnitude over the next 15 years with the exception of some of the major links such as Oxford Street.

The completion of the Eastern Distributor would result in a redistribution of the traffic growth expected by 2011. Increases are substantial along the northern sections of the new facility due to the additional capacity provided along the corridor. This results in reductions in volumes along the surface sections of the present route (Bourke and Flinders Streets) and on parallel streets which form the present northbound section of the route corridor (Crown Street). Substantial reductions are expected on sections of Crown and Bourke Streets resulting in traffic volumes significantly below those experienced at present. Substantial reductions are also expected in Flinders Street. Little noticeable change would be expected on more distant routes such as Ocean Street to the east.

Changes on the east-west links are rather different providing a mix of outcomes. In some cases, little change is anticipated (Fitzroy Street and Dacey Avenue), in others, volumes are expected to fall back to todays values, representing a reduction over the 2011 no proposal scenario (for example, parts of Oxford Street) and in others, some increases will be experienced.

5.2.3 FREIGHT AND DANGEROUS GOODS MOVEMENTS

There are three north-south routes used by most heavy goods vehicles through the area, namely:

- Anzac Parade/Flinders Street/Campbell Street/Crown Street/Cahill Expressway;
- Southern Cross Drive/South Dowling Street/Flinders Street/as above; and
- O'Riordan Street/Botany Road/Gibbons Street/Regent Street/Harris Street/City West Link.

East-west links include:

- Gardeners Road; and
- Dacey Avenue.

Heavy goods vehicles make up a relatively small proportion of total traffic using the Eastern Distributor corridor at present (approximately five percent northbound and 4.5 percent southbound). This increases further south on South Dowling Street (to approximately eight percent) as traffic from the west joins the route to the south. It is not expected that these proportions of heavy goods vehicles traffic will change in future although total numbers will increase in line with traffic increases as a whole. The present route via O'Riordan Street and Botany Road is relatively convenient for goods traffic from both Port Botany and Sydney (Kingsford Smith) Airport. As it represents an untolled alternative to the proposed Eastern Distributor, the route is expected to continue as an important route for heavy goods vehicles. As dangerous goods would not be allowed to enter the proposed tunnels, drivers would continue to use existing surface routes.

Like heavy goods vehicles a number of alternative routes would be available for dangerous goods traffic. The most apparent of these routes from the southern to and from the southern suburbs and the Harbour Bridge would be:

- O'Riordan Street, Botany Road, Abercrombie Street, Western Distributor and the Harbour Bridge;
- Botany Road, Abercrombie Street, Western Distributor and the Harbour Bridge;
- Southern Cross Drive, Link Road, Epsom Road, Botany Road, Abercombie Street, Western Distributor and the Harbour Bridge (north bound traffic only);
- Southern Cross Drive, South Dowling Street, O'Dea Avenue, Bourke Road, McEvoy Street, Botany Road, Abercrombie Street and the Harbour Bridge;
- Southern Cross Drive, South Dowling Street, (Surface Lanes), Lachlan Street, McEvoy Street, Botany Road, Abercrombie Street and the Harbour Bridge;
- Southern Cross Drive, South Dowling Street (Surface Lanes), Cleveland Street (or Flinders Street), Crown Street, Sir John Young Crescent, Cahill Expressway, Macquarie Street, Bridge Street and the Harbour Bridge; and

- Southern Cross Drive, South Dowling Street, Cleveland Street, Abercrombie Street, Western Distributor and the Harbour Bridge.

A major objective of the Eastern Distributor proposal is to remove heavy through traffic from a number of north-south streets. Crown Street falls into this category. Through the Local Area Improvement Program it may be recommended that heavy goods other than local deliveries should not be accommodated in Crown Street. Alternatives would be available such as many of the routes described above. The most popular route would likely be the one shown in *Figure 5.2*. It is therefore not appropriate and the Eastern Distributor proposal does not propose to designate routes for dangerous goods vehicles. Dangerous goods vehicles, like other heavy goods vehicles, would be restricted by any load limits imposed as part of the Local Area Improvement Program. Such limits may apply to Crown Street.

5.2.4 SAFETY

It is now generally accepted that major highways with limited access experience crash rates of some 20 percent of those recorded on other arterial road systems. Recorded accidents include those involving fatalities, serious injury, non-serious injury, vehicles damaged to the extent of requiring towing or third party property damage. At an estimated 102 million vehicle kilometres per year on new access controlled sections of the Eastern Distributor, the proposal has the potential to eliminate approximately 50 reported accidents per year.

5.2.5 CONSIDERATION OF FUTURE FUEL SUPPLIES

There is a debate sparked by publications such as Petroconsultants of Geneva's *The World's Oil Potential 1930-2050* (1995) and opposed by articles such as Professor Hensher's *Socially and Environmentally Appropriate Futures for the Motor Car* (1992) about the validity of forecasts which do not account for access to fuel in the future. Transport forecasting often gives little attention to fuel supplies. There is a finite known supply of petrol and other fossil fuels. The impact of fuel supplies in the future, therefore, relies on the rate at which available supplies are consumed, and the proportion of transport dependant upon conventional automotive fuels.

When present consumption levels are applied to known fuel supplies, a simple trend analysis can show when current supplies will be depleted. If this is accelerated by forecasting transport demand growth at the same levels of fuel usage, the consumption is faster. On the other hand, if the known pool of available supply is expanded, or it is used more efficiently or limited fossil fuels are replaced with less limited or renewable fuels, the constraint of petrol supply on travel behaviour is reduced. In relation to personal travel in Sydney, Government policy has sought to reduce dependency on private vehicles,

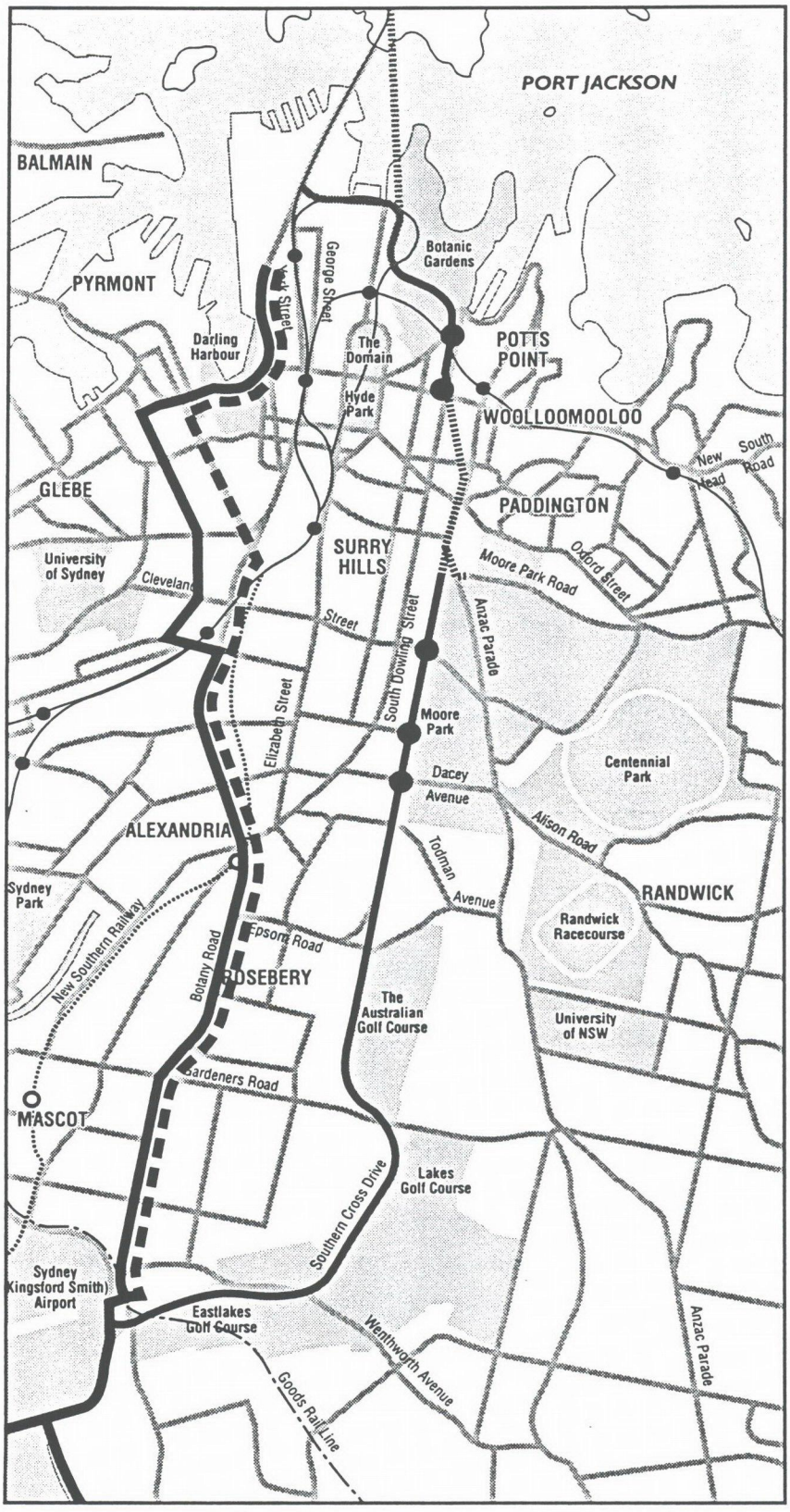


Figure 5.2
Preferred Heavy Goods Route

provide alternative transport forms for commuters and businesses, use fuel more efficiently and expand the market role of alternatives to fossil fuels.

Under the most adverse forecasts, the price of petrol would rise and people would replace as much personal car travel as they can. If Sydney motorists find they are paying significantly more for petrol, they may nevertheless continue to use the proposed Eastern Distributor because:

- travel efficiency will become more valued by travellers;
- the proposal supports improvements to public transport and other alternatives to private travel; and
- alternatively fuelled vehicles would be able to use the facility.

The debate has not produced definitive findings and there is insufficient evidence available to suggest abandonment of desired road corridors is an appropriate response to the issue.

CHAPTER 6 TRAFFIC AND TRANSPORT OPPORTUNITIES

6.1 LOCAL AREA IMPROVEMENT PROGRAM

6.1.1 PROJECT INITIATIVES

The Eastern Distributor would result in a substantial reduction in traffic volumes on a number of parallel streets. This would produce immediate amenity benefits for both residents and visitors to the area. These benefits would be substantially reduced unless appropriate programs aimed at consolidating these improvements are put in place as soon as possible. Such programs are complex and require active community participation and agreement if they are to be successful.

The primary objective of the Local Area Improvement Program is to take advantage of the opportunities presented by the changes in traffic volume on a number of key streets. It would seek to improve the local environment by the introduction of measures which restrict through traffic and ensure that alternative routes for those who wish to avoid the toll are unattractive to the driver. The latter needs to be achieved while maintaining reasonable access for both residents and businesses within the areas affected.

The strategies which may be pursued in arranging the local road system to achieve these benefits provide the basis for an overall concept of area improvement. For example, the strategies could be based on the identification of urban villages such as those recognised by South Sydney Council (South Sydney Council, 1996). These include Woolloomooloo/Kings Cross, East Sydney, Darlinghurst, Surry Hills, Redfern East and Waterloo.

Strategies to enhance the public spaces and movement networks within these areas would incorporate traffic management measures that restrict through traffic and improve pedestrian networks, safety and amenity for local residents.

The principal local traffic management issues raised during the consultations carried out prior to the publication of this EIS which would be examined as part of the Local Area Improvement Program are:

- achieving desired reductions in traffic flows and amenity improvements in Bourke, Crown and Riley Streets;
- managing southbound traffic flows on Bourke Street at Woolloomooloo which may result from the proposed on-ramp to the main southbound tunnel near William Street;

- managing future traffic flows on Cowper Wharf Road although it is recognised that Cowper Wharf Road would still function as an important route into and out of Potts Point, Kings Cross and Elizabeth Bay;

- eliminating bypass movements along narrow streets in Woolloomooloo, East Sydney, Darlinghurst and Surry Hills;

- examining the effects of and possible reductions in traffic flows in Ocean Street, Woollahra, and the relationship of those traffic flows with other north-south links between New South Head Road and Oxford Street;

- enhancing pedestrian safety and public amenity at Taylor Square and other areas in Flinders Street and Oxford Street;

- generally providing on-street parking on main roads;

- maintaining existing bus routes and enhancing services along Oxford Street and Flinders Street;

- providing reasonable access and circulation for residents and visitors to major institutions in the area;

- improving streetscapes in important civic spaces such as at intersections of main roads;

- examining the future function of Greens Road as a link between Oxford Street and Moore Park Road;

- examining the impact of major events in the Moore Park area on the road network and proposals to alter the present roles of Driver Avenue, Cook Road and Lang Road;

- examining the desirability of closing any of the local roads that join South Dowling Street;

- managing traffic flows on Mort Street and Ridge Street due to their present function as local access roads to South Dowling Street;

- examining the relationship of the proposed restructured access to Link Road and the management of traffic flows on Epsom Road, Lenthall Street, Todman Avenue, O'Dea Avenue and Joynton Avenue;

- examining access at Milroy Avenue, Carminya Street, Winkurra Street, Baker Street, Myrtle Street and Ingram Street to and from Dowling Street;

- preventing the movement of heavy vehicles on local roads;
- providing safe and convenient pedestrian and cyclist facilities; and
- provisions for buses.

Recent local area traffic management techniques have tended to move away from street closure to approaches which discourage traffic usage. The latter have proved reasonably successful in suburban areas but the much higher traffic pressures experienced in the inner city have meant that more traditional closures are occasionally necessary to ensure that inappropriate traffic movements are eliminated. Road closures also enable distinct amenity and safety improvements to be achieved but they can only be implemented following thorough community consideration of adverse emergency service vehicle and local traffic accessibility impacts.

The proposal for the Eastern Distributor includes:

- closing Bourke Street on the northern side of Oxford Street;
- introducing two-way traffic in Crown Street with midblock capacity reduced to one lane in each direction; and
- re-allocating traffic lanes along Oxford Street to the west of Taylor Square and Flinders Street to provide peak hour and full time exclusive bus lanes respectively and wider kerbside lanes for cyclists.

Other opportunities resulting from changes to traffic flows brought about by the Eastern Distributor would be considered as part of the Local Area Improvement Program. They could include:

- introducing streetscape improvements, including footpath widening in Oxford Street between Bourke and South Dowling Streets;
- narrowing Sir John Young Crescent providing opportunities to improve the area along the eastern side of The Domain;
- introducing two-way traffic in Bourke Street between Forbes and Stanley Streets with streetscape improvements and additional kerbside parking; and
- applying light traffic restrictions on all local roads except those that would function as State or Regional roads.

It is not the purpose of this EIS to provide details of specific local traffic management proposals for incorporation in the Local Area Improvement

Program as it applies to local streets. They are not part of the proposal which is the subject of this document, although the Eastern Distributor would provide the opportunity to introduce such schemes once the Distributor is in operation. However, proposals to improve bus facilities in Oxford and Flinders Streets, reduce traffic and introduce two way flow into Crown Street, and close Bourke Street to through traffic at Taylor Square are integral to the community objectives of the Eastern Distributor.

6.1.2 HISTORY OF LOCAL AREA TRAFFIC MANAGEMENT PROPOSALS

The 1985 EIS (Department of Main Roads, 1985) identified a number of full and half road closures that were recommended to be implemented with the three stages of that proposal. They were limited in their scope, mainly dealing with major roads adjacent to the Eastern Distributor. Bourke Street was proposed to be closed at Taylor Square.

As part of a program of community consultation undertaken by the RTA in 1994, an indicative local area traffic management scheme was developed (Project Planning Associates, 1994). Following that process, the Government called for detailed proposals from the private sector for the construction and operation of the Eastern Distributor. The proponents were also required to submit proposals for a local area traffic management scheme.

Airport Motorway's proposal for local area traffic management is contained in *Appendix B*. It is similar to the 1994 RTA scheme and provides an indication of some of the measures that may be put in place. A consultative process would be developed by the RTA and local Councils to examine such proposals, and others submitted by the community, prior to making any final decisions. An environmental assessment would be carried out to determine the impacts of the proposals put forward as part of the Local Area Improvement Program.

6.1.3 ADOPTED OBJECTIVES

The objectives of the Local Area Improvement Program would be:

- reducing existing (1996) traffic volumes on inappropriate roads, including removal of a significant volume of through traffic;
- maintaining reasonable levels of access for residents and businesses;
- slowing traffic speeds throughout defined areas;
- improving amenity;
- improving pedestrian, vehicular and cyclist safety;

- improving public transport access;
- restricting heavy vehicle use of local roads; and
- reintroducing two way traffic flows on streets of sufficient width to accommodate it.

6.1.4 FUNDING AND RESPONSIBILITY

The responsibility for the planning and implementation of local area improvements would normally be divided between the local Councils and the RTA. This is divided in accordance with the status of the specific road and the nature of the improvement.

The RTA is normally responsible for its own components of the scheme and any traffic works along or adjacent to State roads which are included in its ongoing development programmes.

Councils are normally responsible for the planning, design and implementation of all works associated with other roads and all non-traffic related works included in the improvement programmes. Changes in status of a number of the streets affected by the various works may require a change in responsibility, probably from the RTA to the local Council.

The RTA is facilitating the formation of a number of consultative committees involving Sydney City, South Sydney, Randwick and Woollahra Councils. These committees would examine the various options available, prepare briefs to commission studies if necessary, consult the community and interested groups and make recommendations to Council on the preferred proposals. The committees may also monitor and review the performance of the proposals if considered appropriate.

Resources to implement the program would be available from two sources. Airport Motorway would be required to implement a program that would be similar in value to their original proposal outlined in *Appendix B*. The RTA would provide some funding to the implementation of the program. It is expected that the total value of the program, including the work described in *Section 6.1.1* on Crown, Bourke, Oxford and Flinders Streets would be of the order of $1 million.

6.2 PUBLIC TRANSPORT IMPROVEMENTS

6.2.1 PROPOSAL INITIATIVES

The introduction of an improved north-south link and the subsequent reduction in traffic on some of the parallel streets presents a number of opportunities for improving bus operations.

The Eastern Distributor is likely initially to involve a few express services to and from the City and North Sydney and tourist coach operations, many of which focus on Sydney (Kingsford Smith) Airport. The responsible authorities are expected to explore a more intensive range of uses in the longer term. Public bus services would not be charged a toll.

Some Anzac Parade bus services could operate express services via the Eastern Distributor to William and/or Macquarie Street using the tunnel. This could provide a faster journey time to the northern parts of the Central Business District. This would need to be considered in the context of bypassing important destinations in the Central Business District and the possible reduction in the level of service to this area.

Special services in transit between depots and termini (before and after passenger carrying trips) and charter or special events services may make use of the Eastern Distributor to speed their journey but in general, bus services are more likely to be undertaken on surface roads where passengers are picked up and set down. It is expected that only minor changes will be made to existing bus routes in the short term.

Bus services would be improved by the following:

- bus priority measures to exploit expected reductions in traffic flows on surface north-south routes and to overcome delays to buses in particular sections of routes;

- design of the Eastern Distributor which allows for existing bus routes to be retained, allows buses to manoeuvre as required and minimises conflict between buses and other vehicles; and

- related traffic management (such as in Crown and Bourke Streets) which would recognise an important role for buses.

The reduction of north-south traffic due to the Eastern Distributor and related bus priority measures on the surface can be expected to have significant benefits to bus services in south-eastern Sydney. Experience with the implementation of bus priority, or improvements in traffic flow on bus routes

elsewhere in Sydney, indicates that significant increases in bus patronage occur when bus travel time is reduced. Examples include:

- Harbour Bridge 24 hour Bus Lane;
- Glebe Island Bridge;
- Gore Hill Link; and
- removing some buses on the Anzac Parade corridor from general traffic around Moore Park in 1993 (by returning them to the exclusive bus roadway) resulted in savings of some seven minutes per trip in a 42 minute journey (a saving of almost 20 percent).

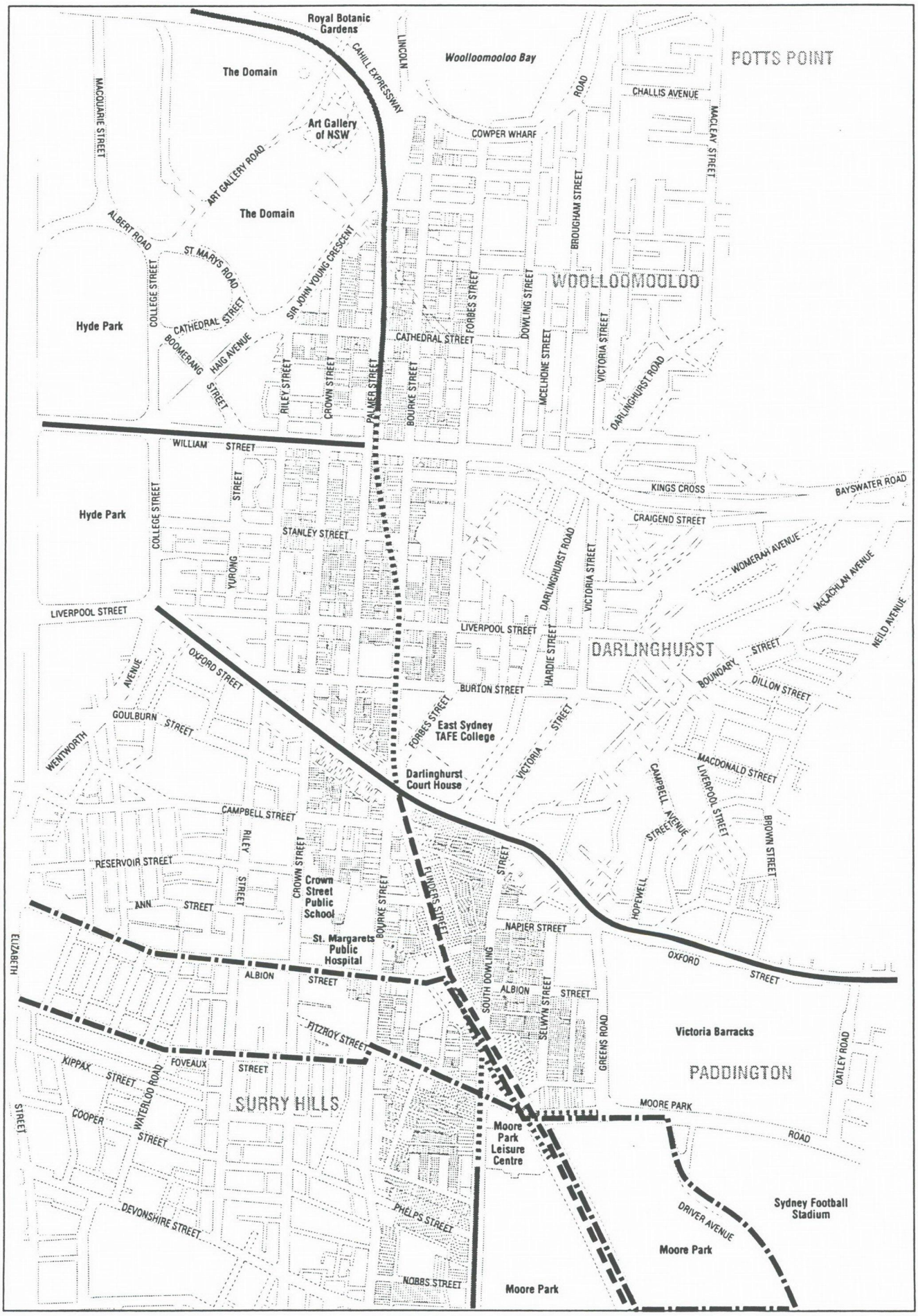
At present all inbound (to the City) express buses use the Fitzroy, Foveaux and Riley Street Routes to avoid congestion in Flinders Street in the vicinity of Moore Park Road. The majority of these services could be returned to Flinders Street following reductions in traffic volumes in that area and the introduction of bus priority measures. However, services on routes 339, 374 and 376 would continue to use the present route which is intended to provide flexibility for passenger destinations in the City.

Approximately half of the buses on the Anzac Parade/Flinders Street Corridor make use of the exclusive busway in Moore Park. The remainder use the roads. Agreement between Sydney Buses, the RTA and the Moore Park Trust has been reached on the future arrangements for exclusive bus lanes in this area. The busway between Moore Park Road and Gregory Avenue is to be returned to the park and exclusive bus lanes included in Anzac Parade as a substitute. The north-bound lane would continue past Drivers Triangle and along Flinders Street to Oxford Street. A south-bound lane would continue as far as Gregory Avenue and then return onto the existing busway in the park.

Probable bus priority systems are shown on *Figure 6.1*.

A number of detailed issues would need to be considered with regard to the implementation of measures to improve the operation of bus services. Some of these are:

- Anzac Parade/Flinders Street - bus lanes north and south bound integrated with the exclusive busway to allow express bus priority through Taylor Square and Moore Park intersections;
- Gregory Avenue - bus lane or bus priority signals to improve access to the main sporting facilities and the Showground site;



Proposed Eastern Distributor

High Occupancy Vehicle Lanes and Bus Priority

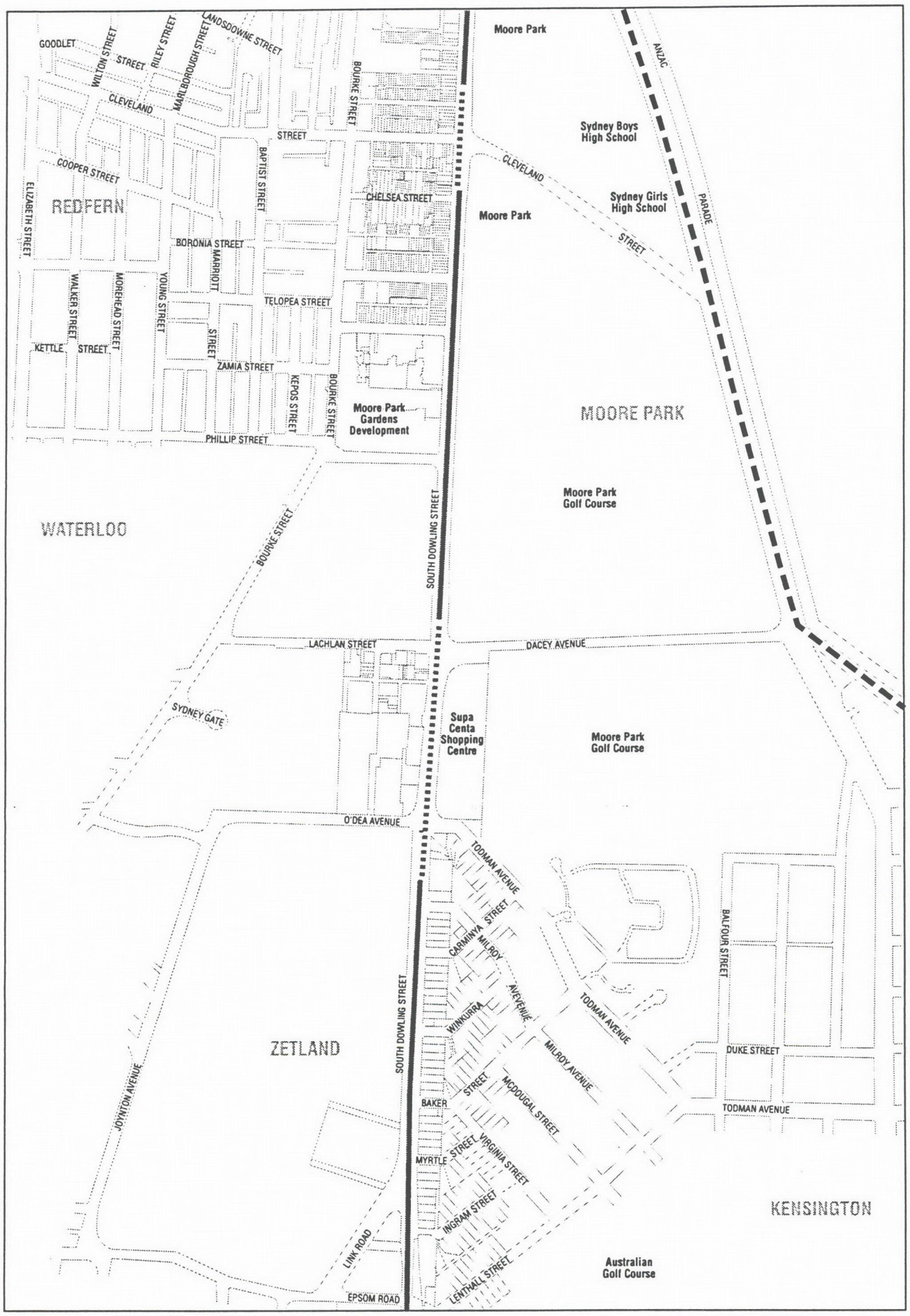
Priority Lanes during Major Events

Provision for Exclusive Lanes or Corridors

N

0 100 200 300 400 500 Metres

Figure 6.1a
Possible Bus Priority Systems



Proposed Eastern Distributor

High Occupancy Vehicle Lanes and Bus Priority

Priority Lanes during Major Events

Provision for Exclusive Lanes or Corridors

N

Figure 6.1b

Possible Bus Priority Systems

0 100 200 300 400 500 Metres

- Oxford Street - improve the turn at Taylor Square into Flinders Street (outbound) and improve through bus movements eastbound;
- Crown Street - traffic management and intersection designs should allow for two way bus movement;
- Bourke Street - the potential for the introduction of bus services to serve new residential development in Zetland needs to be investigated;
- Riley Street - used by inbound express services and Route 301;
- South Dowling Street - route 301-303 services between Crescent Street and Todman Avenue;
- Todman Avenue - bus access is still required to and from South Dowling Street and some form of signal priority may be required;
- William Street - effects of traffic increases on bus operations will need to be investigated; and
- minimisation of toll plaza queuing for buses.

While the Eastern Distributor would provide an opportunity to make a substantial contribution to the improvement of bus operating facilities on the surface streets, planning by Sydney Buses to capitalise on these changes is at an early stage and would be considered in greater detail later.

All improvements to bus facilities would also benefit taxis which would also be able to take advantage of reduced traffic volumes on streets within an important transit corridor.

6.2.2 ADOPTED OBJECTIVES

Objectives in relation to public transport improvements associated with the Eastern Distributor would be as follows:

- reduce average journey times in peak periods and the variability of journey times;
- improve public transport access;
- improve pedestrian/vehicular safety; and
- integrate provision for public transport improvements with overall traffic management, pedestrian and public domain improvements.

6.2.3 FUNDING AND RESPONSIBILITIES

The Department of Transport is responsible for the overall planning and management of public transport while Sydney Buses and various private organisations have operational responsibility for the provision of services. The RTA is responsible for the road based facilities including the street management systems on State roads over which the services operate. The respective councils are responsible for other roads.

The RTA administer a *Public Transport Infrastructure Improvement Program*. The program provides fundings for projects to make public transport an attractive, efficient, accessible and viable alternative to the private car. One component of the program is for bus priority and intermodal accessibility, which aims to provide bus priority on strategic corridors to:

- reduce bus travel times and bus delays;
- improve predictability of bus travel times;
- improve patronage on routes;
- provide savings in bus operation costs; and
- provide service improvements.

The proposed bus priority improvements identified as part of the Eastern Distributor proposal not undertaken by Airport Motorway meet the objectives of the RTA program and would be eligible for funding. The Anzac Parade and Oxford Street bus corridors are identified as strategically important in the RTA's *Sydney Transit Priority Network Plan*.

In common with the consideration of other opportunities raised by the implementation of the Eastern Distributor, a Taskforce made up of senior representatives of the various responsible authorities would be established. The Taskforce would consider in detail and define all development programmes which need to be implemented either prior to or immediately following opening of the Eastern Distributor.

6.3 PEDESTRIANS AND CYCLISTS

6.3.1 PROPOSAL INITIATIVES

In common with public transport, the reduction in traffic on surface roads adjacent to the Eastern Distributor corridor would provide opportunities for improvements to pedestrians and cyclists which would need to be

consolidated by complementary programs of action. The impacts of the Eastern Distributor proposal on pedestrians and cyclists are addressed in *Chapters 7* and *8*.

6.3.2 ADOPTED OBJECTIVES

The objectives of the program related to the improvement of pedestrian and cycle facilities would be as follows:

- taking advantage of traffic volume reductions on streets brought about by the Eastern Distributor, to improve amenity for pedestrians and cyclists;
- maintaining, or preferably improving pedestrian facilities for crossing the Eastern Distributor;
- improving pedestrian and cyclist safety;
- widening footpaths and providing bike safe kerbside lanes where feasible;
- providing coherent, integrated, convenient and safe pedestrian and cycleway networks;
- providing an alternative bicycle route to that along South Dowling Street from Fitzroy Street to The Crescent;
- improving key pedestrian areas such as Taylor Square and Drivers Triangle; and
- providing safe and convenient crossings suitable for community groups with mobility impairments.

Many of these objectives also relate to the Local Area Improvement Program and would need to be considered in conjunction with that program.

Funding and Responsibilities

Responsibility for the provision and maintenance of pedestrian and bicycle facilities is split between the RTA and the relevant local Council depending on the status of the road. It is envisaged that the mechanisms and funding arrangements established for the Local Area Improvement Program would address pedestrian and cyclist issues in the local area.

CHAPTER 7 IMPACTS DURING CONSTRUCTION

7.1 TRAFFIC AND TRANSPORT

7.1.1 GENERAL TRAFFIC FLOWS

Construction of a major transport infrastructure system within a densely developed urban environment will cause disruption to a range of traffic flow, public transport, pedestrian and cyclist activities. Access to properties may also be hindered with associated inconvenience to residents. This section describes the general construction staging proposals and broader traffic implications. The following sections provide further detail of specific impacts on transport and access during construction of the Eastern Distributor.

In the section of the proposal north of William Street, southbound traffic would continue to use Palmer Street while the adjacent southbound motorway carriageway is constructed. Southbound traffic would be shifted to the new carriageway to enable construction of the northbound carriageway. These arrangements would continue until the completion of the motorway.

The upgrading of Southern Cross Drive to three lanes in each direction could be undertaken without significant disruption to traffic. At Mill Pond Road near Sydney (Kingsford Smith) Airport, the work predominantly involves remarking traffic lanes and there is sufficient room to upgrade the intersection without serious traffic diversion. The most significant traffic disruption and diversion that would result from the construction of the proposed Eastern Distributor would be associated with works in the Anzac Parade and South Dowling Street area.

To minimise the impact of construction on traffic flows a range of management measures would be implemented. They are complex requiring a number of stages to be implemented at major construction sites. They are generally described in Chapter 8. The traffic management measures would include the diversion of traffic over certain periods from sections of South Dowling Street and Anzac Parade.

Between Dacey Avenue and Todman Avenue only one directional traffic could be maintained on South Dowling Street during construction of the Dacey Avenue to Todman Avenue tunnel. Southbound traffic would remain on South Dowling Street with the location of the lanes periodically altered to suit construction staging. All northbound traffic would be diverted into O'Dea Avenue and to Bourke Street and would link back into South Dowling Street via Crescent Street, with appropriate traffic priority measures introduced. Existing southbound traffic on Bourke Street between Crescent Street and

O'Dea Avenue would be diverted east at Crescent Street to join southbound South Dowling Street traffic or west on Phillip Street to Elizabeth Street. This arrangement would be in place for approximately 18 to 24 months.

Similarly, only one directional traffic could be maintained on South Dowling Street during the construction of the Cleveland Street underpass. It is proposed that northbound traffic would remain on South Dowling Street and southbound traffic would be diverted onto a temporary carriageway in Moore Park. New traffic signals would be installed to control the intersection.

On Anzac Parade, near Moore Park Road, southbound traffic would need to be diverted onto the existing bus roadway located to the east of Anzac Parade. The bus roadway would be widened to accommodate three lanes of traffic. This arrangement would last for up to six months.

Calculating the level of service of an intersection provides an indication of how well the intersection performs during peak traffic periods. *Table 7.1* provides the existing level of service and the anticipated level of service of key intersections during the construction of the proposed Eastern Distributor.

The best indicator of the level of service at an intersection is the average delay experienced by vehicles at that intersection. For traffic signals, the average delay per vehicle over all movements should be taken.

Average delays for different levels of service are:

- A less than 14 seconds;
- B 15 to 28 seconds;
- C 29 to 42 seconds;
- D 43 to 56 seconds;
- E 57 to 79 seconds; and
- F greater than 70 seconds.

TABLE 7.1 LEVEL OF SERVICE OF KEY INTERSECTIONS DURING CONSTRUCTION

Intersection	Existing Level of Service		Level of Service During Construction	
	AM Peak	PM Peak	AM Peak	PM Peak
Sir John Young Crescent and Palmer Street	B	B	C	C
William Street and Bourke/Palmer Streets	A	A	B	B
Anzac Parade, Flinders Street and Moore Park Road	F	E/F	F	F
Fitzroy Street and South Dowling Street	C	C	D	C
Cleveland Street and South Dowling Street	E	E	E	E
Crescent Street and South Dowling Street	C/D	D	F	D
Lachlan/Dacey Avenue and South Dowling Street	F	D	F	D
Todman/O'Dea Avenue and South Dowling Street	C	C	C	C
Crescent/Phillip Streets and Bourke Street	D	F	F	F
McEvoy Street and Bourke Street	E	D/E	E	D/E
O'Dea Avenue and Bourke Street	F	C/D	F	C/D

Source: EMME/2 Model, Symonds Travers Morgan, modified by Rust PPK for the Lachlan/Dacey/South Dowling Street existing AM peak.

The intersections of Sir John Young Crescent and Palmer Street, William Street and Bourke/Palmer Streets, Fitzroy Street and South Dowling Street, Crescent Street and South Dowling Street, and Crescent/Phillip Streets and Bourke Street would experience some decline in their level of service during the construction of the Eastern Distributor.

It is not possible to determine what proportion of traffic would make a major detour to avoid the works. This would be dependent on a number of factors, not least the increase in congestion resulting from the works which would vary for each stage of construction. While intersection analysis suggests that the key intersections would continue to operate although often at a poor level of service, other considerations such as the effect of minor accidents where any

interruption in flows is highly sensitive, would have much greater consequences than at present.

7.1.2 FREIGHT AND DANGEROUS GOODS MOVEMENTS

Heavy goods vehicles continuing to use the existing route would experience the same delays due to the works as all traffic. The number of heavy vehicles is relatively small, and some of those may choose to travel by an alternative route. Those routes are described in *Section 5.2.3* and may include:

- O'Riordan Street, Botany Road, Regent Street, Gibbons Street, Cleveland Street, Abercrombie Street, Western Distributor and the Harbour Bridge;
- Botany Road, Regent Street, Gibbons Street, Cleveland Street, Abercrombie Street, Western Distributor and the Harbour Bridge; and
- Southern Cross Drive, Link Road, Epsom Road, Botany Road, Regent Street, Gibbons Street, Cleveland Street, Abercrombie Street, Western Distributor and the Harbour Bridge.

7.1.3 PUBLIC TRANSPORT

Bus services would be unlikely to be adversely affected by the works in the area to the north of William Street. However the Oxford Street/Flinders Street/Anzac Parade route is a major bus corridor which is likely to be affected both directly by the works in the Drivers Triangle area and indirectly by works in South Dowling Street. A small number of services use Dacey Avenue, Cleveland Street and Todman Avenue and these would be affected both by the possible adjustment of flow direction in this area and the increase in traffic volumes resulting from the diversions.

Analysis of the performance of the key intersections resulting from the diversion of southbound traffic from Anzac Parade and the bus roadway indicates poor levels of service and subsequent lengthy time delays especially along Anzac Parade. This would be likely to result in increases in journey times for buses using this route in the peak periods for the duration of the diversion.

An alternative proposal would involve a temporary widening of Anzac Parade between Moore Park Road and Gregory Avenue to provide three southbound lanes. Although this arrangement would reduce the delays for bus services along Anzac Parade, it would require the undertaking of roadworks at night and deleting the right turn from Anzac Parade to Moore Park Road for eastbound traffic.

The potential delays resulting from the works would also affect taxis and other forms of public transport using these routes. The impact on taxis would be limited as they are not tied to a fixed route and can divert to alternatives. However other vehicle diversions during the construction phase would increase usage of other routes resulting in additional delays which could affect all forms of transport.

7.1.4 PEDESTRIANS AND CYCLISTS

Pedestrians and cyclists are generally less inconvenienced by construction works due to their greater flexibility and lesser demands on space. The exception to this occurs when existing pedestrian routes are severed by the works or anything associated with it. Such changes would be likely to result in minor inconvenience. Where a change of level is required a barrier is introduced to some people in the community, including mothers with young children, the elderly and those with various physical disabilities.

Temporary facilities would be provided at existing major pedestrian and cyclist crossings of the Eastern Distributor corridor. Some inconvenience would be caused to the community, the extent of which would vary over time and also vary depending on the age and mobility of individuals.

Uncontrolled pedestrian and cyclist crossings on Palmer Street and South Dowling Street presently occur at some risk to personal safety. These crossings of the corridor would not be allowed during the construction of the proposal. It would require pedestrians and cyclists to travel to the controlled crossing points.

7.1.5 MAJOR EVENT MANAGEMENT

Major events at the Sydney Football Stadium, Sydney Cricket Ground and within the Royal Agricultural Showground produce high peak flows of vehicles and pedestrians, the main intensity usually being at the end of the event. Following its redevelopment the Showground area is likely to produce regular, moderate vehicle and pedestrian flows, but with less intensive peaks than at the time of the Royal Easter Show.

Specific measures are put in place for each major event and traffic movements are controlled by the police. Major vehicle flows are to and from the intersections along South Dowling Street and towards Anzac Parade/Moore Park Road. Major pedestrian movements are in the direction of Central Station along Fitzroy/Foveaux Streets and Oxford Street via Flinders Street.

The changes at Drivers Triangle and the workspace requirements for construction activities would result in increased difficulties during major events. It is anticipated that police would seek to direct traffic away from any

bottlenecks to the extent that this is possible. Increased delays would be experienced over the construction period and the management of pedestrian flows would be more difficult than at present.

The Eastern Distributor would take approximately 36 months to construct. Depending on the receipt of appropriate environmental approvals, it is anticipated that construction would be completed in June 2000, although some parts of the proposal would be completed prior to that time.

In the lead up to the 2000 Olympics, it is proposed that a number of major sporting events be conducted at newly developed facilities. Although no new sporting facilities are proposed in the eastern suburbs of Sydney, some use may be made of facilities in the Moore Park area. The location and number of the pre-Olympic sporting events is yet to be determined. The impacts of the construction of the Eastern Distributor on pre-Olympic sporting events conducted in the Moore Park area would be similar to the impacts on general events at the Sydney Football Stadium and Sydney Cricket Ground as described above. It is not anticipated that the construction of the Eastern Distributor would impact on the feasibility of conducting any pre-Olympic sporting events.

7.1.6 PROPERTIES AND PROPERTY ACCESS

The construction of the Eastern Distributor would require modifications to existing property accesses which may cause inconvenience or disruption to local property owners and tenants. That disruption would vary depending on the location of the access and the nature of adjoining construction activities. Disruption would be minimised through the use of traffic management techniques, appropriate staging of construction activities and ongoing consultations with property owners and tenants.

For a period of 18 to 24 months northbound traffic would not be permitted to travel along South Dowling Street, between O'Dea Avenue and Crescent Street. This would inconvenience, and may cause economic loss to, businesses located on the western side of South Dowling Street. For example, a service station located south of Lachlan Street relies on customers exiting from northbound traffic on South Dowling Street. While it may be possible to provide access to the service station from southbound traffic on south Dowling Street during construction, that access would likely be less convenient than existing access to the service station. Consequently some loss of trade would be experienced by the service station.

7.1.7 IMPACTS ON TRAFFIC AND TRANSPORT SYSTEMS

Inevitably the construction of a major transport facility in an existing highly developed urban area would lead to some disruption to existing traffic systems and result in inconvenience to those affected.

The effects on traffic resulting from construction activities along the corridor would be increased delays and longer journey times especially in the peak periods. This would be most pronounced on those roads directly affected but could spread further depending on the extent of the delays produced during each phase of construction.

No major adverse impacts are anticipated with regard to freight and dangerous goods movements during construction since general traffic must be accommodated and freight and dangerous goods vehicles represent only a small proportion of general traffic. The existing routes used by freight and dangerous goods vehicles through eastern Sydney would continue to operate.

The most apparent disruptions to existing traffic and transport systems resulting from the construction of the Eastern Distributor would occur at the following locations:

- Anzac Parade, near Moore Park Road;
- South Dowling Street, south of Fitzroy Street to Todman Avenue; and
- along streets located south of Crescent Street, between Elizabeth Street to the west and South Dowling Street to the east.

These impacts are discussed below.

Anzac Parade

It is proposed to utilise the exclusive bus roadway parallel to Anzac Parade for general southbound traffic during the construction of the tunnels that would be located under Anzac Parade and Moore Park Road. The use of the bus roadway would last for a maximum of six months. Close liaison with relevant authorities would be maintained to ensure that major pedestrian routes, including those associated with events in the Moore Park area, are not unduly hindered. This would include consideration of the elderly and physically disabled.

Major events would continue to occur in the Moore Park area indefinitely. Their traffic and transport demands are high, and can be matched at regular intervals by aggregations of smaller events at the different recreational and sporting venues.

A Moore Park Traffic Committee was established in 1996 to develop general transportation strategies to establish an efficient, practical approach to event management and general transport related issues in the area. The committee represents the main traffic generators, as well as transport agencies. This includes the Sydney Cricket and Sports Ground Trust, Royal Agricultural Society, Fox Studios, Centennial and Moore Park Trust, South Sydney Council, Sydney Transit Authority and the RTA.

This Committee has begun to produce a co-ordinated strategy which aims to *"achieve quality access to, from and through the precinct which is compatible with the needs and expectations of the venue managers, users, local residents and the general public"*. Apart from changes from within the precinct related to the introduction of the Fox Studios development and implementation of a Centennial Park and Moore Park Trust Plan of Management, the precinct may become a trial area for event transport planning to test Olympic strategies. It will also host marathon, soccer and cycling events during the 2000 Olympics.

The Moore Park Road, Flinders Street and Anzac intersection has an existing poor level of service. That would continue to be the case throughout the construction of the Eastern Distributor.

Buses would experience greater delays at the northern end of Anzac Parade due to the proposed use of the bus roadway for southbound traffic. These more significant delays would occur for approximately six months. For other periods during the construction of the proposal delays would only be marginally worse than existing delays at the Moore Park Road, Fitzroy Street and Anzac Parade intersection.

South Dowling Street

During the construction of the South Dowling Street section of the proposed Eastern Distributor, traffic would be diverted onto a temporary roadway through Moore Park. The Moore Park Traffic Committee would be kept informed and involved in the relationship between these works and its collective operations. Its normal strategies for pedestrian, other non-vehicular and vehicular access would need to be modified for changing conditions during this construction period as well as for post construction opportunities. The Moore Park Traffic Committee may need to produce a series of event strategy plans. Throughout the construction process Airport Motorway would liaise with the Committee and the community, and measures may be introduced to temporarily influence traffic staging when appropriate.

Measures to manage the adverse impacts of construction would include:

- maintaining regular liaison between the community, the Moore Park Traffic Committee, Airport Motorway, and the RTA;

- establishing where possible, priority for public transport and high occupancy vehicles as part of the traffic management arrangements;
- maintaining high quality pedestrian linkages between Central Station and the Moore Park precinct;
- preparing a traffic management strategy for construction related to various phases of construction; and
- halting construction activities which coincide with and are likely to adversely affect the conduct of major events in the Moore Park precinct.

The impacts of the proposed diversion of northbound traffic from South Dowling Street to Bourke Street, between O'Dea Avenue and Crescent Street would include:

- alterations to the nature of access to properties on the western side of South Dowling Street, between Lachlan Street and O'Dea Avenue. This may potentially cause economic loss to some local businesses;
- diversion and redistribution of traffic flows on Bourke Street, Phillip Street, Crescent Street, Elizabeth Street, O'Dea Avenue, McEvoy Street, Link Road and Epsom Road. The diversion and redistribution of traffic would result in increased traffic flows on some roads, alterations to traffic direction and increased delays at intersections.

Properties fronting the roads listed above would experience a change in the nature of access which may lead to increased travel distance and travel times.

General

The general impacts on the traffic and transport system are expected to be significant throughout the construction period. In principle, appropriate liaison and temporary construction activities would be introduced to provide workable responses, albeit at the cost of a temporary diminution in the level of accessibility in and through the area.

Significant delays to traffic are likely to be experienced as a result of construction. Intensive traffic management, incident detection and emergency response procedures would need to be part of more detailed planning.

Public transport services, including those bus services that are of vital importance in serving the Eastern Suburbs, and those that are of growing importance in serving the Moore Park precinct, would be given priority treatment throughout the construction period, where practicable.

All of the above requirements would be embodied in a detailed Construction Traffic Management Strategy that would be part of the overall Eastern Distributor environmental management plan. The impact of the construction of the Eastern Distributor would be minimised through the use of traffic management techniques, appropriate staging of construction activities and ongoing consultations with local Councils, residents, local businesses and property owners.

CHAPTER 8 IMPACTS DURING OPERATION

8.1 TRAFFIC AND TRANSPORT SYSTEMS

The characteristics of the traffic and transport system of eastern and south eastern Sydney are described in Chapters 4, 5 and 6. This section examines the impacts of the proposal on the road network, movements of heavy and dangerous goods, public transport and pedestrians and cyclists.

8.1.1 ROAD NETWORK OPERATIONS

To assess the impacts of the proposal, comparisons have been made between the traffic flows that are anticipated to occur on the existing road network in the future, both with and without the introduction of the Eastern Distributor. Three sets of comparisons have been made, namely:

- changes that would be brought about by the proposal in the future, that is comparing the existing 1996 situation with what is anticipated to occur in 2011 with the Eastern Distributor;

- changes in traffic flow that would occur if the proposal was not built, that is a comparison between the 1996 existing situation and what is anticipated to occur in 2011 if the Eastern Distributor is not built; and

- a comparison between the anticipated future situation, that is traffic flows in 2011 both with and without the introduction of the Eastern Distributor.

A range of other impacts have been investigated. These have included toll sensitivity (that is no toll and various toll levels); the effect of other projects such as the M5 east; and other projects which may or may not be constructed such as the Market Street tunnel; variations or additions to the Eastern Distributor corridor such as ramps to Gardeners Road; and various changes in travel demand.

Examination of the effect of the proposal under a range of traffic demands is required for the economic analysis of the proposal and under a higher traffic demand scenario to enable the worst case environmental impacts to be quantified.

The results of the traffic modelling outlined in Chapter 5 indicate the following:

- the Eastern Distributor would cater for increased demand along its corridor but is expected to be at or close to capacity during the peak period by the year 2011;

- a number of parallel links, especially those close to the Eastern Distributor corridor or making up part of the present north/south route would experience significant reductions in traffic. These would include Crown Street, Bourke Street and Flinders Street;

- other streets in close proximity to the corridor may experience minor increases in traffic over current levels. An example is Anzac Parade;

- some of the main east-west links, especially those that would have a direct link to the Eastern Distributor, such as William Street and Cleveland Street, would experience some increases in traffic although there is little difference between the build and no build options in many cases;

- some east-west links such as Fitzroy and Foveaux Streets are expected to experience reductions over the present situation, while others such as Cleveland Street would experience a mix of relatively small changes, some increases and some decreases depending upon the location along Cleveland Street;

- on a number of roads the reductions in traffic volume would be sufficient to allow the introduction of local area traffic management such as converting one way streets to two way;

- access to Crescent Street would be restricted to left in and left out only to South Dowling Street under the Eastern Distributor proposal. Traffic currently using Bourke Street and making a right turn from Crescent Street is likely to transfer onto the motorway section of South Dowling Street. Vehicles currently turning right into Crescent Street would exit South Dowling Street at Cleveland Street, Lachlan Street and Todman Avenue;

- access to and from Link Road would be restricted to left turning into and out of Southern Cross Drive under the Eastern Distributor proposal. Traffic currently making right turning movements out of Link Road would mainly be redirected to Botany Road if travelling to the south. Alternatively they would travel along Joynton Avenue to access Southern Cross Drive. Traffic currently turning right into Link Road would exit South Dowling Street at Lachlan Street and O'Dea Avenue;

- traffic on Moore Park Road, east of Greens Road, may experience traffic growth of up to 27 percent as a result of the Eastern Distributor. This is

probably a "worse case" situation as a number of the traffic models show a lower level of increase; and

- the construction of the Eastern Distributor would be unlikely to noticeably affect traffic conditions on Ocean Street, Woollahra. A reduction of traffic along this street would only be achieved by the introduction of appropriate local area traffic management measures.

Consideration was also given to a number of other proposals and their likely impacts relative to the proposed Eastern Distributor. These proposals include:

- *Market Street tunnel* - construction of the Market Street tunnel would result in little or no change in traffic on the northern sections of the Eastern Distributor and other links in the local network. It would, however, bring about significant changes in traffic flows to the west of the central business district. Should the Cahill Expressway be closed at the same time, some volume reductions would result on northern sections of the Eastern Distributor with corresponding increases elsewhere, for example on Oxford Street and Fitzroy and Foveaux Streets;

- *M5 East* - the inclusion or otherwise of the M5 East is expected to have a limited effect on the Eastern Distributor; and

- *Gardeners Road ramps* - the introduction of north facing ramps at Gardeners Road would probably result in a small increase in volumes along the section of the Eastern Distributor immediately to the north and along Gardeners Road. Correspondingly, small reductions in traffic volumes would be expected along Todman Avenue and Southern Cross Drive, south of Gardeners Road.

The capacity of a highly developed road network is often determined by the efficiency of operation of its intersections. In many cases, additional network capacity can be achieved by undertaking a program of intersection improvements.

In general, most of the key intersections in the road network are operating at levels of service which can only occasionally be considered to be satisfactory or good. Traffic growth, resulting from land use changes and increased economic activity, will result in the performance of these intersections to decline unless improvements are made.

The Eastern Distributor proposal would bring about changes which would influence the efficiency of the intersections in the road network. In common with the overall assessment of the traffic impacts of the proposal, these changes would be most significant either where the Eastern Distributor interfaces with

existing streets, where the proposal includes changes to the existing road network or where its influences brings about changes elsewhere on the network.

Table 8.1 provides an assessment of the anticipated performance of a number of key intersections based on anticipated traffic flows in 2011, both with and without the Eastern Distributor. It uses inputs derived from both the Tracks and EMME/2 models.

TABLE 8.1 RELATIVE PERFORMANCE OF SELECTED INTERSECTIONS (2011)

Main Road	Cross Road	Performance			Comment
		Worse	Same	Better	
Sir John Young Crescent	Crown			■	
	Palmer			■	
William	Riley			■	
	Crown			■	
	Palmer	■			Consequence of the Eastern Distributor
	Bourke	■			Consequence of the Eastern Distributor
Oxford	Crown		■		
	Bourke			■	
	Wentworth Avenue	■			Consequences of general traffic growth
Flinders	Albion			■	
	Moore Park Road			■	
South Dowling	Flinders			■	
	Fitzroy		■		
	Cleveland	■			Physical restrictions on turning movements limit capacity achievable
	Crescent			■	
	Dacey		■		
	Todman			■	
	Link Road			■	
Foveaux	Crown		■		
	Bourke		■		

TABLE 8.1 CONTINUED

Main Road	Cross Road	Performance			Comment
		Worse	Same	Better	
Anzac Parade	Moore Park			■	
	Road		■		
	Cleveland		■		
	Dacey				
Crown	Liverpool		■		
	Campbell			■	
	Albion		■		
	Cleveland		■		
Bourke	Liverpool			■	
	Campbell			■	
	Albion		■		
	Cleveland		■		
	Lachlan		■		
	O'Dea Avenue		■		

A number of factors influence the results shown in the above table and would also influence the capacity to improve those results, namely:

- the capacity of intersections for general traffic may be reduced where bus priority is included. In these circumstances it may be appropriate to accept a reduction in capacity for general traffic in order to make significant improvements to public transport facilities;

- the achievement of desired objectives in the implementation of a program of local area traffic management may result in the reintroduction of two way traffic in some streets. This may increase the number of movements at intersection and thereby influence the capacity of those intersections. In the context of the local area traffic management program such a result may be desirable; and

- the physical restrictions imposed by the presence of buildings or cultural features may inhibit the potential to further improve intersections in some cases resulting in a deterioration of performance. In the case of Cleveland Street, the proposal would significantly improve the flow of traffic travelling north or south along South Dowling Street as it would be uninhibited due to the proposed tunnel under Cleveland Street. The potential to make further road space available for right and left turn movements at the intersection of Cleveland and South Dowling Streets is limited by the importance of features that surround the intersections such as buildings and significant fig trees in Moore Park.

8.1.2 INFLUENCE OF THE TOLL

Traffic modelling undertaken for this EIS included assessing the influences of the Eastern Distributor both with and without a toll using the Tracks traffic model. The imposition of a toll on a motorway tends to suppress traffic using the motorway. In the case of the Eastern Distributor this would only occur for traffic travelling in a northbound direction. A number of drivers would tend to seek an alternative route.

The scale of this diversion is difficult to estimate, but experience with other toll routes in Sydney suggest that even if there is an easily accessible alternative, traffic diversion is at its peak immediately following opening of the facility and then reduces as acceptance grows. This diversion would reduce even more rapidly if the toll free alternative is not convenient and involves lengthy travel times.

Northbound motorists may choose a number of alternatives to using the Eastern Distributor. The closest alternative route would essentially be the one that exists today, namely the Flinders, Campbell and Crown Streets route to Sir John Young Crescent and the Cahill Expressway or Macquarie Street in the city.

The capacity of Crown Street to accommodate significant volumes of northbound traffic that may wish to divert from the Eastern Distributor, would be limited by the proposed introduction of two way traffic on that road. Further local area traffic management measures may be put in place as a result of the implementation of the Local Area Improvement Program.

An alternative route to the use of Crown Street would be College Street. The convenience of this route would, however, be influenced by the Sydney City Council's plans for the redevelopment of the Boomerang Street and Haig Avenue area and the resultant accessibility for vehicles through this area.

An alternative route further to the west of the Eastern Distributor would be accessing the Western Distributor to the Harbour Bridge. A number of different routes could be used to access the Western Distributor for northbound traffic travelling from the south and south-eastern suburbs of Sydney. The routes would include:

- O'Riordan Street, Botany Road and Abercrombie Street;
- Botany Road and Abercrombie Street;
- Link Road, Epsom Road, Botany Road and Abercrombie Street;
- O'Dea Avenue, McEvoy Street, Botany Road and Abercrombie Street;

- Lachlan Street, McEvoy Street, Botany Road and Abercrombie Street; and

- Cleveland Street and Abercrombie Street.

O'Riordan Street and Botany Road are important heavy goods vehicle routes and would continue to have that role. Cleveland Street is an important east/west route across the area, however, it has limited capacity and carries heavy volumes of traffic. Significant improvements to Cleveland Street including road widening would most likely be unacceptable.

Further south, land adjacent to the Lachlan Street and McEvoy Street east/west corridor is zoned for road widening purposes. The potential exists to make significant improvements to that route which may encourage the use of Botany Road as a toll free route for both general traffic and heavy goods vehicles, but also may encourage traffic from the south to use the Eastern Distributor in lieu of Botany Road.

The differences between the modelled morning peak hour traffic volumes without a toll indicates that less traffic would be attracted to a tolled Eastern Distributor. However, the transfer of traffic is fairly widely spread across the network, with relatively small changes on any one road.

Expected differences in traffic volumes when comparing the tolled and not tolled situation are shown in *Table 8.2*. References in the table relate to *Figure 5.1*.

TABLE 8.2 COMPARISON OF TOLLED AND NOT TOLLED EASTERN DISTRIBUTOR

	Existing (1996 Tracks Model)	2011 Without Proposal	2011 with Tolled Proposal	2011 with No Toll on Proposal
Figure 5.1a Cahill Expressway to William Street				
1	3,700	7,100	10,000	11,100
2	62,000	64,000	66,000	66,000
3	60,000	65,000	25,700	33,900
4	NA	NA	44,100	41,600
5	NA	NA	45,100	45,400
6	NA	NA	33,700	49,600
7	NA	NA	20,700	20,200
8	9,400	9,300	22,400	21,800

TABLE 8.2 CONTINUED

	Existing (1996 Tracks Model)	2011 Without Proposal	2011 with Tolled Proposal	2011 with No Toll on Proposal
9	NA	NA	11,100	10,500
10	NA	NA	7,300	9,400
11	25,000	31,700	4,600[3]	5,200
12	16,900	16,700	200	100
13	64,000	67,000	42,500	43,300
14	64,000	66,000	49,800	48,100
15	73,000	75,000	85,000	87,000
16	73,000	75,000	85,000	85,000
Figure 5.1b Stanley Street to South Dowling Street Area				
1	28,500	33,800	9,400[3]	7,900
2	43,300	41,500	Low Flow	Low Flow
3	NA	NA	40,900	59,000
4	37,900	47,600	41,800	33,400
5	32,100	40,200	31,000	21,500
6	NA	NA	56,000	56,000
7	49,500	53,000	23,700	17,800
8	19,000	19,500	6,900	7,400
9	58,000	62,000	24,700	18,900
Figure 5.1c Fitzroy Street to Cleveland Street Area				
1	22,800	23,200	21,400	21,000
2	NA	NA	13,200	23,400
3	28,900	35,800	11,200	8,200
4	46,600	50,000	24,600	20,300
5	NA	NA	800	800
6	19,700	21,700	27,700	29,400
7	19,700	21,700	26,900	28,600
8	37,200	38,400	39,700	40,800
9	NA	NA	42,300	42,300
10	24,500	25,100	18,100	15,400
11	24,000	28,400	3,400	3,300
12	NA	NA	49,400	49,400
13	NA	NA	27,700	35,600

TABLE 8.2 CONTINUED

	Existing (1996 Tracks Model)	2011 Without Proposal	2011 with Tolled Proposal	2011 with No Toll on Proposal
14	24,500	25,100	22,200	24,100
15	30,900	32,300	36,800	43,100
16	30,100	30,700	29,800	30,900
17	NA	NA	49,400	49,400
18	NA	NA	23,500	27,100
19	24,800	28,700	1,600	1,600
20	33,100	33,900	26,900	26,700
Figure 5.1d Cleveland Street to Todman Avenue Area				
1	15,900	16,600	22,000	22,000
2	NA	NA	29,900	29,900
3	25,100	26,800	21,100	21,100
4	44,900	44,500	22,800	24,200
5	NA	NA	49,700	52,000
6	7,200	13,100	21,600	21,700
7	29,500	29,600	29,100	28,400
8	36,000	37,300	20,800	20,800
9	46,600	52,000	28,900	29,500
10	NA	NA	49,700	52,000
11	NA	NA	29,900	29,900
12	14,800	13,300	16,000	16,500
13	16,500	16,500	16,400	16,600
Figure 5.1e Dowling Street Area				
1	44,900	52,000	16,200	16,700
2	33,800	35,300	11,500	11,600
3	NA	NA	29,900	29,900
4	NA	NA	46,400	47,000
5	17,300	29,400	12,800	15,700
6	18,100	21,100	19,400	19,000
Additional Roads				
Crown Street (Between Devonshire and Foveaux)	21,700	27,300	4,800[3]	6,000

TABLE 8.2 CONTINUED

	Existing (1996 Tracks Model)	2011 Without Proposal	2011 with Tolled Proposal	2011 with No Toll on Proposal
Bourke Street (between Devonshire and Foveaux)	16,400	17,100	13,400[4]	12,500
Elizabeth Street (between Devonshire and Foveaux)	9,100	15,100	9,000	9,400
Southern Cross Drive (south of Wentworth Avenue)	70,000	89,000	85,000	86,000

Notes

1. With some exceptions related to one-way roads annual average daily traffic (AADT) flows have been calculated from the two hour morning peak values derived from the Tracks model by applying the factor 13/1.8. However these factors will vary depending on the nature of the road and the traffic carried by it with significant peak spread changes.
2. The toll sensitivity in the Tracks modelling is much higher than is likely to occur.
3. The Tracks numbers on Crown Street are lower than may be achievable through local area traffic management.
4. The numbers on Bourke Street between Devonshire and Foveaux are higher than may be achievable through local area traffic management.
5. NA means not applicable or not available.

Traffic modelling shows that the effect of not having a toll on the Eastern Distributor would increase traffic by 11 percent in the main northbound tunnel. Other changes in traffic flows would be widely distributed across the road network, but would be expected to be relatively small on individual roads, ranging between two and five percent in most cases. Changes of this order are not normally perceived by road users and would be unlikely to be high enough to result in significant changes to local amenity.

8.1.3 HEAVY AND DANGEROUS GOODS MOVEMENTS

The present *"Eastern Distributor"* route does not function as a major corridor for heavy goods vehicles at present as more convenient routes are available. Heavy goods vehicles make up about five percent of all vehicles on northern sections of Crown Street, reducing to about four percent at the Cahill Expressway. The overall numbers of heavy goods vehicles on the Eastern Distributor would increase in line with an expected general increase in traffic.

Dangerous goods vehicles would not be allowed to use the tunnels on the Eastern Distributor route. They are presently not allowed to use the Domain and Harbour tunnels and that situation would continue.

Dangerous goods vehicles would use similar routes to those presently existing. No significant increase in the movements of dangerous goods vehicles are expected along any particular route and therefore no significant changes to hazards and risks are expected.

Dangerous goods vehicles travelling to and from Woolloomooloo Bay and Garden Island would not be able to use the present southbound Palmer Street and Bourke Street routes. Alternative routes would need to be found such as use of Macleay Street, Crown Street, William Street or College Street. The number of vehicles that would need to divert from the existing Palmer Street and Bourke Street route is not considered to be significant.

8.1.4 PUBLIC TRANSPORT

The Eastern Distributor proposal would maintain all existing bus priority measures including dedicated bus lanes along Anzac Parade. The completion of the proposal would provide opportunities to significantly improve public transport services. The decrease in traffic volumes on routes such as Flinders Street would generally benefit bus operations. These improvements would be consolidated by the implementation of priority measures. Such changes would result in shorter journey times, greater reliability and potentially improved levels of service in response to increasing demand, especially during peak periods. Improvements to public transport services to and from the Eastern Suburbs may lead to some reductions in private travel during peak periods.

The State Rail Authority and New Southern Railway operators expect that between seven to 16 percent of current car travellers to the Airport would divert to the train. The extent of the diversion would depend on whether they are business travellers, tourists or Airport employees (Kinhill, 1994). The overall percentage of forecasted travel on the New Southern Railway that may choose to travel along the improved Eastern Distributor corridor would likely be small and would not affect the viability of that public transport initiative.

8.1.5 PARKING AND PROPERTY ACCESS

Parking

The Eastern Distributor proposal would generally result in the maintenance or improvement of existing on street parking facilities. In the Woolloomooloo area parking would be prohibited on Palmer Street as it is today. As part of the Local Area Traffic Management program consideration would be given to establishment of all day parking on Crown Street and Riley Street. Other opportunities to improve on street parking provision in areas of east Sydney and Surry Hills would be available and be reviewed as part of the Local Area Improvement program.

Land would be available on both the eastern and western sides of South Dowling Street for non-peak parking. As in the case of all clearway restrictions in Sydney, this parking provision would be subject to periodic review and proper traffic management practices.

On the eastern side of Dowling Street at Kensington, parking provision for many local residents would be significantly improved. A local access lane would be provided that would not be subject to clearway restrictions.

Existing restrictions on parking during major events at the Sydney Cricket Ground and Football Stadium complex would generally continue to operate after the Eastern Distributor is operational.

Property Access

Existing property accesses would be maintained during the operation of the Eastern Distributor. Most residents who enter or exit their properties on the eastern side of Dowling Street at Kensington would find conditions safer than presently exist.

Access to Community Institutions and Facilities

There are numerous community institutions and facilities throughout the Woolloomooloo, Darlinghurst, Surry Hills, Paddington, Redfern, Zetland and Kensington areas. The Eastern Distributor proposal would result in some alteration to access routes to those facilities. These alterations would mainly occur in the Woolloomooloo and Darlinghurst areas as a result of alterations to traffic management on Crown and Bourke Streets. For example, accessing facilities located in or around Bourke Street, between William Street and Oxford Street, would require new routes to be found. The predominant route would likely be the use of Crown Street which would accommodate two way traffic after the Eastern Distributor is open. Existing east-west roads would continue to be used from Crown Street such as Stanley Street, Liverpool Street and Burton Street.

The alterations to local access routes in and around the Darlinghurst and Woolloomooloo areas would cause only minor inconvenience for local traffic.

Access to Proposed New Developments

The proposed improvements to the State Road network would likely significantly improve general access to the many urban redevelopment schemes proposed for the eastern and south-eastern suburbs of Sydney. These schemes include the Fox Studio development at the Sydney Showgrounds, proposals in the Green Square area and potential redevelopment of the Defence land and ACI sites adjoining South Dowling Street.

The traffic generated from these proposals have been included within the assumptions modelled for future traffic growth as outlined in *Chapter 5*. No direct access is proposed off South Dowling Street for the Moore Park Gardens development. Access from Dowling Street to the Defence land at Zetland may be allowed but would be subject to an application being considered by the RTA once development proposals have been finalised.

8.1.6 PEDESTRIANS AND CYCLISTS

Pedestrians

The Eastern Distributor would result in a series of changes which would affect pedestrians and cyclists amenity and safety. These are:

- the reduction of vehicular traffic on a number of important streets which would improve conditions for both pedestrians and cyclists;

- the presence of the Eastern Distributor would, however, have the potential to introduce additional severance to existing pedestrian and cycle routes.

Pedestrian and cyclist severance exists between Woolloomooloo and eastern areas of the city as a result of heavy traffic on Palmer Street. This causes a level of deterrence and tends to restrict pedestrian movements in the east/west direction. Controlled pedestrian crossings exist at Sir John Young Crescent, Cathedral Street and William Street. Uncontrolled pedestrian movements occur along Palmer Street, at some risk to personal safety.

The Eastern Distributor proposal would prohibit the uncontrolled pedestrian movements across Palmer Street by the placement of appropriate barriers. Pedestrian movements would continue to be allowed at Sir John Young Crescent, Cathedral Street and William Street. While the facilities at William Street would be very similar to what exists today, overhead pedestrian bridges would be required at Sir John Young Crescent and Cathedral Street. The Cathedral Street pedestrian bridge would be incorporated with a set of pedestrian lights which would allow safe crossing of Palmer Street. While, the pedestrian bridges would be designed to cater for disabled access in accordance with appropriate standards, members of the local communities have expressed a concern that they would be inconvenient, unsafe and exposed to the weather.

The replacement of pedestrian lights with pedestrian bridges may be inconvenient to mothers with young children, the elderly or the disabled. Generally, however, for the majority of the community it is likely that the level of pedestrian access across the Eastern Distributor would be similar to what presently exists. Further, alternatives to the provision of the pedestrian bridges

would involve significant additional cost such as the placement of the Eastern Distributor in a tunnel.

At Drivers Triangle, the introduction of the Eastern Distributor proposal would also alter pedestrian facilities. The northbound entry to the main tunnel from Moore Park Road and Anzac Parade would restrict pedestrian movements across the triangular park bounded by Flinders, Fitzroy and South Dowling Streets to pedestrian lights located midway between South Dowling Street and Moore Park Road. Alternative pedestrian facilities would be provided at the intersections of Flinders Street with South Dowling Street and Moore Park Road. This may cause some minor inconvenience to local pedestrians.

The proposed removal of pedestrian lights on South Dowling Street, between Fitzroy and Cleveland Streets, may result in increased journey times for pedestrians and subsequent increase in community severance. The existing pedestrian traffic lights adjacent to the Bourke Street public school would be removed. The construction of a pedestrian bridge adjacent to Parkham Street has been considered. The Centennial Park and Moore Park Trust has expressed a preference for diverting pedestrian movements to the Cleveland Street traffic lights so that the bridge structure does not impact on the park, and uncontrolled pedestrian movements do not impact on sporting facilities which are proposed to be redeveloped in that section of Moore Park. Some local residents from the Parkham Street area also expressed concern about the impacts of direct and significant volumes of pedestrian movements along Parkham Street. The impacts of elevated structures adjacent to terrace homes was also a concern. Conversely, a significant proportion of local residents in Surry Hills expressed a desire that the existing level of access to Moore Park be either maintained or improved.

The provision of a pedestrian bridge over South Dowling Street between Fitzroy and Cleveland Streets could be financed as part of the proposal. However, the location and design of such a bridge has not received widespread support. Consequently the present proposal for the Eastern Distributor does not include a pedestrian bridge over South Dowling Street. The removal of the existing pedestrian lights would require pedestrians to travel approximately 150 metres to the traffic lights at Cleveland Street. This would cause some inconvenience, the extent of which would depend on the intended destination, age and physical condition of the pedestrian.

A pedestrian bridge is proposed as part of the Moore Park Gardens development, between Madison Street and Crescent Street. Such a facility would be an adequate replacement for the pedestrian crossing that exists at the traffic lights at Crescent Street which would be removed as part of the Eastern Distributor proposal.

A pedestrian facility would also be removed at the Link Road and Dowling Street intersection. This would cause some severance of the Zetland and Kensington area, however, other routes would be available at the Todman Avenue and Dowling Street intersection and under Southern Cross Drive at Lenthall Street.

Cyclists

Bikesafe lanes would be incorporated as part of the proposal south of Crescent Street on South Dowling Street and Dowling Street to Southern Cross Drive. Facilities similar to those existing today would be maintained on Southern Cross Drive to its intersection with Wentworth Avenue. A ramp for cyclists would be provided on the proposed pedestrian bridge being constructed over South Dowling Street at the Moore Park Gardens development. This ramp would allow cyclists to exit the bridge and access the bikesafe lane to travel south along South Dowling Street. These facilities represent an improvement over the existing situation. North of Crescent Street, cyclists would be encouraged to use an identified bike route along Bourke Street. The safety and amenity of this route would be improved by the expected reductions in traffic on Bourke Street passing through Surry Hills and East Sydney.

South of Wentworth Avenue provision for cyclists would be made on Wentworth Avenue with possible bike routes using open space and local streets to be investigated with Botany Council.

8.1.7 IMPACTS ON TRAFFIC AND TRANSPORT SYSTEMS

The main traffic and transport related impact of the proposed Eastern Distributor would be the redistribution of traffic on the road network. Significant reductions in traffic volumes would be experienced along roads such as Flinders Street, Crown Street and Bourke Street, the extent of which would depend on the volume of traffic attracted to the Eastern Distributor and on measures implemented either as part of the Local Area Improvement Program or reductions in the capacity of those roads to carry general traffic due to the implementation of bus priority measures.

A number of benefits would flow from the Eastern Distributor across the transport network. In terms of general traffic, an overall reduction in travel time in the peak period for the whole of the road network of approximately three percent would occur. A more significant improvement would occur for north/south traffic using the distributor. Opportunities would be created by the proposal to improve public transport and general environmental amenity. The nature and extent of those improvements would ultimately be determined by appropriate State Government authorities, the local Councils and the local community. Traffic modelling indicates that the proposal would not significantly increase total kilometres travelled on the road network

(0.3 percent) when comparing the road network with and without the Eastern Distributor proposal in the year 2011.

There would be some localised impacts on pedestrian movements and the performance of some intersections may decline after the Eastern Distributor is constructed. The development of the Eastern Distributor may bring forward the need to address other capacity problems on the road network. Investigations in the timing, design and financing of these improvements would be reviewed over time by the RTA and relevant local councils.

CHAPTER 9 ECONOMIC ANALYSIS

9.1 GENERAL PRINCIPLES

The economic analysis of the project has been undertaken in accordance with the RTA Economic Analysis Manual. The base case for the evaluation is the existing road system in the eastern area of Sydney from Woolloomooloo in the north to Mill Pond Road in the south. The design year is 2011 with the future road network including the Eastern Distributor operating with a $2 toll on northbound traffic only.

The TRACKS model was used to estimate road user benefits (travel time savings and changes in vehicle operating cost) of the options following several runs of the model with differing assumptions.

9.2 METHOD AND ASSUMPTIONS

9.2.1 EVALUATION PERIOD

The evaluation is undertaken over a 30 year period made up as follows:

- construction period of three years (mid 1997 to mid 2000); and
- benefit period of 27 years (2000 to 2026).

This is a similar procedure to that used in the previous two economic evaluations of the Eastern Distributor project (the 1984 EIS and the 1991 RTA Review of Economic Analysis) and is in conformity with that recommended in the RTA Economic Analysis Manual.

9.2.2 PRICE AND DISCOUNT RATES

All costs and benefits, except property costs, are in 1996 price levels. The construction costs and all parameter values in the RTA Economic Analysis Manual are in 1996 price levels.

The main discount rate is 7 percent, with sensitivity analyses undertaken at 4 percent and 10 percent. Undiscounted costs and benefits (zero discount rate) are also reported in *Appendix C*.

The discount year, the year to which all costs and benefits are discounted, is 1997 or the first year of the evaluation period.

9.3 CAPITAL COSTS

9.3.1 CONSTRUCTION

Construction costs were supplied by Airport Motorway and are shown in *Table 9.1* in the years in which they are expected to occur. These costs, which total $404.5 million, include the construction of the Eastern Distributor, associated road works and toll plazas, South Dowling Street, Southern Cross Drive and Mill Pond Road.

TABLE 9.1 CONSTRUCTION COSTS BY YEAR

Year	Amount ($'000)	Share (%)
1997	82,846	20.8
1998	166,741	41.8
1999	121,125	30.4
2000	33,790	8.0
Total	**404,502**	**100.0**

9.3.2 ACQUISITION COSTS

The cost to acquire property for construction of the Eastern Distributor is estimated to be $35.91 million. This amount was calculated by indexing the cost used in the 1984 EIS to current prices levels. That cost included three components:

- property required for the expansion of the road infrastructure;
- credits for surplus parcels of land that can be retained for non-transport uses or resold; and
- loss of development potential for some land affected by the project.

The indexing method used to estimate the costs of acquiring property for the Eastern Distributor has limitations: the project now has a different scope than the earlier proposal, the index applies only to residential properties, and it is only available to 1995. (Property costs are therefore in 1995 price levels while the remainder of costs and benefits are in 1996 price levels.) In practice the use of the land would be paid for by Airport Motorway by way of annual lease payments to the RTA; the amount of lease payments is confidential.

The cost of $35.91 million is assumed to occur in the first construction year (1997). Some of the land is already owned by the RTA and some would need to be purchased to enable the project to commence.

9.3.3 RELOCATION AND DISTURBANCE COSTS

The 1984 EIS used an amount of 10 percent of the value of property taken to represent these costs. They represent the cost to property owners and renters of having to move against their will. In economic terms, this is the loss of householder surplus or the value above market prices that people and businesses place on their properties. The same approach has been adopted for this evaluation.

The cost of relocation and disturbance used in the current evaluation is $3.591 million, applied in the first construction year (1997).

9.3.4 MAINTENANCE AND OPERATING COSTS

These costs were supplied by Airport Motorway and include maintenance costs of the Eastern Distributor infrastructure and the operation of the toll facility. The costs vary from year to year, ranging from $3 million in the first (part) year of operation to $12.7 million in the last year of the evaluation period. The total undiscounted value of these costs over the evaluation period is $272 million (see *Appendix C*).

9.4 PROJECT BENEFITS

Project benefits consist of the following:

- travel time savings;
- vehicle operating cost savings;
- reduction in accidents costs;
- benefits to public transport users;
- amenity improvements; and
- residual value of assets.

9.4.1 TRAVEL TIME SAVINGS

The value of travel time savings is the product of the following:

- the travel time saved;
- the value of travel time; and
- the annualisation factor.

Travel Time Saved

The travel time saved in the peak period was obtained from the TRACKS traffic assignment model for 1996 and 2011. It uses a fixed trip matrix, that is the same number of trips are applied to each network, but the characteristics of the network (travel distances, travel times) are varied in accordance with the network being modelled. The toll is modelled as an increase in travel time. In 1996, 256,680 trips were assigned to two options:

- no Eastern Distributor (Base Case); and
- Eastern Distributor with a toll of $2 for trips going north.

In 2011, a higher number of trips (281,531) was assigned using the same two options. *Table 9.2* shows that the travel time savings are expected to increase significantly over time if the Eastern Distributor is constructed.

TABLE 9.2 TRAVEL TIME SAVINGS RELATIVE TO THE BASE CASE, 1996 AND 2011

	Benefit of Eastern Distributor	
Option	**1996**	**2011 Eastern Distributor Tolled**
Hours ('000)	4,747	7,178
Value ($'000)	71,295	107,809

The TRACKS model assigns trips for a two hour morning peak. The travel time savings (given in minutes by the model) were annualised by multiplying the model output by a factor of 1800/60. The '1800' component is at the upper end of the range recommended by the RTA. It implies that the morning peak of two hours represents about 14 percent of daily traffic, and the '60' component converts the model output from minutes to hours. The annualising factor is considered to be reasonable given the consistently heavy traffic flow conditions in the eatern Sydney area.

Value of Travel Time

The travel time savings in hours were converted to dollars using the value of travel time obtained from the RTA Economic Analysis Manual. The value in 1996 price levels is $15.02 per vehicle hour. This value is calculated using network-wide assumptions on traffic flow composition, vehicle occupancy and values of time per person hour reported in the Manual.

Total Travel Time Benefit

Travel time savings were linearly interpolated between 1996 and 2011 and assumed to remain constant thereafter. The value of travel time could be varied over time if it was thought there are likely to be real increases in wages during the evaluation period. Taking a conservative position, it was assumed that the value of travel time would remain constant over time.

9.4.2 VEHICLE OPERATING COSTS

Changes in vehicle operating costs were estimated from changes in distance travelled produced from the TRACKS model. Trip length is expected to increase for trips which use the Eastern Distributor (although trip time will decrease because of higher speeds). The extra kilometres travelled would be higher the more trips that are made on the Eastern Distributor.

The TRACKS model assigns trips for a two hour morning peak. Vehicle operating costs were annualised using the factor of 1800, as with travel time savings.

TABLE 9.3 EXTRA DISTANCE TRAVELLED AND VEHICLE OPERATING COSTS RELATIVE TO BASE CASE, 1996 AND 2011

	Benefit of Eastern Distributor	
	1996	2011 Eastern Distributor Tolled
Distance Travelled (kilometres x 1000)	(11,176)[1]	(13,795)
Value ($'000)	(1,553)	(1,918)

Notes:
1. Distance travelled applies only to the Eastern Suburbs sub area, not the Sydney Region as a whole.
2. (disbenefit).

The distance travelled was converted to dollars using the vehicle operating cost per kilometres obtained from the RTA Economic Analysis Manual. The value in 1996 price levels is 13.9 cents per kilometre, which is an average over all vehicle types.

As with travel time savings, additional vehicle operating costs were linearly interpolated between 1996 and 2011 and assumed to remain constant thereafter.

9.4.3 ACCIDENT COST SAVINGS

Accident savings were estimated based on analysis of almost four years of data (May 1992 to December 1995) for the roads likely to be affected by the Eastern Distributor. This analysis enabled the calculation of crash rates for those roads to be prepared. It was assumed that the crash rate on the Eastern Distributor would be one quarter of that on arterial roads. The crash rates were then applied to the kilometres travelled from the TRACKS model to estimate the difference in the number of crashes. Crashes were valued using the unit accident cost rates in the RTA Economic Analysis Manual.

Accident cost savings were estimated to be $1.848 million in 1996 and $2.020 million in 2011 for the Eastern Distributor. Between 1996 and 2011 the savings were linearly interpolated and they were assumed to remain constant thereafter.

9.4.4 PUBLIC TRANSPORT BENEFITS

The Eastern Distributor would have the effect of improving flows on roads which are alternative routes and hence travel times for bus services should improve. It has not been possible to value these savings to bus passengers for this evaluation. In the 1984 EIS a value of about half a million dollars per annum was used.

9.4.5 AMENITY IMPROVEMENTS

A change in property values was used in the 1984 EIS as a benefit in the cost-benefit analysis to represent the change in residential amenity associated with the Eastern Distributor. The change in value was a one-off benefit in the first year of operation of the project. This is effectively a capitalisation of improvements in amenity over the life of the project.

The amenity improvements could include reductions in noise and vehicle emissions as well as general improvement in the environment due to lower levels of traffic. Some areas were expected to experience an increase in traffic levels and consequently a reduction in property values. The change in property prices was estimated from a review of studies estimating the effects

of noise on property values, and it was concluded that houses in noisy streets sell for about 10 percent less than houses in quiet streets. A higher value of 16 percent was used in the evaluation based on the following arguments:

- noise is not perfectly correlated with all other impacts on amenity;
- householders do not appreciate the effects of traffic noise in advance of purchase; and
- there is a scarcity of quiet areas in the Eastern suburbs. As a result quiet houses would attract a higher premium. On the other hand, those who chose to live in the inner city can be presumed to have less strong preferences for quiet.

The 1984 EIS included a direct residential benefit and an indirect residential benefit. The former applied to residences in streets which experienced changed traffic conditions. The indirect residential benefit was included on the assumption that streets which did not experience changed traffic conditions but which were adjacent to streets with reduced traffic volumes would benefit indirectly from the improved amenity. The indirect residential benefit was not included in the current evaluation.

The inclusion of the change in property values means that it would be double counting to include valuations of noise and air pollution impacts in the cost-benefit analysis. As there are likely to be difficulties involved in placing values on noise and emissions, the property valuation method is preferred.

It was not possible to replicate the analysis undertaken in the 1984 EIS. As with the RTA Review of Economic Analysis (1991), the benefit has been updated using the change in property prices since 1984. *Table 9.4* shows average prices for residential properties in inner Sydney suburbs in 1984, 1991 and 1995 (the latest year for which data are available).

TABLE 9.4 AVERAGE PRICES FOR COTTAGES AND COTTAGE SITES IN INNER SYDNEY SUBURBS, SELECTED YEARS

	1984	1991	1995
Cottages	$145,647	$325,909	$396,364
Change from 1984		124%	172%
Cottage Sites	$93,265	$220,455	$252,727
Change from 1984		136%	171%

Source: Valuer-General Blue Book (various years)

The change between 1984 and 1991 is below that reported in the RTA Review of Economic Analysis; it is possible that another data set was used. In the current cost-benefit analysis we have used an increase in property values of 170 percent (or 2.7 times) since 1984 and applied it to the value of the direct residential amenity benefit estimated in 1984 ($8.9 million), giving a benefit of $24 million. This benefit was entered into the cost-benefit analysis in 2000, the year that the Eastern Distributor is expected to open.

The capitalised property value of $24 million implies an annual residential amenity benefit of about $2 million (at a discount rate of 7 percent) to the end of the evaluation period. As noted above, this value can be viewed as a proxy for valuing changes in noise and emissions.

9.4.6 RESIDUAL VALUES

Residual values for long-lived assets are generally included as a benefit in the last year of an economic evaluation. The RTA Economic Analysis Manual suggests that residual values should be included for long-lived assets but does not give any guidance on how they might be calculated. The 1984 EIS assumed that the residual value would be 75 percent of construction cost while the review undertaken by the RTA in 1991 did not include a residual value.

We have included a residual value only for the components of the Eastern Distributor that are likely to have a life of 100 years. Leightons advised that these components have a cost of $120 million. Seventy five percent of this amount ($90 million) was included as the residual value of the Eastern Distributor as it would then have been operating for about 25 years.

9.5 RESULTS OF THE ANALYSIS

The complete results of the cost-benefit analysis are shown in tables in *Appendix C*. The results are presented in terms of four criteria as follows:

- net present value (NPV) or the discounted costs minus the discounted benefits, which measures the overall economic worth of the project;
- NPV per $ of capital (construction costs plus property costs) invested, which measures the efficiency of capital invested and can be used to rank projects when capital is limited;
- benefit cost ratio (BCR) or benefits minus non-capital costs divided by capital costs, which provides a simple method of reporting on the worth of projects and ranking them; and

- first year rate of return or the non-capital costs plus benefits in 2001 (the first full year of operation of the project) divided by capital costs, which can be used in place of a full analysis as an indication of the worth of a project.

Table 9.5 summarises the results in terms of the NPV and benefit/cost ratio (BCR) at a discount rate of 7 percent. It shows that the Eastern Distributor is economically justified with a net present value of $512.6 million, ie over the life of the project the benefits will exceed the costs by over half a billion dollars. The BCR indicates that benefits are estimated to be 2.3 times greater than the costs.

TABLE 9.5 COST-BENEFIT ANALYSIS RESULTS (DISCOUNTED AT 7 PERCENT PER ANNUM)

Criteria	Amount
Net Present Value ($ million)	512.6
Benefit Cost Ratio	2.3

9.5.1 COMPOSITION OF NPV

Table 9.6 shows the total of the discounted costs and benefits over the evaluation period for each of the items quantified. The major item is the travel time savings benefit of almost one billion dollars estimated to occur as a result of the Eastern Distributor. Construction costs and maintenance and operating costs are the next two most significant items $372 million and $99 million respectively). The remaining items are minor by comparison.

TABLE 9.6 COMPOSITION OF NET PRESENT VALUE (DISCOUNTED AT 7 PERCENT PER ANNUM) ($ MILLION)

Cost/Benefit Item	Amount
Road Issues	
▪ Construction	-372.0
▪ Property	-35.9
▪ Relocation and Disturbance	-3.6
▪ Maintenance and Operating	-98.9
Road User Issues	
▪ Travel Time	989.3
▪ Vehicle Operating Costs	-18.3
▪ Accidents	19.9
Other Issues	
▪ Residential Amenity	19.6
▪ Residual Value	12.6
Total	**512.6**

9.5.2 SENSITIVITY ASSESSMENT

Discount Rates

The Treasury Economic Evaluation guidelines recommend a discount rate of 7 percent, but suggest that sensitivity tests be undertaken at 4 and 10 percent. Using a lower discount rate improves the performance in economic terms of the Eastern Distributor and using a higher discount rate makes it worse. In the latter case, the project remains viable in that the net present value remains positive.

TABLE 9.7 NET PRESENT VALUE AT VARIOUS DISCOUNT RATES ($ MILLION)

Discount Rate	NPV ($ million)
7% (Main Results)	512.6
4%	946.4
10%	257.3

Traffic Flows

The TRACKS model produced estimates of travel time savings and distance travelled for three levels of traffic demand. The main cost-benefit analysis results used the most likely traffic demands. *Table 9.8* shows the effects on the economic worth of the Eastern Distributor if traffic flows are somewhat lower or higher than the most likely forecast. In both cases the net present value reduces:

- when traffic is lower, there are fewer vehicles to benefit from the Eastern Distributor; and
- when traffic is higher, the benefits per vehicle are lower because of the effects of congestion.

TABLE 9.8 NET PRESENT VALUE OF EASTERN DISTRIBUTOR WITH TOLL AT VARIOUS TRAVEL DEMAND LEVELS, DISCOUNTED AT 7 PERCENT PER ANNUM

Travel Demand	NPV ($ million)
Most Likely	512.6
Low	473.1
High	262.9

Construction Costs

Table 9.9 shows the effects of varying the level of construction costs on the economic worth of the Eastern Distributor. Construction costs were increased by 20 percent and decreased by 20 percent. The former made the project less worthwhile, while if construction costs are over-estimated, the project becomes more worthwhile.

TABLE 9.9 NET PRESENT VALUE BY VARIATION IN CONSTRUCTION COSTS, DISCOUNTED AT 7 PERCENT PER ANNUM ($ MILLION)

Construction Cost Option	Net Present Value
Main Results	512.6
Plus 20 percent	438.2
Minus 20 percent	587.0

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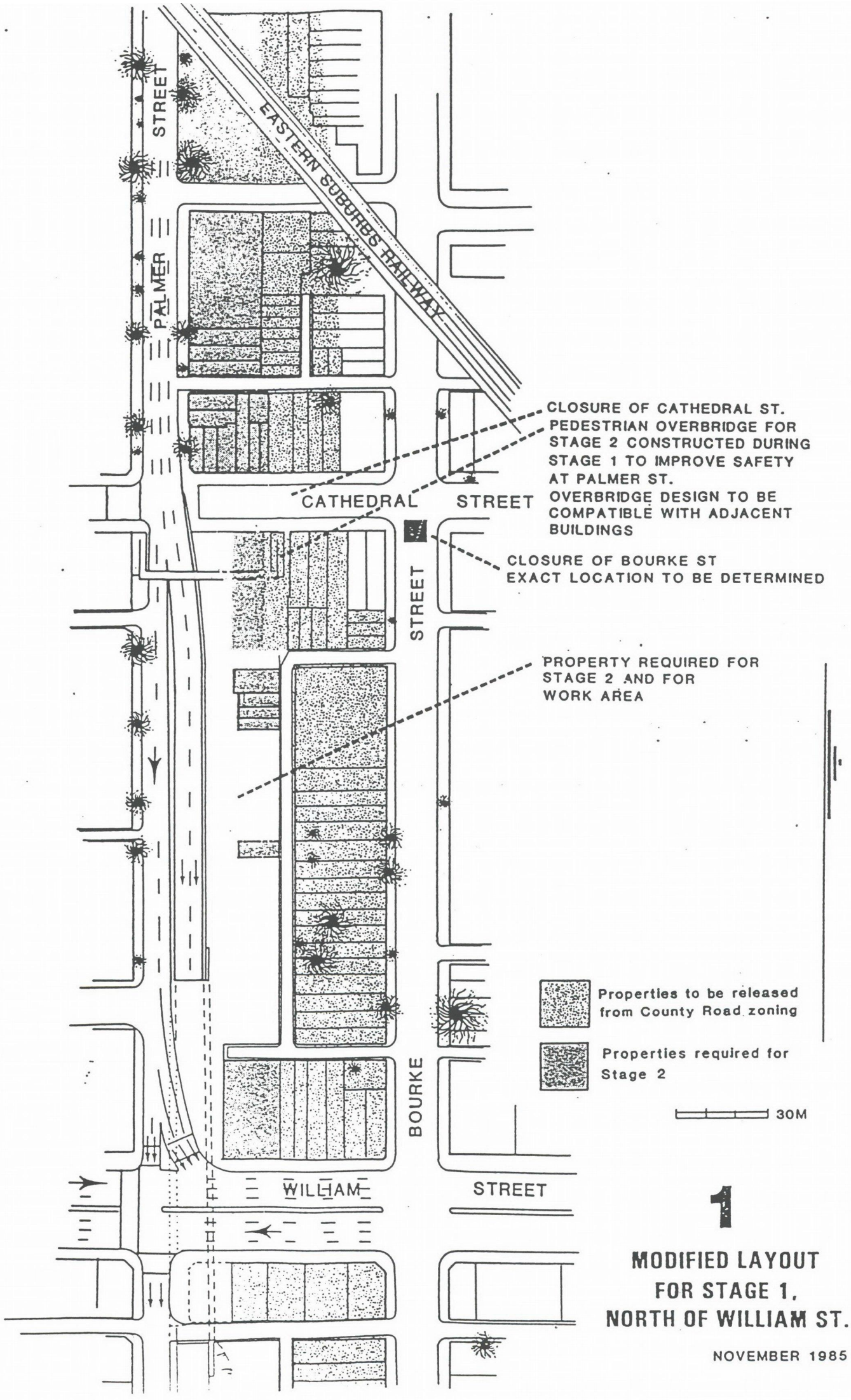
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Appendix A

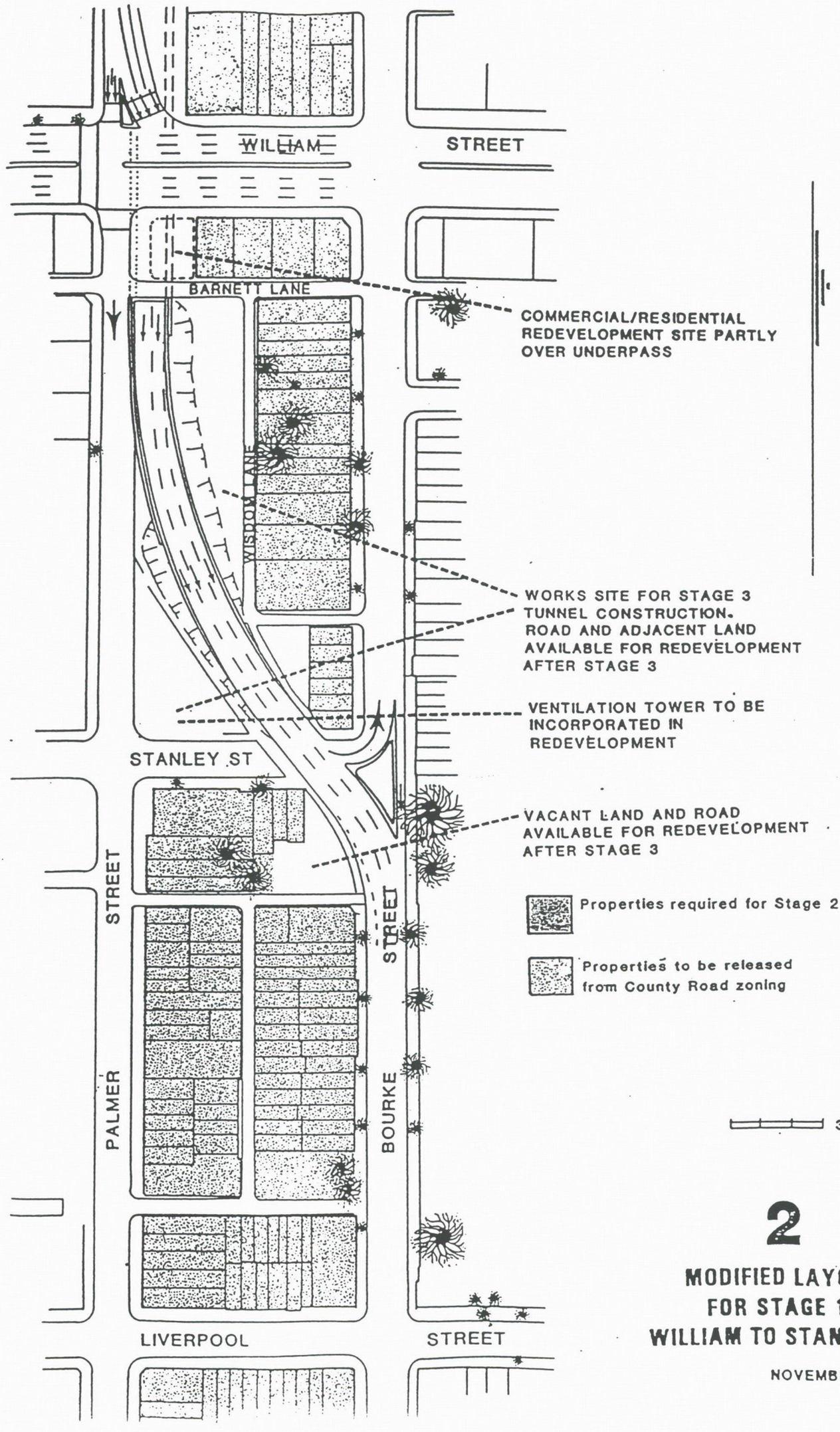
1985 Eastern Distributor Proposal



1

MODIFIED LAYOUT FOR STAGE 1, NORTH OF WILLIAM ST.

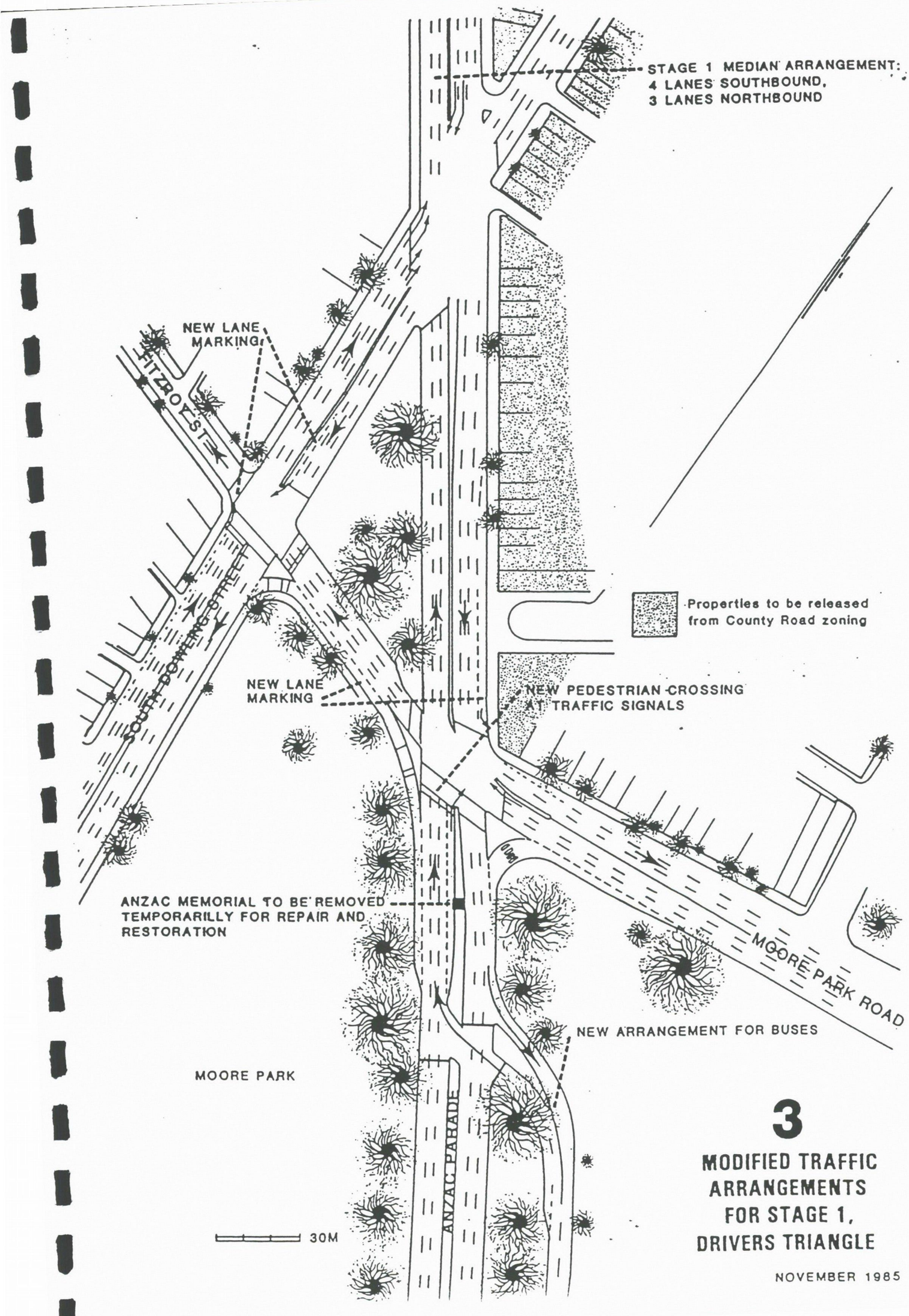
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2

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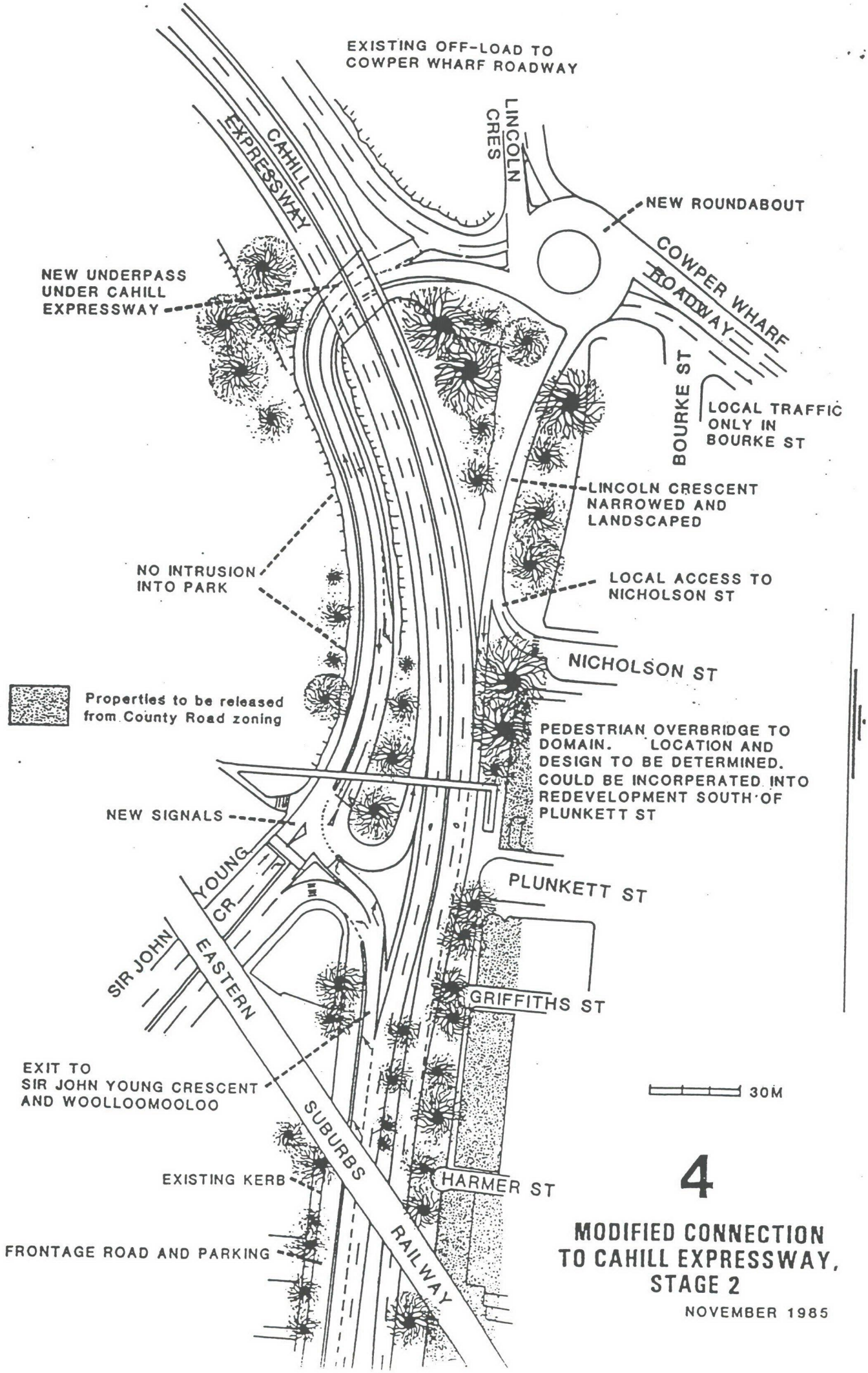
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3

MODIFIED TRAFFIC ARRANGEMENTS FOR STAGE 1, DRIVERS TRIANGLE

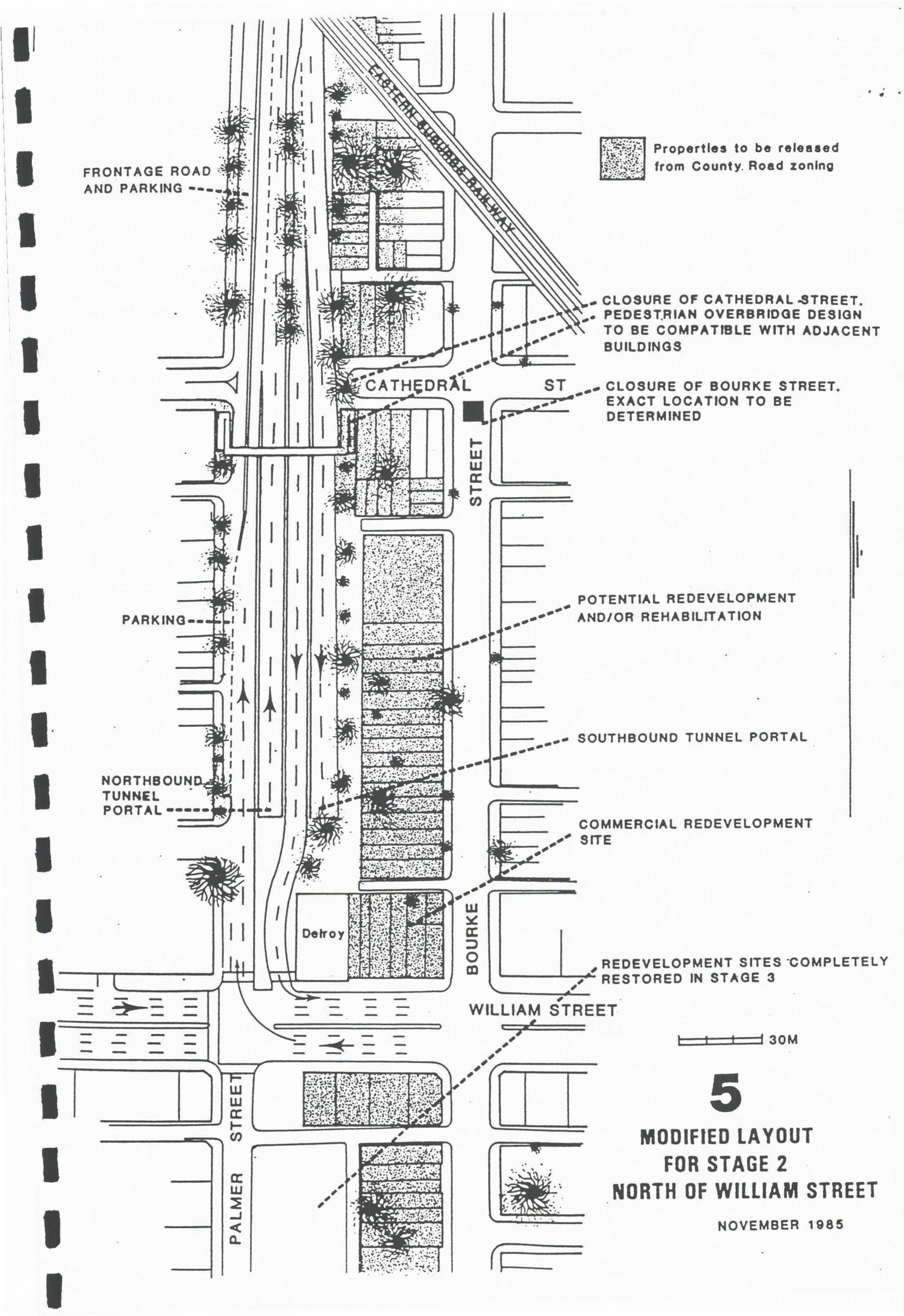
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4

MODIFIED CONNECTION TO CAHILL EXPRESSWAY, STAGE 2

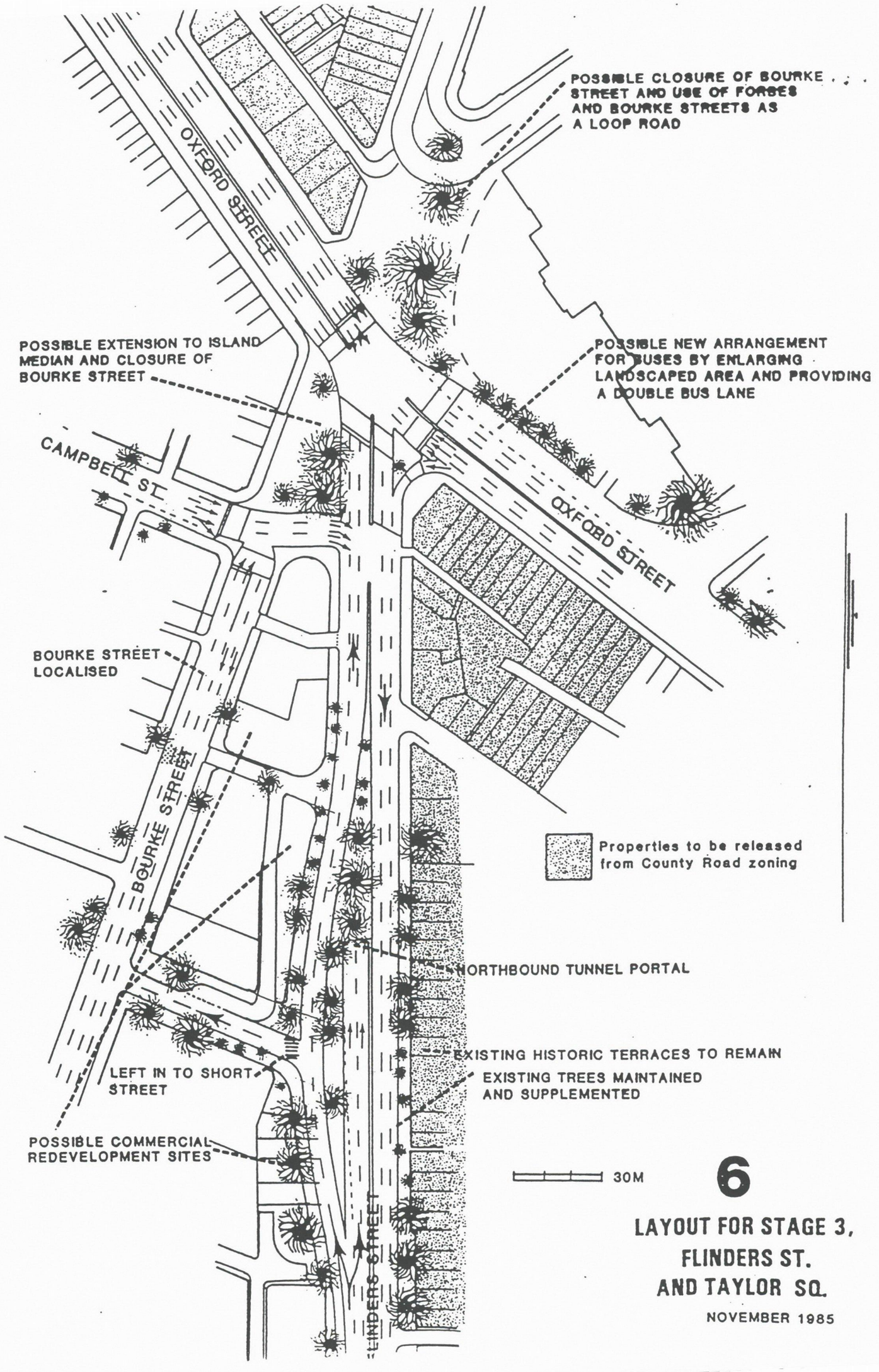
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5

MODIFIED LAYOUT FOR STAGE 2 NORTH OF WILLIAM STREET

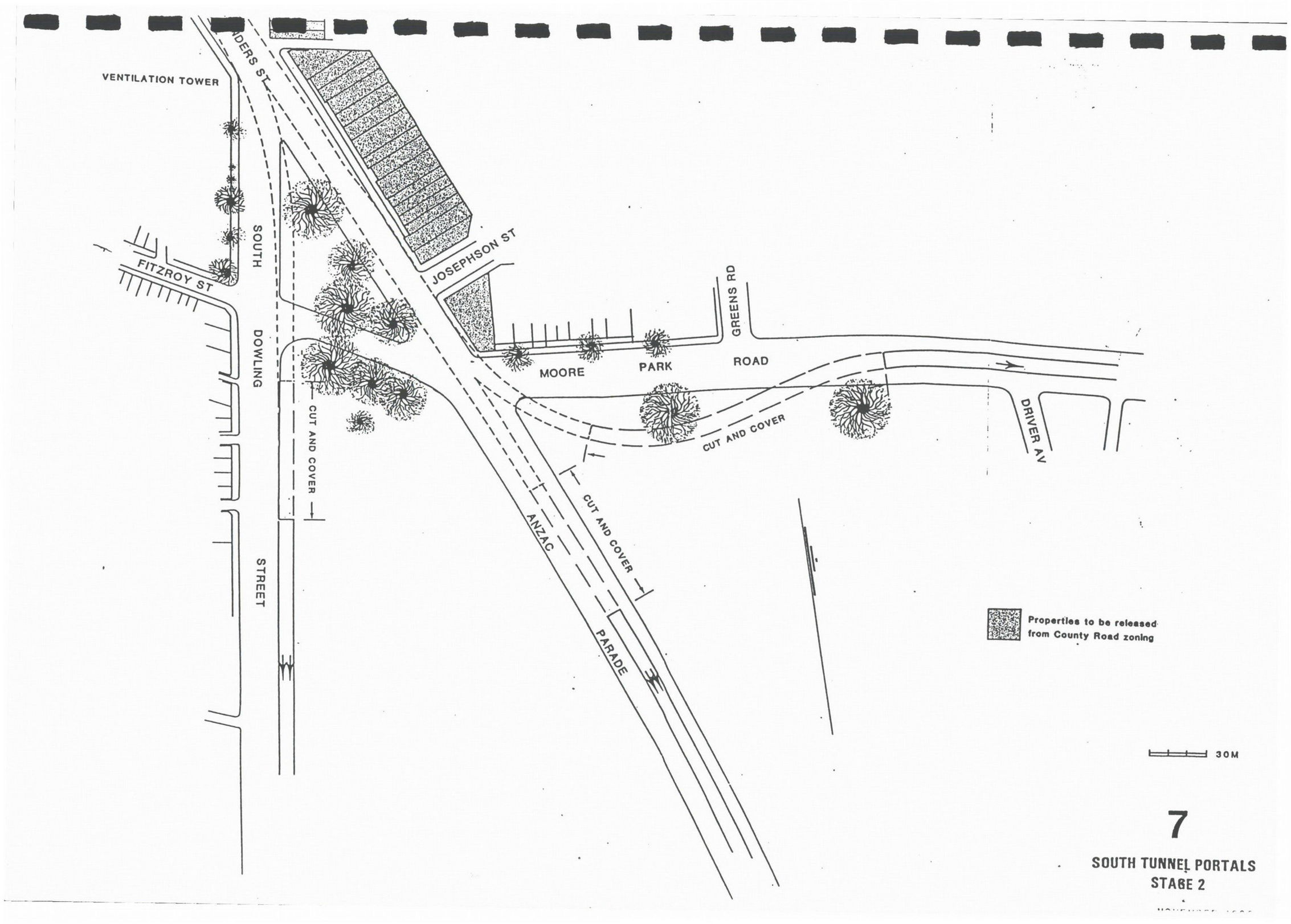
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6

LAYOUT FOR STAGE 3, FLINDERS ST. AND TAYLOR SQ.

NOVEMBER 1985



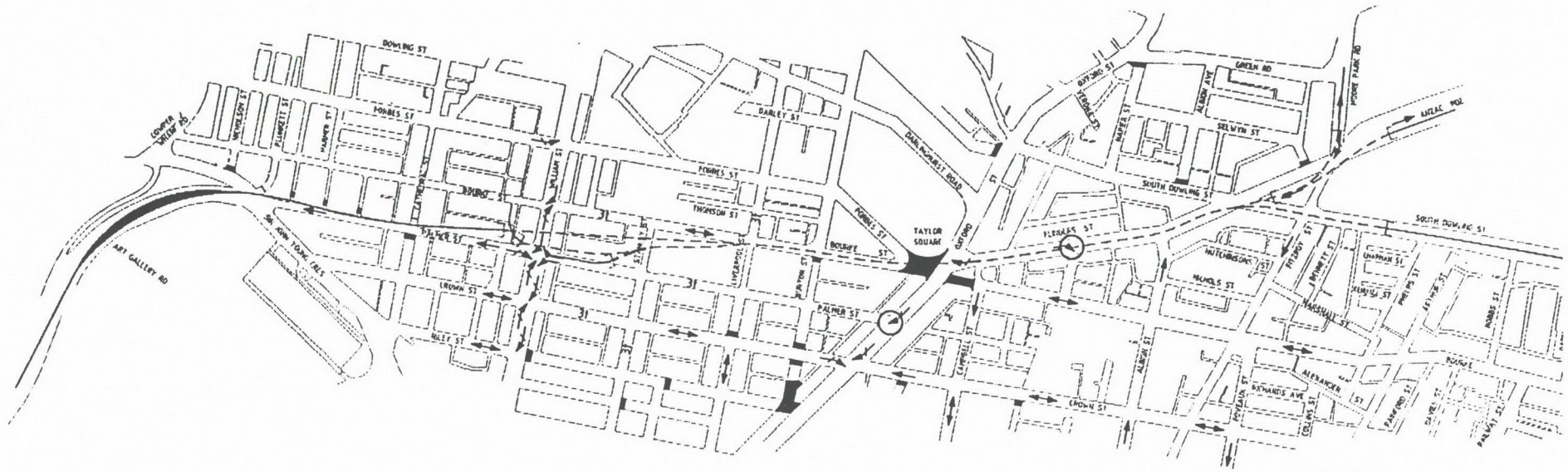
7

SOUTH TUNNEL PORTALS STAGE 2

Appendix B

Local Area Traffic Management
Proposals by Airport Motorway

Eastern Distributor Proposal



LEGEND

- PROPOSED TWO WAY TRAFFIC
- PROPOSED ROAD CLOSURE
- NO TURN
- ALLOW MOVEMENT WHICH IS CURRENTLY BANNED
- 31 LIGHT TRAFFIC ONLY
- NEW TRAFFIC SIGNALS
- REMOVAL OF TRAFFIC SIGNALS

NOTE : BUS LANES ARE SHOWN ON DRG No. 1003

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REV	DATE	DESCRIPTION	CHK'D	APPROVED
A	96.04.25	CONCEPT COMPLETE		

SCALE 32.5m 0 32.5 75 112.5 150 187.5m

	PREPARED	VERIFIED	DATE
DESIGNED	A. MILFORD	S. GRIFFITHS	
DRAWN	T. BADHSON	S. GRIFFITHS	

STATUS CONCEPT COMPLETE

Approval by the Project Manager is necessary that the design and drawing have been verified as conforming with the requirements of the Client Brief. Where undefined, all information on this drawing is intended for preliminary purposes only as it is unchecked.

MAUNSELL PROPRIETARY LIMITED
A.C.N 064 040 034

Leighton Contractors Pty Limited
Level 10, 12 Help Street
Chatswood NSW 2067
Australia

EASTERN DISTRIBUTOR
NEW SOUTH WALES

CAHILL EXPRESSWAY TO SOUTHERN CROSS DRIVE

LOCATION EASTERN DISTRIBUTOR

DRG. TITLE
LOCAL AREA TRAFFIC MANAGEMENT PLAN

DRG. No. N593/1004/DD. REV A

Appendix C

Tables of Costs and Benefits

OPTION: Eastern Distributor with Toll
Most Likely Traffic

TABLE A1

DISCOUNT RATE: 0%

YEAR	DISCOUNT FACTOR	CONST-RUCTION COSTS	PROP-ERTY COSTS	OTHER COSTS AND BENEFITS								BENEFITS -COSTS	CUMU-LATIVE B-C
				Reloc & Dist	Mtce Cost	Travel Time	VOC	Crashes	Residential Amenity	Residual Value	Total		
1997	1.0000	82846	35910	-3591							-3591	-122347	-122347
1998	1.0000	166741									0	-166741	-289088
1999	1.0000	121125									0	-121125	-410213
2000	1.0000	33790			-3000	40516	-825	947	24000		61638	27848	-382365
2001	1.0000				-8900	83466	-1675	1905			74797	74797	-307568
2002	1.0000				-8900	85901	-1699	1917			77218	77218	-230350
2003	1.0000				-8900	88335	-1723	1928			79640	79640	-150710
2004	1.0000				-9300	90769	-1748	1940			81661	81661	-69049
2005	1.0000				-9700	93203	-1772	1951			83683	83683	14634
2006	1.0000				-9700	95638	-1796	1963			86104	86104	100738
2007	1.0000				-9700	98072	-1821	1974			88525	88525	189263
2008	1.0000				-9700	100506	-1845	1986			90947	90947	280210
2009	1.0000				-10000	102940	-1869	1997			93068	93068	373278
2010	1.0000				-10200	105375	-1894	2009			95290	95290	468568
2011	1.0000				-10200	107809	-1918	2020			97711	97711	566279
2012	1.0000				-10200	107809	-1918	2020			97711	97711	663990
2013	1.0000				-10200	107809	-1918	2020			97711	97711	761701
2014	1.0000				-11000	107809	-1918	2020			96911	96911	858612
2015	1.0000				-11700	107809	-1918	2020			96211	96211	954823
2016	1.0000				-11700	107809	-1918	2020			96211	96211	1051034
2017	1.0000				-11700	107809	-1918	2020			96211	96211	1147245
2018	1.0000				-11700	107809	-1918	2020			96211	96211	1243456
2019	1.0000				-10700	107809	-1918	2020			97211	97211	1340667
2020	1.0000				-9700	107809	-1918	2020			98211	98211	1438878
2021	1.0000				-9700	107809	-1918	2020			98211	98211	1537089
2022	1.0000				-9700	107809	-1918	2020			98211	98211	1635300
2023	1.0000				-9700	107809	-1918	2020			98211	98211	1733511
2024	1.0000				-11200	107809	-1918	2020			96711	96711	1830222
2025	1.0000				-12700	107809	-1918	2020			95211	95211	1925433
2026	1.0000				-12700	107809	-1918	2020		90000	185211	185211	2110644
TOTAL		404502	35910	-3591	-272500	2709665	-49355	52836	24000	90000	2551056	2110644	

Net Present Value ($m)	2110.6
Net Present Value/$ Capital	4.8
Benefit Cost Ratio	5.8
First Year Rate of Return	17.0

OPTION: Eastern Distributor with Toll
Most Likely Traffic

TABLE A2

DISCOUNT RATE: 4%

YEAR	DISCOUNT FACTOR	CONSTRUCTION COSTS	PROPERTY COSTS	OTHER COSTS AND BENEFITS								BENEFITS -COSTS	CUMULATIVE B-C
				Reloc & Dist	Mtce Cost	Travel Time	VOC	Crashes	Residential Amenity	Residual Value	Total		
1997	1.0000	82846	35910	-3591							-3591	-122347	-122347
1998	0.9615	160328									0	-160328	-282675
1999	0.9246	111987									0	-111987	-394662
2000	0.8890	30039			-2667	36019	-734	842	21336		54796	24757	-369905
2001	0.8548				-7608	71347	-1432	1629			63937	63937	-305968
2002	0.8219				-7315	70604	-1396	1575			63468	63468	-242500
2003	0.7903				-7034	69812	-1362	1524			62940	62940	-179560
2004	0.7599				-7067	68977	-1328	1474			62056	62056	-117504
2005	0.7307				-7088	68103	-1295	1426			61146	61146	-56358
2006	0.7026				-6815	67194	-1262	1379			60496	60496	4137
2007	0.6756				-6553	66254	-1230	1334			59805	59805	63942
2008	0.6496				-6301	65287	-1198	1290			59077	59077	123019
2009	0.6246				-6246	64296	-1168	1247			58130	58130	181149
2010	0.6006				-6126	63285	-1137	1206			57228	57228	238378
2011	0.5775				-5890	62257	-1108	1166			56426	56426	294804
2012	0.5553				-5664	59863	-1065	1122			54255	54255	349059
2013	0.5339				-5446	57560	-1024	1078			52169	52169	401228
2014	0.5134				-5647	55346	-985	1037			49752	49752	450979
2015	0.4936				-5775	53218	-947	997			47492	47492	498472
2016	0.4746				-5553	51171	-910	959			45666	45666	544137
2017	0.4564				-5340	49203	-875	922			43909	43909	588047
2018	0.4388				-5134	47310	-842	886			42221	42221	630268
2019	0.4220				-4515	45491	-809	852			41019	41019	671286
2020	0.4057				-3936	43741	-778	820			39847	39847	711133
2021	0.3901				-3784	42059	-748	788			38314	38314	749447
2022	0.3751				-3639	40441	-719	758			36841	36841	786288
2023	0.3607				-3499	38886	-692	729			35424	35424	821712
2024	0.3468				-3884	37390	-665	701			33541	33541	855252
2025	0.3335				-4235	35952	-640	674			31751	31751	887003
2026	0.3207				-4072	34569	-615	648		28859	59388	59388	946391
TOTAL		385200	35910	-3591	-146833	1465633	-26964	29062	21336	28859	1367501	946391	

Net Present Value ($m)	946.4
Net Present Value/$ Capital	2.2
Benefit Cost Ratio	3.2
First Year Rate of Return	15.2

OPTION: Eastern Distributor with Toll — TABLE A3
Most Likely Traffic
DISCOUNT RATE: 7%

YEAR	DISCOUN FACTOR	CONST-RUCTION COSTS	PROP-ERTY COSTS	OTHER COSTS AND BENEFITS								BENEFIT -COSTS	CUMU-LATIVE B-C
				Reloc & Dist	Mtce Cost	Travel Time	VOC	Crashes	Residenti Amenity	Residual Value	Total		
1997	1.0000	82846	35910	-3591							-3591	-122347	-122347
1998	0.9346	155833									0	-155833	-278180
1999	0.8734	105795									0	-105795	-383975
2000	0.8163	27583			-2449	33073	-674	773	19591		50315	22732	-361243
2001	0.7629				-6790	63676	-1278	1454			57062	57062	-304181
2002	0.7130				-6346	61246	-1211	1367			55056	55056	-249125
2003	0.6663				-5930	58861	-1148	1285			53067	53067	-196058
2004	0.6227				-5792	56526	-1088	1208			50854	50854	-145203
2005	0.5820				-5645	54245	-1031	1136			48704	48704	-96499
2006	0.5439				-5276	52021	-977	1068			46835	46835	-49664
2007	0.5083				-4931	49855	-926	1004			45002	45002	-4662
2008	0.4751				-4608	47750	-877	943			43208	43208	38546
2009	0.4440				-4440	45707	-830	887			41323	41323	79869
2010	0.4150				-4233	43727	-786	833			39542	39542	119411
2011	0.3878				-3956	41810	-744	783			37894	37894	157305
2012	0.3624				-3697	39075	-695	732			35415	35415	192720
2013	0.3387				-3455	36519	-650	684			33098	33098	225818
2014	0.3166				-3482	34130	-607	639			30680	30680	256498
2015	0.2959				-3462	31897	-567	598			28465	28465	284963
2016	0.2765				-3235	29810	-530	559			26603	26603	311566
2017	0.2584				-3024	27860	-496	522			24863	24863	336429
2018	0.2415				-2826	26037	-463	488			23236	23236	359665
2019	0.2257				-2415	24334	-433	456			21942	21942	381607
2020	0.2109				-2046	22742	-405	426			20717	20717	402324
2021	0.1971				-1912	21254	-378	398			19362	19362	421686
2022	0.1842				-1787	19864	-353	372			18095	18095	439781
2023	0.1722				-1670	18564	-330	348			16911	16911	456693
2024	0.1609				-1802	17350	-309	325			15564	15564	472257
2025	0.1504				-1910	16215	-288	304			14320	14320	486577
2026	0.1406				-1785	15154	-270	284		12651	26034	26034	512610
TOTAL		372057	35910	-3591	-98905	989301	-18344	19875	19591	12651	920577	512610	

Net Present Value ($m)	512.6
Net Present Value/$ Capital	1.3
Benefit Cost Ratio	2.3
First Year Rate of Return	14.0

OPTION: Eastern Distributor with Toll
Most Likely Traffic

TABLE A4

DISCOUNT RATE: 10%

YEAR	DISCOUN FACTOR	CONST-RUCTION COSTS	PROP-ERTY COSTS	OTHER COSTS AND BENEFITS								BENEFIT -COSTS	CUMU-LATIVE B-C
				Reloc & Dist	Mtce Cost	Travel Time	VOC	Crashes	Residenti Amenity	Residual Value	Total		
1997	1.0000	82846	35910	-3591							-3591	-122347	-122347
1998	0.9091	151583									0	-151583	-273930
1999	0.8264	100103									0	-100103	-374033
2000	0.7513	25387			-2254	30440	-620	711	18032		46309	20922	-353111
2001	0.6830				-6079	57009	-1144	1301			51087	51087	-302023
2002	0.6209				-5526	53338	-1055	1190			47947	47947	-254077
2003	0.5645				-5024	49863	-973	1088			44955	44955	-209122
2004	0.5132				-4772	46579	-897	995			41905	41905	-167217
2005	0.4665				-4525	43480	-827	910			39039	39039	-128178
2006	0.4241				-4114	40560	-762	832			36517	36517	-91662
2007	0.3855				-3740	37811	-702	761			34130	34130	-57532
2008	0.3505				-3400	35227	-647	696			31876	31876	-25655
2009	0.3186				-3186	32800	-596	636			29654	29654	3999
2010	0.2897				-2955	30523	-549	582			27602	27602	31601
2011	0.2633				-2686	28389	-505	532			25730	25730	57332
2012	0.2394				-2442	25809	-459	484			23391	23391	80723
2013	0.2176				-2220	23462	-417	440			21265	21265	101988
2014	0.1978				-2176	21329	-379	400			19173	19173	121161
2015	0.1799				-2104	19390	-345	363			17304	17304	138465
2016	0.1635				-1913	17628	-314	330			15731	15731	154197
2017	0.1486				-1739	16025	-285	300			14301	14301	168498
2018	0.1351				-1581	14568	-259	273			13001	13001	181499
2019	0.1228				-1314	13244	-236	248			11942	11942	193441
2020	0.1117				-1083	12040	-214	226			10968	10968	204409
2021	0.1015				-985	10945	-195	205			9971	9971	214380
2022	0.0923				-895	9950	-177	186			9064	9064	223444
2023	0.0839				-814	9046	-161	169			8240	8240	231685
2024	0.0763				-854	8223	-146	154			7377	7377	239061
2025	0.0693				-881	7476	-133	140			6602	6602	245664
2026	0.0630				-801	6796	-121	127		5674	11676	11676	257339
TOTAL		359919	35910	-3591	-70063	701951	-13116	14282	18032	5674	653168	257339	

Net Present Value ($m)	257.3
Net Present Value/$ Capital	0.7
Benefit Cost Ratio	1.7
First Year Rate of Return	12.9

OPTION: Eastern Distributor with Toll
Low Traffic

TABLE A5

DISCOUNT RATE: 7%

YEAR	DISCOUN FACTOR	CONST-RUCTION COSTS	PROP-ERTY COSTS	OTHER COSTS AND BENEFITS								BENEFIT -COSTS	CUMU-LATIVE B-C
				Reloc & Dist	Mtce Cost	Travel Time	VOC	Crashes	Residenti Amenity	Residual Value	Total		
1997	1.0000	82846	35910	-3591							-3591	-122347	-122347
1998	0.9346	155833									0	-155833	-278180
1999	0.8734	105795									0	-105795	-383975
2000	0.8163	27583			-2449	32521	-698	773	19591		49738	22155	-361820
2001	0.7629				-6790	62385	-1334	1454			55715	55715	-306105
2002	0.7130				-6346	59798	-1275	1367			53544	53544	-252560
2003	0.6663				-5930	57283	-1217	1285			51420	51420	-201141
2004	0.6227				-5792	54840	-1162	1208			49095	49095	-152046
2005	0.5820				-5645	52472	-1109	1136			46854	46854	-105193
2006	0.5439				-5276	50180	-1058	1068			44913	44913	-60279
2007	0.5083				-4931	47962	-1008	1004			43026	43026	-17253
2008	0.4751				-4608	45820	-961	943			41194	41194	23941
2009	0.4440				-4440	43753	-915	887			39284	39284	63225
2010	0.4150				-4233	41760	-872	833			37489	37489	100715
2011	0.3878				-3956	39841	-830	783			35839	35839	136554
2012	0.3624				-3697	37235	-776	732			33494	33494	170048
2013	0.3387				-3455	34799	-725	684			31303	31303	201351
2014	0.3166				-3482	32522	-677	639			29002	29002	230353
2015	0.2959				-3462	30395	-633	598			26898	26898	257251
2016	0.2765				-3235	28406	-592	559			25138	25138	282389
2017	0.2584				-3024	26548	-553	522			23493	23493	305882
2018	0.2415				-2826	24811	-517	488			21956	21956	327839
2019	0.2257				-2415	23188	-483	456			20746	20746	348584
2020	0.2109				-2046	21671	-451	426			19599	19599	368184
2021	0.1971				-1912	20253	-422	398			18317	18317	386501
2022	0.1842				-1787	18928	-394	372			17119	17119	403620
2023	0.1722				-1670	17690	-368	348			15999	15999	419619
2024	0.1609				-1802	16533	-344	325			14711	14711	434330
2025	0.1504				-1910	15451	-322	304			13523	13523	447853
2026	0.1406				-1785	14440	-301	284		12651	25289	25289	473142
TOTAL		372057	35910	-3591	-98905	951486	-19998	19875	19591	12651	881109	473142	

Net Present Value ($m)	473.1
Net Present Value/$ Capital	1.2
Benefit Cost Ratio	2.2
First Year Rate of Return	13.7

OPTION: Eastern Distributor with Toll
High Traffic

TABLE A6

DISCOUNT RATE: 7%

YEAR	DISCOUN FACTOR	CONST-RUCTION COSTS	PROP-ERTY COSTS	OTHER COSTS AND BENEFITS								BENEFIT -COSTS	CUMU-LATIVE B-C
				Reloc & Dist	Mtce Cost	Travel Time	VOC	Crashes	Residenti Amenity	Residual Value	Total		
1997	1.0000	82846	35910	-3591							-3591	-122347	-122347
1998	0.9346	155833									0	-155833	-278180
1999	0.8734	105795									0	-105795	-383975
2000	0.8163	27583			-2449	29415	-664	773	19591		46666	19083	-364892
2001	0.7629				-6790	55128	-1255	1454			48536	48536	-316356
2002	0.7130				-6346	51659	-1186	1367			45494	45494	-270862
2003	0.6663				-5930	48408	-1121	1285			42642	42642	-228220
2004	0.6227				-5792	45362	-1059	1208			39719	39719	-188501
2005	0.5820				-5645	42507	-1001	1136			36996	36996	-151504
2006	0.5439				-5276	39831	-945	1068			34677	34677	-116827
2007	0.5083				-4931	37323	-893	1004			32503	32503	-84324
2008	0.4751				-4608	34974	-843	943			30465	30465	-53859
2009	0.4440				-4440	32771	-796	887			28422	28422	-25437
2010	0.4150				-4233	30708	-752	833			26557	26557	1120
2011	0.3878				-3956	28774	-710	783			24892	24892	26012
2012	0.3624				-3697	26891	-663	732			23263	23263	49275
2013	0.3387				-3455	25132	-620	684			21741	21741	71016
2014	0.3166				-3482	23488	-579	639			20066	20066	91082
2015	0.2959				-3462	21951	-541	598			18546	18546	109628
2016	0.2765				-3235	20515	-506	559			17333	17333	126961
2017	0.2584				-3024	19173	-473	522			16199	16199	143159
2018	0.2415				-2826	17919	-442	488			15139	15139	158298
2019	0.2257				-2415	16747	-413	456			14374	14374	172673
2020	0.2109				-2046	15651	-386	426			13645	13645	186318
2021	0.1971				-1912	14627	-361	398			12752	12752	199070
2022	0.1842				-1787	13670	-337	372			11918	11918	210988
2023	0.1722				-1670	12776	-315	348			11138	11138	222126
2024	0.1609				-1802	11940	-295	325			10168	10168	232294
2025	0.1504				-1910	11159	-275	304			9277	9277	241572
2026	0.1406				-1785	10429	-257	284		12651	21321	21321	262893
TOTAL		372057	35910	-3591	-98905	738928	-17689	19875	19591	12651	670860	262893	

Net Present Value ($m)	262.9
Net Present Value/$ Capital	0.6
Benefit Cost Ratio	1.6
First Year Rate of Return	11.9

OPTION: Eastern Distributor with Toll
Most Likely Traffic, Construction Costs 20 per cent Higher

TABLE A7

DISCOUNT RATE: 7%

YEAR	DISCOUN FACTOR	CONST-RUCTION COSTS	PROP-ERTY COSTS	OTHER COSTS AND BENEFITS								BENEFIT -COSTS	CUMU-LATIVE B-C
				Reloc & Dist	Mtce Cost	Travel Time	VOC	Crashes	Residenti Amenity	Residual Value	Total		
1997	1.0000	99415	35910	-3591							-3591	-138916	-138916
1998	0.9346	186999									0	-186999	-325915
1999	0.8734	126954									0	-126954	-452870
2000	0.8163	33099			-2449	33073	-674	773	19591		50315	17216	-435654
2001	0.7629				-6790	63676	-1278	1454			57062	57062	-378592
2002	0.7130				-6346	61246	-1211	1367			55056	55056	-323536
2003	0.6663				-5930	58861	-1148	1285			53067	53067	-270469
2004	0.6227				-5792	56526	-1088	1208			50854	50854	-219614
2005	0.5820				-5645	54245	-1031	1136			48704	48704	-170910
2006	0.5439				-5276	52021	-977	1068			46835	46835	-124076
2007	0.5083				-4931	49855	-926	1004			45002	45002	-79074
2008	0.4751				-4608	47750	-877	943			43208	43208	-35866
2009	0.4440				-4440	45707	-830	887			41323	41323	5458
2010	0.4150				-4233	43727	-786	833			39542	39542	45000
2011	0.3878				-3956	41810	-744	783			37894	37894	82894
2012	0.3624				-3697	39075	-695	732			35415	35415	118309
2013	0.3387				-3455	36519	-650	684			33098	33098	151407
2014	0.3166				-3482	34130	-607	639			30680	30680	182086
2015	0.2959				-3462	31897	-567	598			28465	28465	210552
2016	0.2765				-3235	29810	-530	559			26603	26603	237155
2017	0.2584				-3024	27860	-496	522			24863	24863	262018
2018	0.2415				-2826	26037	-463	488			23236	23236	285254
2019	0.2257				-2415	24334	-433	456			21942	21942	307196
2020	0.2109				-2046	22742	-405	426			20717	20717	327913
2021	0.1971				-1912	21254	-378	398			19362	19362	347275
2022	0.1842				-1787	19864	-353	372			18095	18095	365370
2023	0.1722				-1670	18564	-330	348			16911	16911	382282
2024	0.1609				-1802	17350	-309	325			15564	15564	397845
2025	0.1504				-1910	16215	-288	304			14320	14320	412165
2026	0.1406				-1785	15154	-270	284		12651	26034	26034	438199
TOTAL		446468	35910	-3591	-98905	989301	-18344	19875	19591	12651	920577	438199	

Net Present Value ($m)	438.2
Net Present Value/$ Capital	0.9
Benefit Cost Ratio	1.9
First Year Rate of Return	11.8

OPTION: Eastern Distributor with Toll

Most Likely Traffic, Construction Costs 20 per cent Lower

TABLE A8

DISCOUNT RATE: 7%

YEAR	DISCOUN FACTOR	CONST-RUCTION COSTS	PROP-ERTY COSTS	OTHER COSTS AND BENEFITS								BENEFIT -COSTS	CUMU-LATIVE B-C
				Reloc & Dist	Mtce Cost	Travel Time	VOC	Crashes	Residenti Amenity	Residual Value	Total		
1997	1.0000	66277	35910	-3591							-3591	-105778	-105778
1998	0.9346	124666									0	-124666	-230444
1999	0.8734	84636									0	-84636	-315080
2000	0.8163	22066			-2449	33073	-674	773	19591		50315	28249	-286832
2001	0.7629				-6790	63676	-1278	1454			57062	57062	-229769
2002	0.7130				-6346	61246	-1211	1367			55056	55056	-174714
2003	0.6663				-5930	58861	-1148	1285			53067	53067	-121646
2004	0.6227				-5792	56526	-1088	1208			50854	50854	-70792
2005	0.5820				-5645	54245	-1031	1136			48704	48704	-22088
2006	0.5439				-5276	52021	-977	1068			46835	46835	24747
2007	0.5083				-4931	49855	-926	1004			45002	45002	69749
2008	0.4751				-4608	47750	-877	943			43208	43208	112957
2009	0.4440				-4440	45707	-830	887			41323	41323	154281
2010	0.4150				-4233	43727	-786	833			39542	39542	193822
2011	0.3878				-3956	41810	-744	783			37894	37894	231716
2012	0.3624				-3697	39075	-695	732			35415	35415	267131
2013	0.3387				-3455	36519	-650	684			33098	33098	300229
2014	0.3166				-3482	34130	-607	639			30680	30680	330909
2015	0.2959				-3462	31897	-567	598			28465	28465	359374
2016	0.2765				-3235	29810	-530	559			26603	26603	385977
2017	0.2584				-3024	27860	-496	522			24863	24863	410840
2018	0.2415				-2826	26037	-463	488			23236	23236	434076
2019	0.2257				-2415	24334	-433	456			21942	21942	456018
2020	0.2109				-2046	22742	-405	426			20717	20717	476736
2021	0.1971				-1912	21254	-378	398			19362	19362	496097
2022	0.1842				-1787	19864	-353	372			18095	18095	514193
2023	0.1722				-1670	18564	-330	348			16911	16911	531104
2024	0.1609				-1802	17350	-309	325			15564	15564	546668
2025	0.1504				-1910	16215	-288	304			14320	14320	560988
2026	0.1406				-1785	15154	-270	284		12651	26034	26034	587022
TOTAL		297645	35910	-3591	-98905	989301	-18344	19875	19591	12651	920577	587022	

Net Present Value ($m)	587.0
Net Present Value/$ Capital	1.8
Benefit Cost Ratio	2.8
First Year Rate of Return	17.1