

MAJURA PARKWAY

CONCEPT DESIGN

Public Consultation

PROPOSED MEETING STRUCTURE

- **INTRODUCTION :**
 - David Daverin
 - Tony Gill

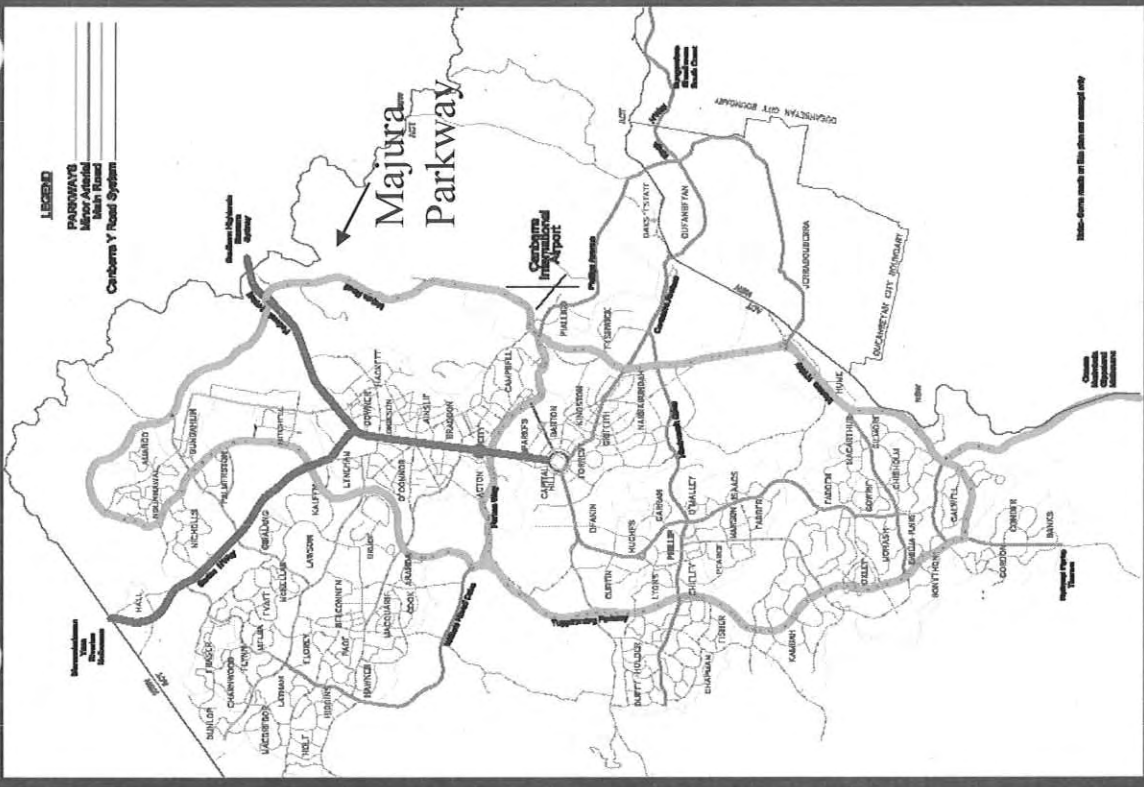
- **PRESENTATION :**
 - Tom Brimson

- **DISCUSSION :**
 - All

- **CLOSE :**
 - David Daverin

PREVIOUS STUDIES

- SMEC Study of Upgrading Majura Lane
- G.H.D. Study of Majura Parkway
- Majura Valley Transport Study (Maunsell)
- Majura Parkway Concept Design and P.A. (Maunsell)



GENERAL POLICY PLAN – Metropolitan Canberra

The Territory Plan (extract below) shows a notional alignment for the Parkway and connecting roads

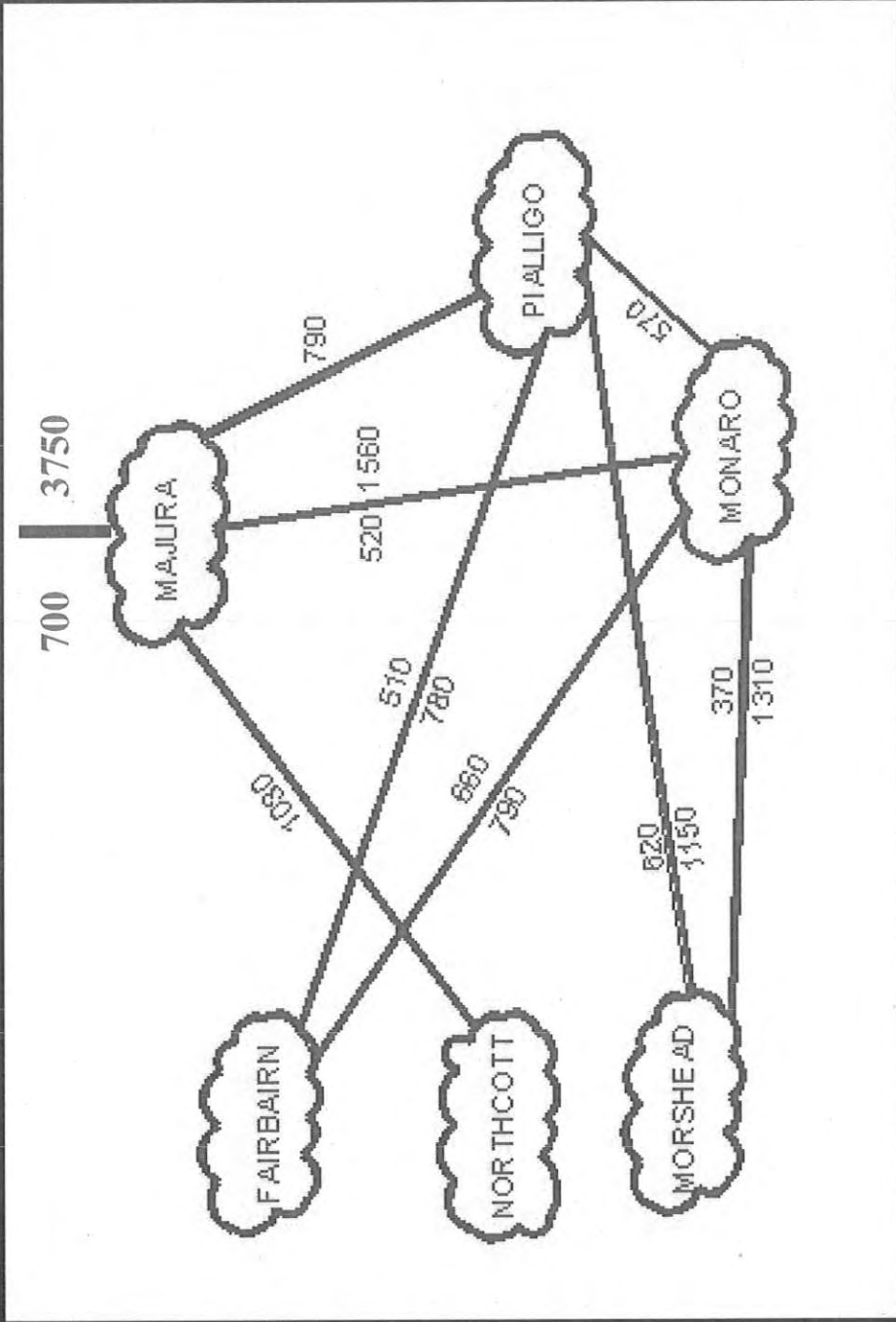


POPULATION AND EMPLOYMENT GROWTH
TRAVEL DEMAND DRIVERS

Town	Population			Employment		
	2003	2011	2031	2003	2011	2031
Gungahlin	18460	42560	111750	4800	7550	22935
North Canberra	38750	47580	53990	51700	60930	77750
Belconnen	83690	83470	95430	24000	24580	29700
South Canberra	22210	24330	29390	40230	43730	56070
Woden	31350	31880	34980	20280	20280	23860
Weston Creek	23350	21500	29770	3480	2830	4510
Tuggeranong	90800	89150	88410	15550	16760	18570
Queanbeyan	30500	38500	42500	8950	11930	15790
Other	n.a.	n.a.	11800	n.a.	7000	3200

Significant aspects of projected traffic estimates are:

- The traffic volumes from Pialligo Avenue and the Monaro Highway to Fairbairn Avenue are particularly high. This traffic is bypassing the Civic, the Central Area and surrounds to destinations in North Canberra, Belconnen and Gungahlin.
- Major demands for travel from the Majura corridor to Northcott Drive accessing Russell, and other parts of the Central Area
- Heavy demands from Pialligo Avenue and the Monaro Highway into the Morshead Drive corridor accessing the Central Area
- Significant north-south traffic on the Majura – Monaro route accessing areas such as Tuggeranong, Fyshwick, South Canberra and Gungahlin.



Longer Term (2031) – AM Peak Hour Demand (v.p.h.)

FUNCTIONAL REQUIREMENTS:

- Existing Majura Road should be retained as a minor service road to provide access to existing and future developments in the Majura Valley.
- Majura Parkway will require two lanes in each direction.
- A new single carriageway connecting the Parkway to Northcott Drive should be provided. This road should have signalised intersections with both Majura Parkway and Fairbairn. Industrial development north of the airport may ultimately necessitate grade-separation of the intersection of the new road with Parkway.
- Upgrading of Northcott Drive to provide an improved approach to the Central National Area from the Federal Highway and the Majura Valley is desirable.
- In the medium term a signalised intersection of the Parkway and Fairbairn Avenue should be provided. This may ultimately require grade separation.
- Morshead Drive should be duplicated between Fairbairn Avenue and Pialligo Avenue.
- Grade – separation of the intersection of Morshead Drive and Pialligo Avenue is required.
- Realignment of Fairbairn Avenue between Morshead and Pialligo Avenue may ultimately be required to accommodate possible a Very High Speed Train.

Native Grasslands

ADEFA & Duntroon

CONSTRAINTS

Yellow Box Red Gum Woodland



Airport

VHS7 Alignment

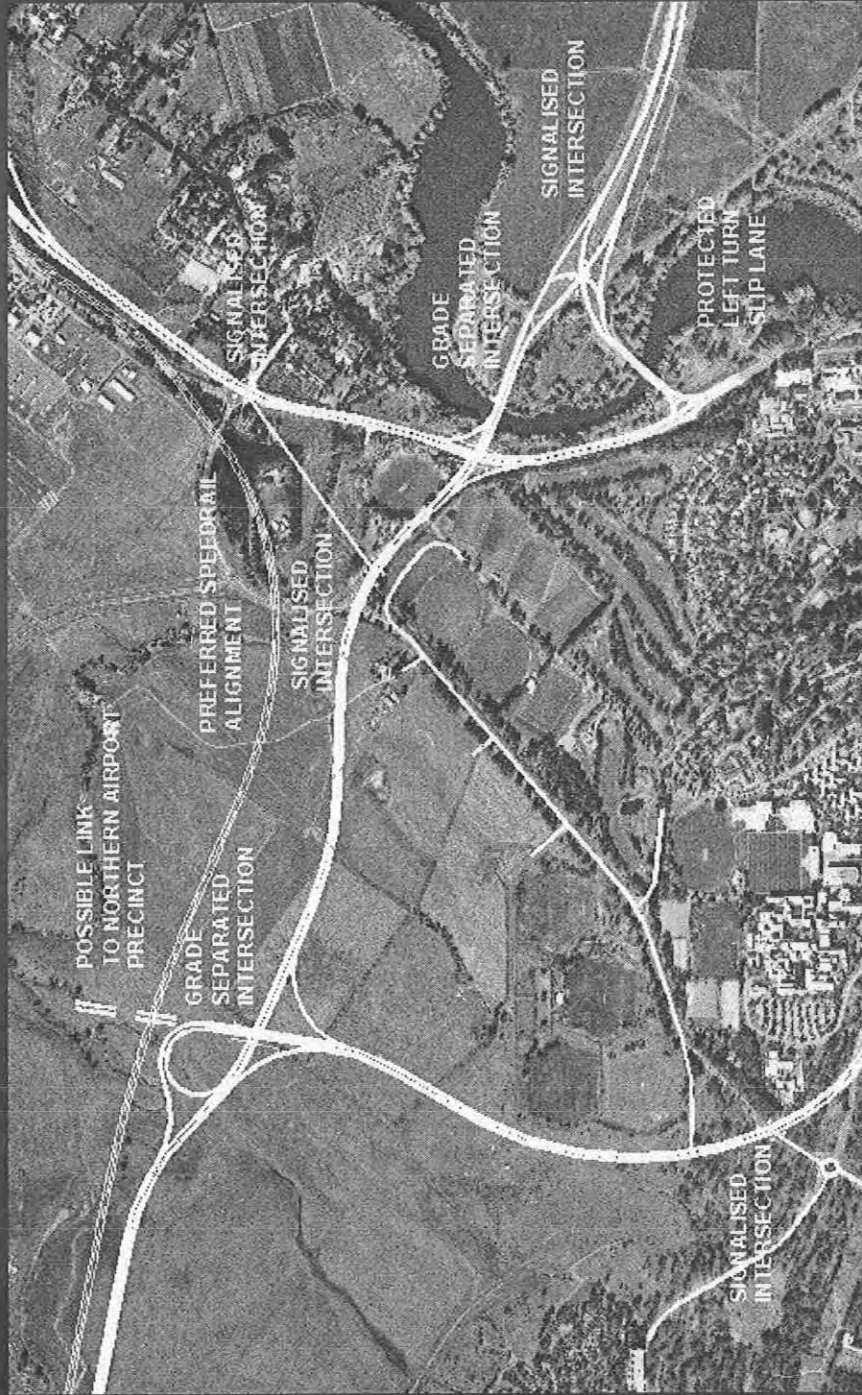
Wildlife Corridor

Federal Highway
Horsepark Drive
Intersection

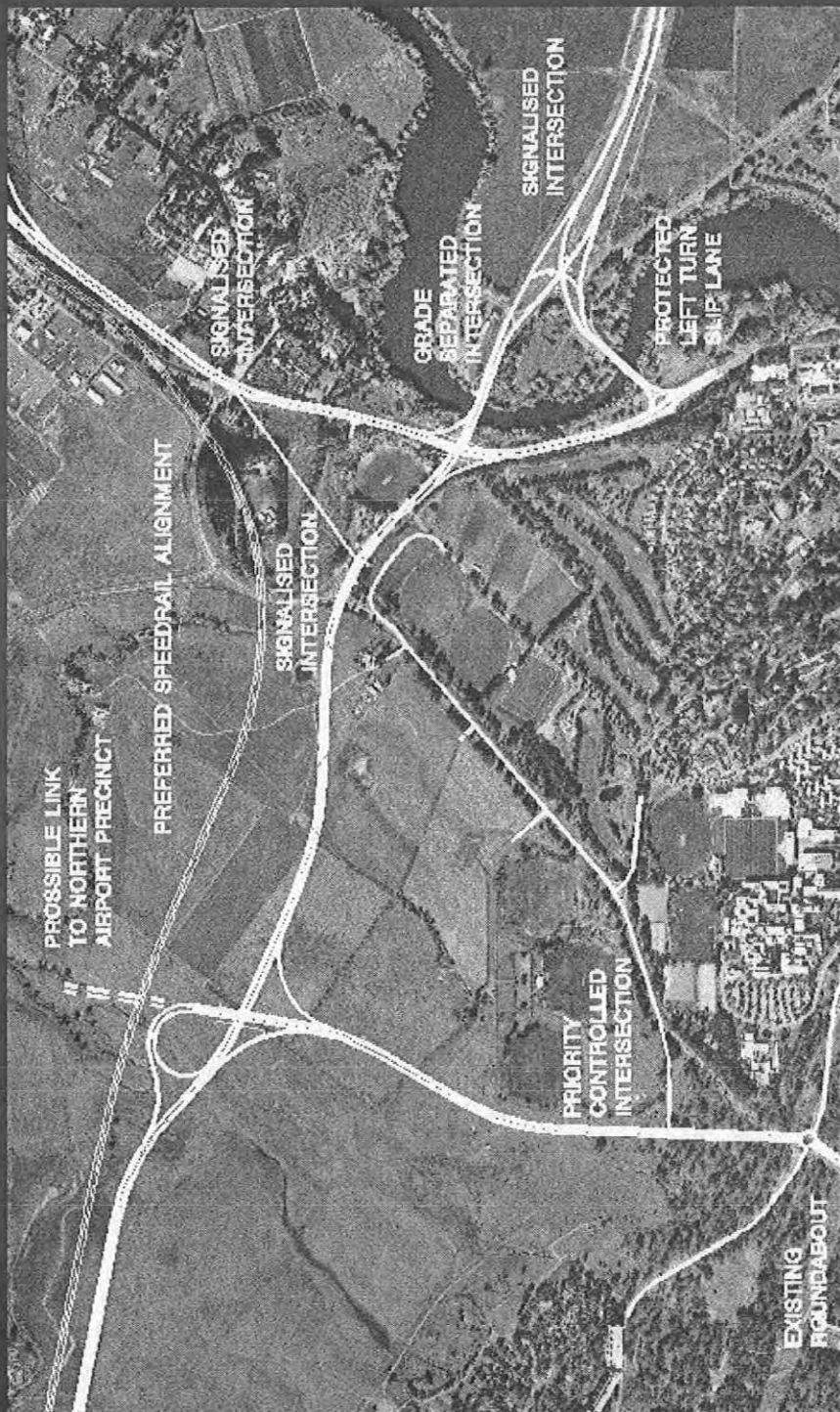
NETWORK OPTIONS – SOUTHERN SECTION

Four main network options were developed for subsequent testing and comparison. The four options all respond to the main travel demands but use different main components in different ways:

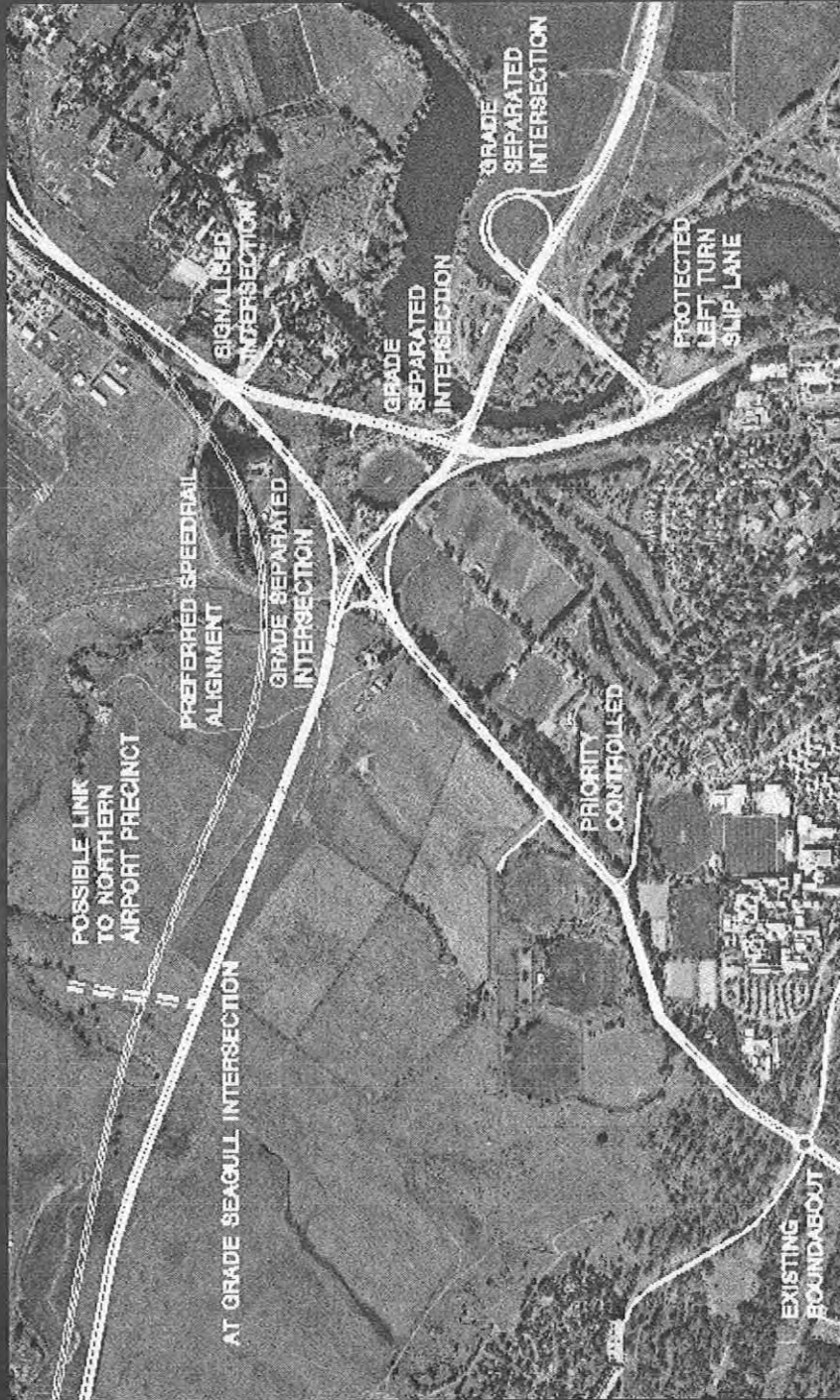
- Option A provides a high quality approach to the CNA via a new northern link and an upgraded Northcott Drive.
- Option B connects the new northern link road directly into Fairbairn Avenue thereby giving greater emphasis to the bypass of the Russell/City area.
- Option C continues the current arrangement with Fairbairn Avenue as existing playing a major arterial role.
- Option D is a more extensive road network with more links (Fairbairn Avenue and the new northern link) catering for the individual major demands in a more direct manner.



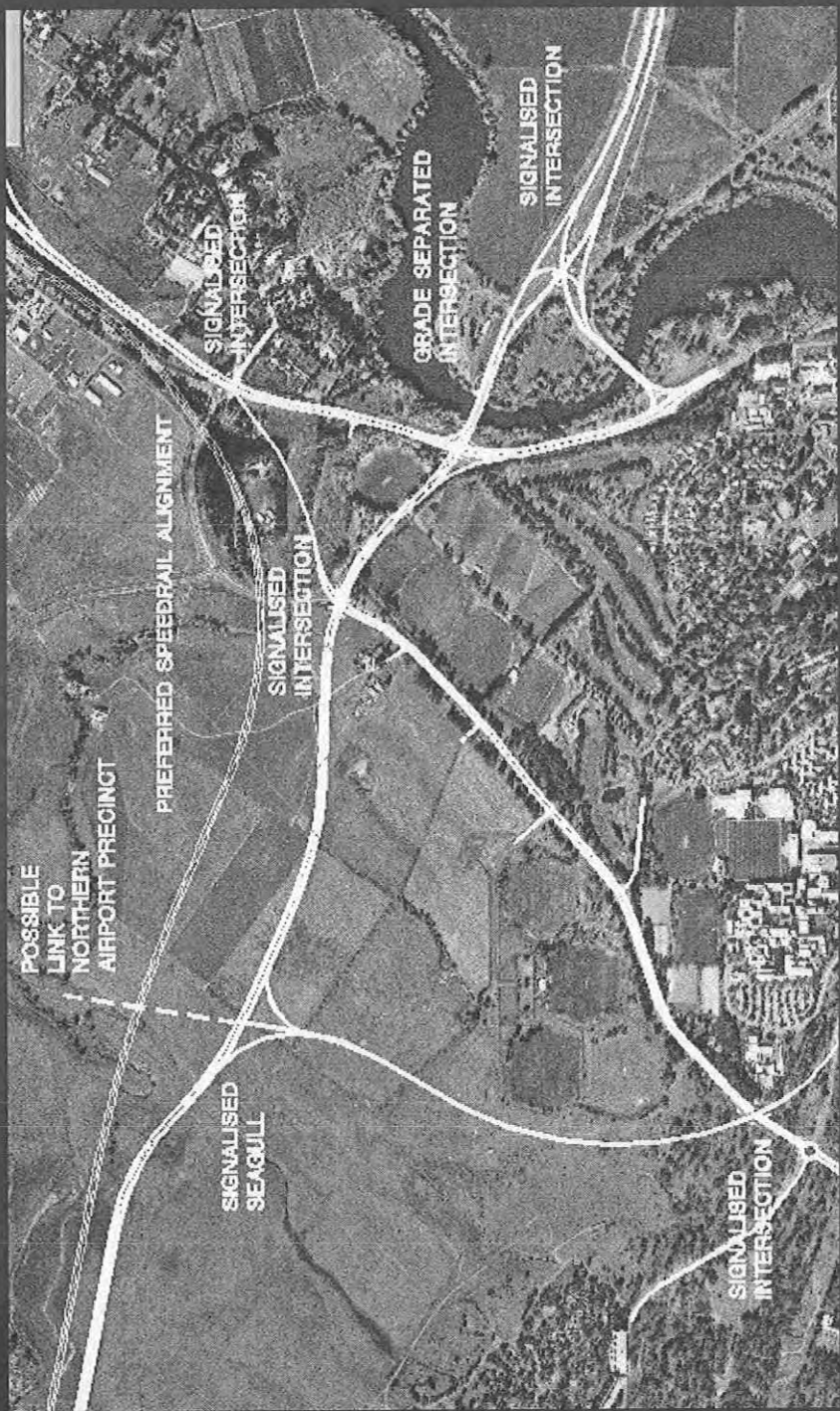
OPTION A



OPTION B



OPTION C

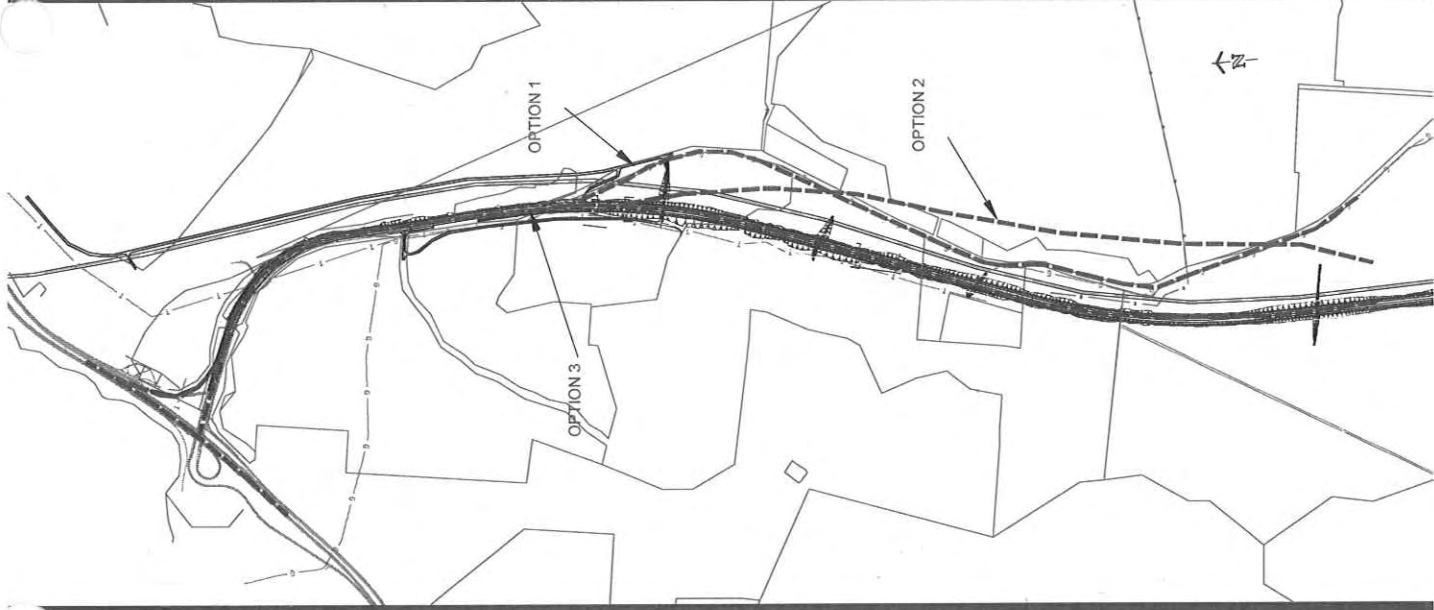
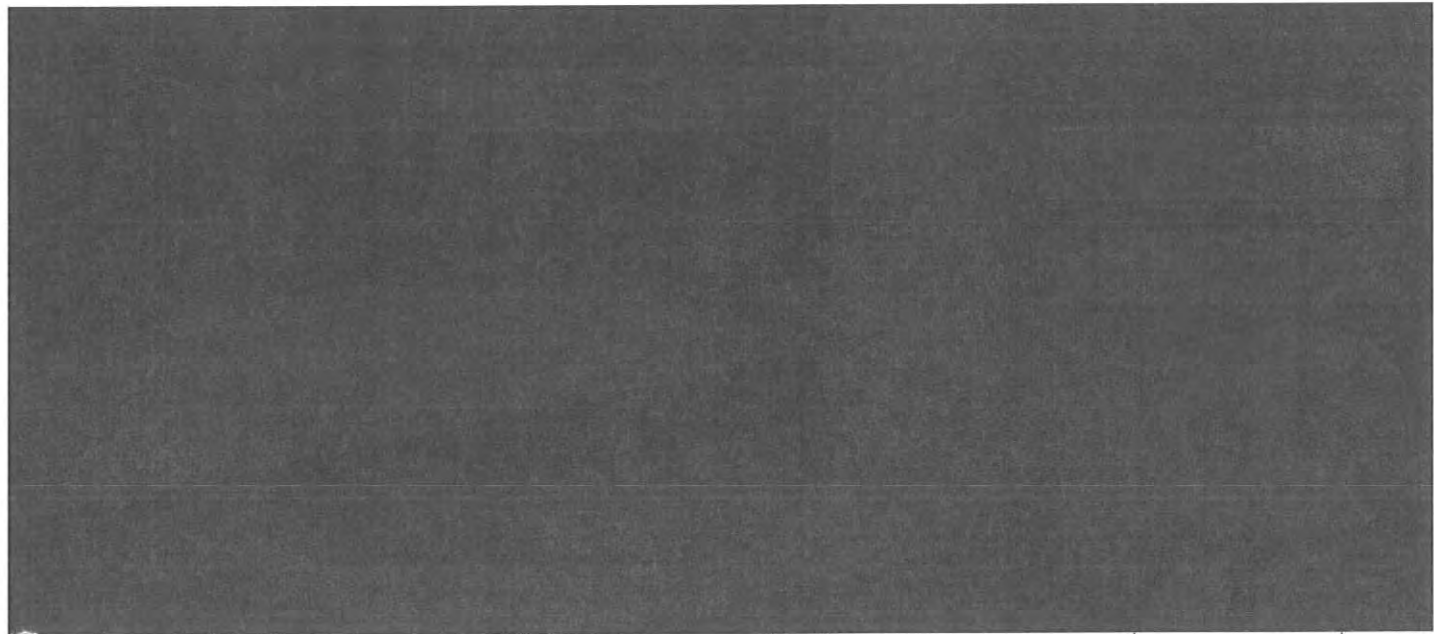


OPTION D

An assessment of these options indicated:

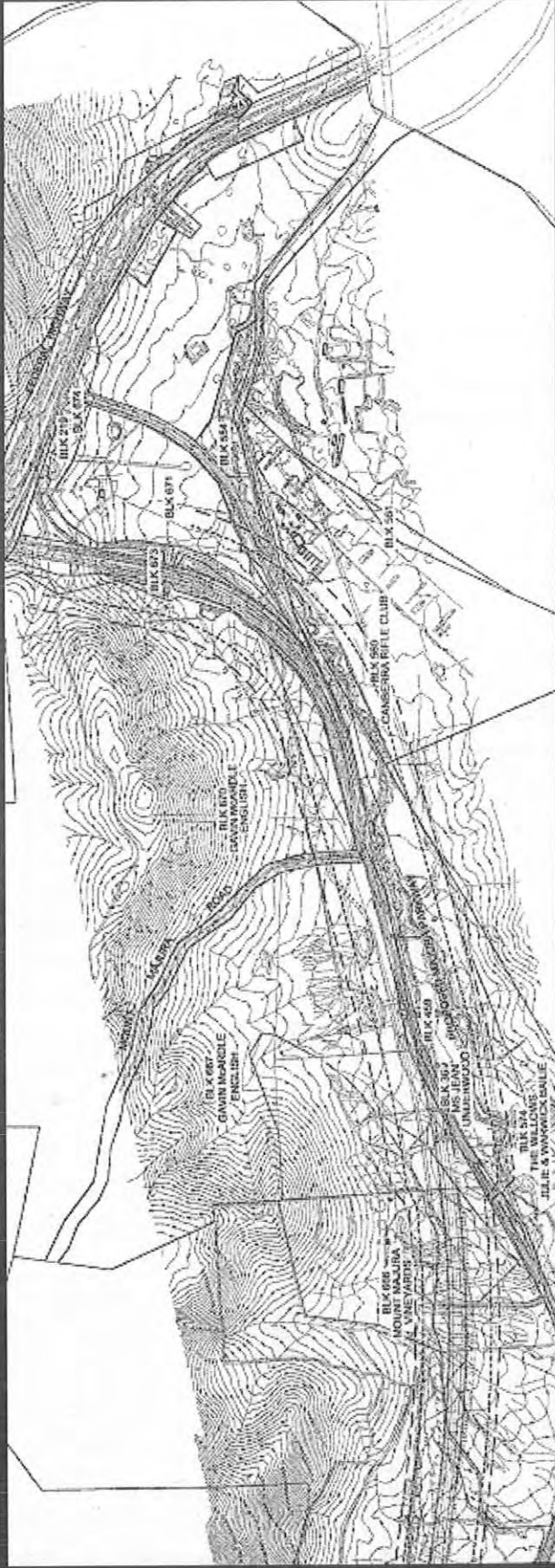
- Options generally shared similar environmental and heritage implications.
- The costs of the options were in the range of \$39 - \$42m with Options A and D being the least expensive.
- Options C and D would have slightly greater impacts on ADFA and Campbell as a result of slightly greater traffic on Fairbairn Avenue.
- Option D was superior to the others from a traffic efficiency perspective.

Taking all the assessment results into account Option D was recommended as the preferred scheme for further development.



An assessment of these options indicated:

- Both Options 1 and 2 impacted on the proposed VHST alignments.
- Option 1 (Majura Road) had alignment deficiencies and required extensive service road construction.
- Option 2 had significant land use impacts.



FINAL SCHEME
NORTHERN SECTION



FINAL SCHEME
CENTRAL SECTION



FINAL SCHEME
SOUTHERN SECTION

[REDACTED]

From: [REDACTED]
Sent: Tuesday, 26 August 2008 4:02 PM
To: [REDACTED]
Cc: [REDACTED]
Subject: FW: IA proposal

[REDACTED]

We are thinking of including the attached document along with the full Economic Analysis document by SMEC as part of our additional information for IA. Can you confirm if this is **final**, and you are happy for it to go. At the moment it is stamped **Draft**.

Thanks.

-----Original Message-----

From: [REDACTED]
Sent: Monday, 16 June 2008 12:24 PM
To: [REDACTED]
Cc: [REDACTED]
Subject: IA proposal

[REDACTED]

I have had a couple of conversations with [REDACTED] about this - last week and today. He is happy with the following offering, after making some minor modifications this morning. He is going to ring you to discuss, as he has had some belated input (this morning) from [REDACTED] which may affect what we say.

Kind Regards,

[REDACTED]
Consultant, Asset Management
Community and Infrastructure Services
Territory And Municipal Services
office: 02 6207 6069



Majura using
template.doc

mobile: [REDACTED]

Majura Avenue, Monaro Highway, Federal Highway

DRAFT

Proposal

The ACT Government proposes that Infrastructure Australia consider the potential for the proposed road upgrade between the Majura Parkway, Federal Highway and the Monaro Highway to be a project of national significance. The roads in the vicinity of the airport play an important role for the ACT economy, the surrounding New South Wales (NSW) region and nationally given the importance of the Monaro Highway as a well-used freight route connection to the Federal Highway.

Background

Both the National Capital and Canberra Spatial Plans identify the airport as a major employment node and describe the importance of considering the Majura Parkway as a future major road. In a regional planning context the road plan provides improved access from and to Queanbeyan and the wider NSW region via the Monaro Highway. In terms of the National road network, constructing the Majura Parkway will provide better connections with the Federal Highway. The road improvement plan has a strategic context and is very important to support the current and the future development of Canberra and the surrounding NSW region.

The feasibility of this project was first studied in February 2007, and further analysis has reaffirmed the need for the major road improvement to proceed. The most recent feasibility study of the project has been carried out by an independent consultant, and has returned a positive outcome in terms of its Net Present Value (NPV) and its Cost Benefit Ratio (CBR). The project has been recommended as one which will significantly improve traffic management in and around the local district, whilst at the same time provide a positive outcome to the economics of the region.

From a national perspective there are a number of key stakeholders who will benefit from the proposed road improvement. These include:

- The Canberra Airport Group
- The ACT Government
- The Department of Defence
- RTA & Queanbeyan City Council
- Department of Transport & Regional Services (Auslink)
- National Capital Authority

Whilst each of these stakeholders will be looking for a different outcome, there is one common thread which binds them all – the need for a more efficient transport route in and out of the bottleneck that is Pialligo Avenue. This over-riding issue is borne out of two key issues:

1. Regional Freight Route

The increased use of the existing road network as a freight route in the Region. This use has grown significantly over the past few years, creating a traffic bottleneck in and around the Pialligo Avenue as trucks compete for space with private motor vehicles which are the result of residential and business growth in the area. This bottleneck has a significant effect on the efficiency of the freight industry, as running costs of trucks increase due to the increased cost of fuel and other related commodities. Regional traffic from NSW either on Pialligo Avenue and or the Federal Highway represent a high proportion of daily travel on the roads in the vicinity of the airport particularly on the section of Pialligo Avenue past the airport where almost 90% is generated in Queanbeyan and the surrounding NSW regions. Commercial traffic on the Monaro Highway and Majura Road represent some 16% of the total traffic presently with the connection between the Monaro Highway, Majura Road and the Federal Highway an important freight route within the ACT but also for regional NSW.

2. Airport Freight Hub

The potential for the redevelopment of the Canberra Airport into a 'freight-hub', allowing for the redirection of significant freight cargo into the airport, and for this to be transferred onto trucks for dispatch to various centres within the region.

Stakeholders

As well as being utilized by several groups of road users, the considered road network is of interest to several stakeholder organizations at different levels. The table below demonstrates the potential beneficiaries to any improvements occurring for this road network.

Road Users (Beneficiaries)	Organisations ((Beneficiaries)	Level
Canberra Airport Traffic (passengers)	Canberra Airport Group	Local
Canberra Airport Traffic (freight)	Canberra Airport Group	Local
Canberra Airport Traffic (employees)	Canberra Airport Group	Local
Canberra Airport Traffic (passengers)	ACT Government	Local
Canberra Airport Traffic (freight)	ACT Government	Local
Canberra Airport Traffic (employees)	ACT Government	Local
Gungahlin Commuter Traffic	ACT Government (Land Sales)	Local
Traffic related to Headquarters Joint Operational Command	Department of Defence	Local
Queanbeyan through traffic*	RTA & Queanbeyan City Council	Regional
Better Connections with the Federal Highway**	Department of Transport & Regional Services (Auslink)	Federal
Politicians, Parliament Members & Canberra Visitors	National Capital Authority	Federal

Financial Benefits

The results of the cost benefit analysis show that the road upgrade can be considered as economically feasible. This is based on the two obtained key performance indicators namely the Net Present Value (NPV) and the Benefit Cost Ratio (BCR). The considered option produces an NPV equating to ~\$125 million over the 25 years span life of the project at a 7% discount rate. The estimated BCR for this option is ~3.9 using a 7% discount rate.

Modelling was used to demonstrate the severity of the current peak traffic congestion problems and the expected further deterioration of the traffic conditions in this network. The modelling was also used to obtain key performance indicators including the number of vehicle kilometres travelled as well as number of vehicle hours travelled both for the existing road network as well as for the considered option in the years 2006, 2016 and 2031. These were used in accordance with RTA Economic Analysis Manual to estimate travel-related costs for each option, and included the costs of the following:

Travel related Costs

- Vehicle operation
- Travel time
- Accidents

Construction Costs

- Capital construction
- Contingencies
- Design
- Supervision
- Annual and cyclic maintenance

The travel benefits for the considered option were determined by subtracting the travel related costs of the improvement option from those travel related costs of the do nothing scenario i.e. the existing road network staying as it is with no future intervention.

Construction Cost

The anticipated construction cost for the roads upgrade project will be approximately \$233,946,000. This includes the already funded \$60,000,000 for stages 1 and 3 of the airport roads projects commenced in 2007-08.

National Infrastructure Audit - Additional Information Request

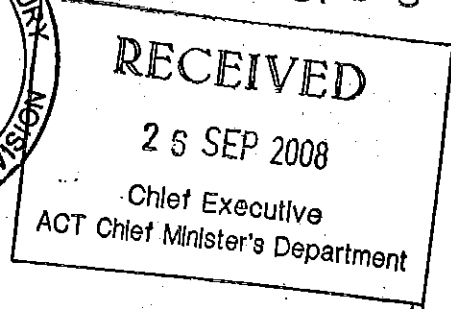
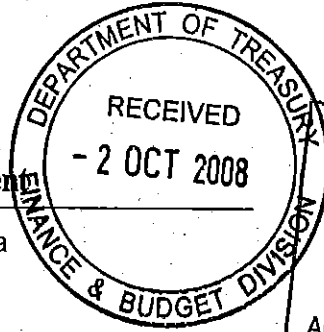
AGENCY	PROJECT	PROBLEM ASSESSMENT	PROBLEM SOLUTION	DOCUMENTATION ON HAND
TAMS	Majura Parkway	Traffic problems around Canberra airport and adjacent roads.	Redevelop Majura Parkway / Canberra Airport into a "Freight Hub" allowing for redirection of freight, cargo into the airport for dispatch to various centres throughout the region.	1) "Majura Avenue, Monaro Highway, Federal Highway" proposal paper prepared by TAMS. 2) "Transport Infrastructure" prepared by TAMS for the National Infrastructure Audit. 3) "Majura Parkway / Pialligo Avenue Economic Analysis Report" prepared by SMEC Australia Pty Ltd for Procurement Solutions.

TSY-C08/1164 348

CMO-808/427



Australian Government
Infrastructure Australia



Mr Andrew Cappie-Wood
Chief Executive
Chief Ministers Office
Australian Capital Territory Government
GPO Box 158
Canberra ACT 2601

→ NEXT: 3/10
CC: Knard

Dear Mr Cappie-Wood

REQUEST FOR ADDITIONAL INPUT INTO THE INFRASTRUCTURE PRIORITY LIST

I am writing in response to a number of jurisdictions seeking information about the Infrastructure Australia audit process.

Since the request of August 2008, Infrastructure Australia has developed a solution prioritisation methodology and this will be used by Infrastructure Australia for guiding its advice in the development of the infrastructure priority list. The infrastructure priority list is due for consideration by the Council of Australian Governments (COAG) by March 2009.

In order for Infrastructure Australia to develop the priority list, further inputs are required from Australian Capital Territory. The attached document titled – *Outline of Infrastructure Australia's Prioritisation Methodology* – includes a number of proformas at appendix C, E and F to be completed by Australian Capital Territory. These proformas focus on inputs to the three steps in prioritisation being: profiling, appraisal and selection.

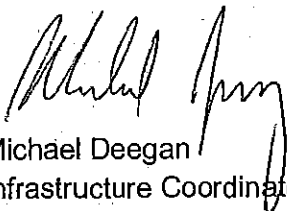
These inputs are dependant and underpinned by the previous request for information on problem assessment as accurate and evidence based understanding of Australian Capital Territory infrastructure issues of national significance.

Infrastructure Australia considers that the broadest possible range of initiatives, offering both infrastructure investment and other solutions, presents the best prospect for an effective response to addressing issues of national productivity. Such other solutions are policy and regulatory initiatives, demand management and pricing initiatives and supply side enhancement initiatives all of which will make better use of current infrastructure. Infrastructure Australia encourages Australian Capital Territory to respond with solutions for consideration in the infrastructure priority list that address these wider policy perspectives.

Infrastructure Australia is required to complete the infrastructure priority list by March 2009. In light of this, the provision of Australian Capital Territory's supplementary information to Infrastructure Australia by 31 October 2008 would be appreciated.

Should you wish to discuss this matter further, please do not hesitate to contact me directly. My office is keen to work collaboratively with your office in finalising this information.

Yours sincerely



Michael Deegan
Infrastructure Coordinator

23 September 2008



Outline of *Infrastructure Australia's* Prioritisation Methodology

This document outlines the key steps that *Infrastructure Australia* will be undertaking to determine the **Infrastructure Priority List** once all audit submissions and subsequent advice have been received from stakeholders.

This document assists all stakeholders in the approach, form and content of their information and data submitted to *Infrastructure Australia* for the purpose of consideration and evaluation of initiatives for the **Infrastructure Priority List**. It includes detailed advice on carrying out profiling and economic appraisals of initiatives.

1. Introduction

1.1. Infrastructure Australia

Infrastructure Australia is a statutory advisory council with twelve members drawn from industry and all levels of government, including five from the private sector, with Sir Rod Eddington as Chair. Infrastructure Australia is supported by an Infrastructure Coordinator, who leads the Office of Infrastructure Coordination within the Australian Government's Infrastructure, Transport, Regional Development and Local Government portfolio.

Infrastructure Australia has the primary function of providing advice to governments, investors and owners of infrastructure on the following:

1. Australia's current and future needs and priorities relating to nationally significant infrastructure;
2. Policy, pricing and regulatory issues that may impact on the utilisation of infrastructure;
3. Impediments to the efficient utilisation of national infrastructure networks;
4. Options and reforms, including regulatory reforms, to make the utilisation of national infrastructure networks more efficient;
5. The needs of users of infrastructure; and
6. Mechanisms for financing investment in infrastructure.

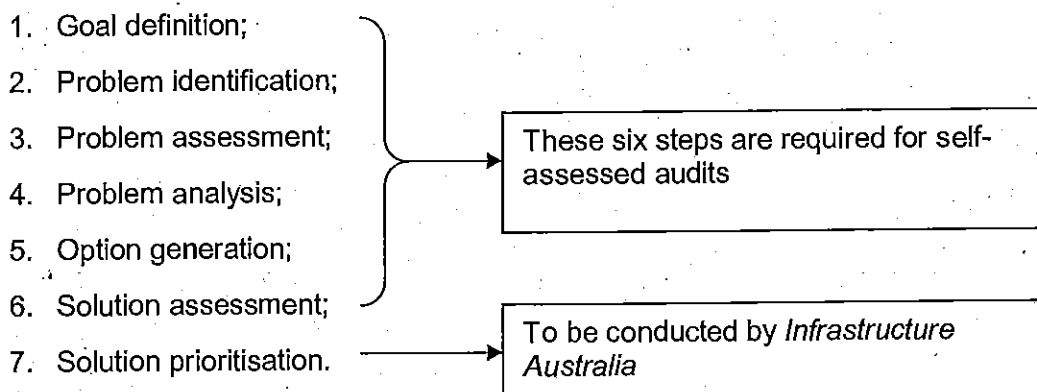
Infrastructure Australia's immediate tasks are to:

- conduct an **infrastructure audit** to determine the adequacy, capacity and condition of nationally significant water, transport, energy, and communications infrastructure;
- produce an **infrastructure priority list**; and
- produce best practice, nationally consistent guidelines for Public Private Partnerships.

Infrastructure Australia is also in a position to provide advice on the harmonisation of policies, and laws, relating to development of, utilisation of, and investment in, infrastructure. *Infrastructure Australia* will also guide the allocation of the Federal Government's Building Australia Fund. *Infrastructure Australia's* focus is on infrastructure issues of significance to national productivity.

1.2. National Infrastructure Audit and the Infrastructure Priority List

A key input into *Infrastructure Australia's* audit is the self-assessed audits conducted by stakeholders. *Infrastructure Australia* has established an audit framework to outline the process, stages and rationale for stakeholders in carrying out their self-assessed audits. This framework seeks to assist stakeholders in clearly and objectively articulating the 'problem' to be addressed and thoroughness in identifying and assessing optional 'solutions'. The thorough analysis of existing and future problems and solutions are an integral part of the framework, therefore clear evidence of existing and future problems and solutions need to be presented in self-assessed audits. The audit framework consists of 7 steps:



A description, rationale and outputs of the audit framework are included in *Appendix A*.

The purpose of this document is to outline the **prioritisation methodology** that *Infrastructure Australia* will use to determine the **infrastructure priority list**. It also assists stakeholders in their self-assessed **solution prioritisation** by outlining a logical, evidence-driven and robust methodology.

The application of this document ensures that the evidence-based outcomes of the audit framework are presented in a clear and consistent manner to ensure the range of proposed initiatives address national productivity issues while recognising the broad range of cost and benefits of all solutions.

1.3. Who should use this document

This document is aimed at sponsors and practitioners responsible for the compilation of submission material for consideration and evaluation by *Infrastructure Australia* in conducting the National Infrastructure Audit and Infrastructure Priority List.

The early sections are relevant to sponsors and provide a high level overview of the **prioritisation methodology**. Appendices provide more detailed guidance to practitioners on *Infrastructure Australia's* expectations on profiling, cost-benefit analyses and deliverables for the purpose of *Infrastructure Australia's* evaluation and comment.

1.4. When to use this document

This document needs to be used by stakeholders for the purpose of carrying out profiling and appraisal of initiatives for further consideration and evaluation by *Infrastructure Australia* for the infrastructure priority list.

As the infrastructure priority list should consist of solutions that are well developed, can immediately respond to Australia's challenges and contributes to national productivity, it is expected that the Infrastructure Priority list will be reviewed on an annual business cycle basis once further information and data on potential initiatives is available.

Infrastructure Australia is aware of the practicalities associated with the information, tools and techniques that are currently available in this **prioritisation methodology** and consider it prudent to flag further improvements to the process in subsequent business cycle so as to best serve the national interest on an ongoing basis. Stakeholders' comments are welcome in this regard.

2. Prioritisation Methodology

2.1 Methodology aim and outcome

The methodology provides an integrated framework that harmonises the information and data resulting in a balanced range of initiatives and uses cost benefit analysis (CBA) as the primary tool for prioritising initiatives.

The aim of the methodology is to be:

- Logical and well defined – as it is systems focused and based on and conforms to *Infrastructure Australia's* aims, objectives, strategic priorities and principles;
- Clear and transparent – as it promotes the open sharing of information;
- Evidence driven – as it uses quality and suitable data and consistent tools; and;
- Robust – as it is comprehensive by looking through multi-lenses to solving a complex problem.

This **prioritisation methodology** provides a best-practice approach for infrastructure prioritisation and has been drawn from international and national based practices and research.

2.2 Methodology phases

The **prioritisation methodology** is one process incorporating three phases:

- profiling;
- appraisal; and
- selection.

A description of these phases is included in the following sections.

2.2.1 Profiling

The profiling phase of the *Infrastructure Australia's* prioritisation methodology assesses the compatibility of the range of initiatives to *Infrastructure Australia's* strategic priorities. A picture of the potential national productivity value of initiatives can be determined while producing a balanced view of the initiatives and their linkages and dependencies to other initiatives.

Infrastructure Australia considers that the broadest possible range of initiatives, offering both infrastructure investment and other solutions, presents the best prospect for an effective response to addressing issues of national productivity. Such other solutions are policy and regulatory initiatives, demand management and pricing initiatives and supply side enhancement initiatives all of which will make better use of current infrastructure.

A Summary of Initiative Profiling proforma has been developed to assist responses. This is included in Appendix C.

The profiling of initiatives needs to outline:

- rating of compatibility to *Infrastructure Australia's* strategic priorities;
- how the strategic priorities are to be addressed by the initiative, and;
- how the initiative is dependant on other complementary and dependant initiatives being policy, regulatory, demand and pricing solutions, enhancement and capital investment solutions.

Profiling creates the coherent argument as to why the initiative is being considered in the first place and what is it actually trying to achieve relative to *Infrastructure Australia's* strategic priorities. The simplicity of testing and reporting against the strategic priorities defines the appropriateness of any initiative at the outset.

For more details on application of the *Infrastructure Australia* profiling phase, including the ratings to be used, refer to Appendix B.

2.2.2 Appraisal

The appraisal phase of the *Infrastructure Australia's* prioritisation methodology adopts 'monetised' cost benefit analysis as its core tool. This is complemented by 'non-monetised' effects. Together, a picture of the wider economic, environmental and social merits of each initiative can be determined.

Infrastructure Australia will:

- Use objective cost-benefit analysis as the primary driver of decision making;
- Consider a wide range of benefits and costs – not just economic, but also social and environmental;
- Give monetised CBA (through the benefit cost ratio) a key role in decision making;
- Ensure non-monetised effects are also taken into account; and;
- Consider both efficiency and equity impacts.

The *Infrastructure Australia* appraisal phase adopts a wide-ranging perspective. It is interested in all the costs and benefits associated with an initiative, interpreted in the broadest sense. These effects can be economic, social and environmental in nature. The *Infrastructure Australia* appraisal process therefore has a holistic perspective.

The appraisal phase is interested in both the overall efficiency of an initiative (- the combined scale of benefits and costs -), as well as its equity and distributional impacts.

Efficiency is determined by comparing the benefits and costs of an initiative - it specifically addresses the question: "When all the benefits and costs are combined, will the initiative deliver net benefits (benefits in excess of costs)?"

On the other hand, the issue of equity and distributional effects is concerned with who bears the benefits and costs.

Cost benefit analysis (CBA) is the primary appraisal tool by which *Infrastructure Australia* assesses the net benefit of an initiative. It is an objective tool that combines 'monetised' benefits and costs - those expressed in dollar value terms. In the *Infrastructure Australia* methodology, as many benefit and cost are monetised as widely as possible. Estimates of wider economic benefits and costs (WEBs) are to be included where relevant and Appendix D provides additional information for practioners.

Benefits and costs that cannot be expressed in money units, referred to here as 'non-monetised' benefits and costs, are also brought to account in the appraisal process. This is done using a qualitative rating scale, with individual rating values ranging from 'highly beneficial' to 'highly detrimental'.

The consideration of risk and uncertainty is also addressed in the *Infrastructure Australia* appraisal process to ensure that decision making is robust. This occurs via sensitivity testing of the CBA results.

For more details on application of the *Infrastructure Australia* appraisal phase refer to Appendix D.

For more details on the deliverables required by stakeholders for *Infrastructure Australia's* appraisal phase refer to Appendix E. This includes a proforma titled the **Summary of Initiative Appraisal Key Results and Assumptions**.

2.2.3 Selection

The selection phase of the *Infrastructure Australia's* Prioritisation methodology integrates the profiling and appraisal assessments and other data and information. As such the national productivity impact of individual initiatives can be compared. Together, the picture of the national productivity impact of the entire range of solutions across all sectors can be created into the infrastructure priority

The *Infrastructure Australia* selection phase aims to utilise the outputs of the preceding profiling and appraisal phases to create a priority list of initiatives to enable informed decision-making for allocation of funding. The selection of the best initiatives rests upon the high degree of problem understanding that is brought through the prioritisation process by analysis and a rigorous approach to definition of the priority list.

While strategic assessment and appraisal assessment have been previously considered individually, the selection phase integrates the multiple inputs to enable choice between initiatives.

Evaluation of each initiative using the multiple inputs provides a wider range of consideration in the prioritisation. Other lenses are then used to ensure that a balance is achieved in the range of initiatives that deliver national productivity improvements.

The integration of the multiple inputs to produce a single prioritised list of initiatives is complex but will be simplified by using matrix mapping of the inputs to offer an easy to visualise assessment of priority. This is being developed by *Infrastructure Australia*.

Central to priority choices are the benefit-cost ratios of initiatives and these are given primacy in the integrated assessment of all inputs or indicators.

All of the other inputs and indicators are considered to be of comparable significance – no weightings are applied and their reporting gives a clearer and more transparent basis to determine the priorities for action.

Using the matrix, priority categories will be determined so as to give emphasis to proposals that promote a balanced view and productivity, strategic fit, and sustainability.

Once an initiative has been assigned a priority category it is further classified according to its degree of development which evaluates deliverability, timing and packaging of initiatives. A proforma for these inputs has been provided in **Appendix F – Inputs into Initiative Selection**.

Thank you for taking the time to read this methodology paper.

All queries in response to this paper should be directed via email at mail@infrastructureaustralia.gov.au or sent to:

The Infrastructure Coordinator
Infrastructure Australia
Level 21
Deutsche Bank Building
126 Phillip St
Sydney NSW 2000

Appendix A – Infrastructure Australia's Audit Framework

Stage	Description	Components required	Rationale
1. Goal definition	<p>Definition of the fundamental economic, environmental and social goals that society seeks to achieve, for example: sustained economic growth and increased productivity, lower carbon emissions and lower local pollution, greater social amenity and improved quality of life.</p>	<ul style="list-style-type: none"> - Formalised, comprehensive, and agreed goals/targets. - Quantified, objective and specific goals/targets. 	<p>A performance benchmark is needed against which the adequacy of infrastructure can be assessed.</p>
2. Problem identification	<p>Objective, specific, evidence-based, and data rich identification of deficiencies with the condition, operation and services provided by infrastructure that may hinder the achievement of those economic, environmental and social goals.</p>	<ul style="list-style-type: none"> - A list of specific problems clearly identified, including network or geographical location. - Those problems accurately quantified and defined, including an assessment of future trends. 	<p>Specifically re inadequacies is essential in order to take targeted and therefore more effective action.</p>
3. Problem assessment	<p>Objective and quantified appraisal of the economic, environmental and social costs of those deficiencies, so that the most damaging deficiencies can be identified and prioritised.</p>	<ul style="list-style-type: none"> - Accurate and objective assessment of the economic/social impacts of those problems. - Priorities identified which reflect the scale of impacts. 	<p>Understanding the cost/impact of deficiencies allows the worst problems to be identified and prioritised.</p>
4. Problem analysis	<p>Objective, policy and economic analysis of why these deficiencies exist – i.e. what is the underlying cause (depending on the sector, reasons could include market failure, government failure, capital restrictions, etc.). This should include an assessment of non-infrastructure reasons for the problem – e.g. land use patterns, peaky demand, or education/business hours.</p>	<ul style="list-style-type: none"> - For each deficiency, analysis of why those problems have developed - Covers both immediate and underlying causes (e.g. not just 'lack of investment', but causes of underinvestment, e.g. regulatory environment). 	<p>Understanding the causes allows effective and targeted solutions to be created. Infrastructure not the only cause of problems.</p>
5. Option generation	<p>Development of a full range of interventions that might address the issue – e.g. pricing, regulatory, better use, packages/systems, capacity increases, informed by the Problem Analysis completed at Stage 4.</p>	<ul style="list-style-type: none"> - A full range of option types have been identified for each deficiency/problem. - These options have been objectively assessed, without some options having been ruled out early or favoured. 	<p>Looking at a range of options rather than relying on early judgements is more likely to identify the best solutions.</p>
6. Solution assessment	<p>Use of cost-benefit analysis to assess those options/solutions. The appraisal should incorporate the full range of economic, environmental and social impacts (including agglomeration and trade impacts, carbon impacts, noise, and social amenity) so that the impact on all society's goals is measured and understood as far as possible.</p>	<ul style="list-style-type: none"> - Accurate and justifiable Cost-Benefit Analysis has been used to appraise options. - CBA is comprehensive and includes wider economic, environmental and social impacts. 	<p>An understanding of the impact of solutions on all goals is essential to understand how the portfolio will achieve those goals.</p>
7. Solution prioritisation	<p>Identification of policy and project priorities from the list of solutions, on an objective basis. The objective basis should give primacy to the Benefit-Cost Ratio (BCR) of policies, but could include broader considerations set out in a transparent framework – such as portfolio/package issues, deliverability, risk, and affordability.</p>	<ul style="list-style-type: none"> - Priority List clearly identified. - Priorities reflect primacy of BCR analysis alongside objective framework. - Relationship to State-funded policies/projects clear – i.e. prioritisation reflects all ideas, not just the unfunded. 	<p>BCRs provide the best available objective evidence as to how well solutions will impact on goals – but not the whole story.</p>

Appendix B - Outline of *Infrastructure Australia's* approach to profiling

This document is provided as a guide to *Infrastructure Australia's* approach to the profiling of nationally significant infrastructure initiatives.

Infrastructure Australia will be using profiling as a key tool in determining the **Infrastructure Priority List**.

Stakeholders should use this document as a guide when undertaking profiling and presenting a **Summary of Initiative Profiling for *Infrastructure Australia***.

Infrastructure Australia will be working collaboratively with stakeholders to assist and guide them in preparing profiles and presenting the results.

Stakeholders need to carry out profiling and submit the results to *Infrastructure Australia*. The profiling needs to comply with this guide.

The 7 strategic priorities are the criteria to be used for the rating of initiatives. The materiality of each initiative with respect to each strategic priority is addressed through the application of a qualitative rating scale ranging from 'highly beneficial' to 'highly detrimental' as shown in the below table. No weightings will be applied.

The descriptions in the following table will assist in making appropriate rating selections.

Rating Level	Description
Highly beneficial	Major positive impacts resulting in substantial and long-term improvements or enhancements of the existing environment.
Moderately beneficial	Moderate positive impact, possibly of short-, medium- or longer-term duration. Positive outcome may be in terms of new opportunities and outcomes of enhancement or improvement.
Slightly beneficial	Minimal positive impact, possibly only lasting over the short-term. May be confined to a limited area.
Neutral	Neutral—no discernible or predicted positive or negative impact.
Slightly detrimental	Minimal negative impact, probably short-term, able to be managed or mitigated, and will not cause substantial detrimental effects. May be confined to a small area.
Moderately detrimental	Moderate negative impact. Impacts may be short-, medium- or long-term and impacts will most likely respond to management actions.
Highly detrimental	Major negative impacts with serious, long-term and possibly irreversible effects leading to serious damage, degradation or deterioration of the physical, economic or social environment. Requires a major re-scope of concept, design, location, justification, or requires major commitment to extensive management strategies to mitigate the effect.

The rating needs to be justified with data and evidence that has been determined through comprehensive problem and solution definition and assessment in the early stages of the Audit.

Another important component of profiling is how the initiative explores the broadest possible range of infrastructure investments and other solutions. These solutions include policy and regulatory initiatives, demand management and pricing initiatives and supply side enhancement initiatives all of which will make better use of current infrastructure. Solutions are to be clearly outlined and backed with data and evidence in the supplied proforma - **A Summary of Initiative Profiling** (refer Appendix C).

Stakeholders need to provide *Infrastructure Australia* with:

- **A Summary of Initiative Profiling** (refer Appendix C); and
- Any other supporting data and information that is referenced in the Summary.

If *Infrastructure Australia* requires further details or justification about the profiling, it will seek further advice from the stakeholder.

Appendix C – Summary of Initiative Profiling

Part A - Overview

Title of Initiative – *Insert title*
 Summary of Initiative –
 A paragraph description.

Part B – Rating and Justification

Complete the following table. In doing so, ensure that all sources of data and information are adequately referenced

Item	Expand Australia's productive capacity	Increase Australia's productivity	Diversify Australia's economic capabilities	Build on Australia's global competitive advantages	Develop our cities and/or regions	Reduce greenhouse emissions	Improve social equity, and quality of life, in our cities and our regions	Linkages
Rating								
How does the initiative meet/does not meet the strategic priority?								
Provide data and evidence of how the initiative meets/does not meet the strategic priority								
Provide an outline of how the initiative is dependant on policy, regulatory, demand pricing, efficiency and/or capital investment initiatives.								

Appendix D - Outline of *Infrastructure Australia's* approach to appraisal

This document is provided as a guide to *Infrastructure Australia's* approach to the appraisal of nationally significant infrastructure initiatives.

Infrastructure Australia will be using Cost Benefit Analysis as a key tool in determining the Infrastructure Priority List.

Stakeholders should use this document as a guide when undertaking appraisals and presenting a **Summary of Appraisal Key Results and Assumptions** for *Infrastructure Australia*.

Infrastructure Australia will be working collaboratively with stakeholders to assist and guide them in preparing appraisals and presenting the key results and assumptions.

This document includes guidance on: what costs and benefits to include in the appraisals, what assumptions and key variables should be used, and how to present the appraisal results and assumptions. A proforma **Summary of Appraisal Key Results and Assumptions** is included in Appendix E to assist stakeholders in the presentation of appraisals for *Infrastructure Australia*.

D1. Appraisal Overview

See previous section 2.2.2.

D2. Monetised Benefits and Costs

The following table provides a list of the costs and benefits that *Infrastructure Australia* expects to be monetised and included in a CBA of any initiative.

Benefit / Cost
Financial costs and benefits
Capital costs
Operating costs
Revenues / fees / fares charges, traded outputs
Economic cost or benefits to the <i>user of the service</i>
Higher/lower prices for good/service
Time savings
Deaths / injuries
Economic cost or benefits to <i>non-users</i>:
Agglomeration impacts (1)
Noise impacts
Environmental and social cost and benefits – <i>whole of society</i>
Local air pollution
Carbon emissions
Physical fitness

(1) This is an example of 'wider economic benefits' that have traditionally not been included in CBA. See following section for further details

D2.1 Outline of approach to the monetisation of Wider Economic Benefits

Most of the economic costs and benefits that *Infrastructure Australia* will consider are consistent with national and State and Territory guidelines on economic appraisal. The main area of departure from existing guidelines is that *Infrastructure Australia* would like to take into consideration what have been referred to as "wider economic benefits" (WEB) of initiatives, such as agglomeration effects. These particularly apply to transport initiatives.

WEB are improvements in economic welfare that are acknowledged but which have not been typically captured in traditional CBA. The identification and measurement of these effects are currently confined to the transport sector. They are not the same as the economic benefits determined by CGE (computable general equilibrium) models.

Recent evidence suggests that WEB adds between 5 and 40 per cent¹ to the traditionally evaluated benefits. WEB can be disaggregated into a number of specific sources of benefit. The most significant is agglomeration, the notion that similar firms are drawn towards to the same location since 'proximity generates positive externality'². These are the benefits derived from face to face contact, information exchange and networking only available to industries working close to each other.

Another source of benefit covered by WEB is that related to imperfect competition in the labour market. Travel time savings are used as a measure of improved productivity following the reduction in journey time associated with a transport improvement. However, if the labour market is imperfect, the value of the travel time change is not equal to the production change, so that the travel time benefit will underestimate the true production improvement.

Finally, WEB can include the labour market impact resulting from welfare benefits generated from improvements to the supply of labour as a result of transport improvements.

The following links provide additional information on WEB and their calculation to assist those preparing economic appraisals:

- General guidance on wider economic benefits is included at the UK Department of Transport site: <http://www.dft.gov.uk/pgr/economics/rdg/webia/>
- Specific technical guidance on the calculation of wider economic benefit is in the UK Department of Transport document titled, *Transport, Wider Economic Benefits and Impacts on GDP*, June 2006, available at the following site:

<http://www.dft.gov.uk/pgr/economics/rdg/webia/webmethodology/transportwidereconomicbenefits3137>

¹ See Meyrick et al., 2008, *East West Needs Assessment Economic Benefits and Cost Analysis – Technical Report*, Victorian Government

² Head, Ries, Swenson, 1995, 'Agglomeration benefits and location choice: Evidence from Japanese manufacturing investment in the United States', *Journal of International Economics*, 38, pp223-247.

D2.2 The use of Computable Equilibrium (CGE) Models

WEB discussed above are genuine efficiency effects to be considered in a CBA. In contrast, the outputs of CGE (computable general equilibrium) models do not generally play a role in CBA. CGE models focus on 'economic activity impacts', which are not a measure of efficiency effects.

Infrastructure Australia does not encourage stakeholders to undertake CGE modelling, however recognises that some initiatives will have CGE information available which will be included in submissions to *Infrastructure Australia*.

Infrastructure Australia will primarily use CBA data for measuring the benefits of an initiative and will not consider CGE benefits as additive to CBA benefits.

If CGE analysis outputs are submitted in support of an initiative and constitute a significant portion of the business case, *Infrastructure Australia* will scrutinise the CGE model assumptions and methodology in order to provide advice to *Infrastructure Australia* on any double counting.

D3 Non-Monetised Benefits and Costs

The following are benefit and cost categories that are relevant to the determination of net benefits of an initiative, but generally cannot be monetised.

Benefit / Cost
Visual / landscape
Social amenity, e.g. parklands
Social cohesion
Heritage or cultural impacts

In the **Summary of the Key Results and Assumptions**, these non-monetised benefits/costs should be discussed after the monetised CBA results. Refer to Appendix E for the required proforma.

Each non-monetised benefit/cost shall be rated using the rating scale in the Table below. The descriptions in the following table will assist in making appropriate rating selections.

Rating Level	Description
Highly beneficial	Major positive impacts resulting in substantial and long-term improvements or enhancements of the existing environment.
Moderately beneficial	Moderate positive impact, possibly of short-, medium- or longer-term duration. Positive outcome may be in terms of new opportunities and outcomes of enhancement or improvement.
Slightly beneficial	Minimal positive impact, possibly only lasting over the short-term. May be confined to a limited area.
Neutral	Neutral—no discernible or predicted positive or negative impact.
Slightly detrimental	Minimal negative impact, probably short-term, able to be managed or mitigated, and will not cause substantial detrimental effects. May be confined to a small area.
Moderately detrimental	Moderate negative impact. Impacts may be short-, medium- or long-term and impacts will most likely respond to management actions.

Highly detrimental

Major negative impacts with serious, long-term and possibly irreversible effects leading to serious damage, degradation or deterioration of the physical, economic or social environment. Requires a major re-scope of concept, design, location, justification, or requires major commitment to extensive management strategies to mitigate the effect.

D4 Key parameters

The CBA uses a number of key parameters, including the discount rate, the appraisal period and the base case.

Literature on CBA contains a number of debates about the key parameters that should be used in different circumstances. For example, there are a range of views about the method that should be used to set the public sector's discount rate for different asset types.

Infrastructure Australia will generally consider appraisals that have been prepared in accordance with Commonwealth, State and Territory guidelines and at this stage, *Infrastructure Australia* will not be providing separate detailed technical guidelines on appraisal that will resolve all of these debates.

Assumptions and methodologies used in appraisals will be carefully scrutinised by *Infrastructure Australia* to prevent the overstatement of benefits or understatement of costs. Unrealistic or inappropriate assumptions will be discounted by *Infrastructure Australia* in its prioritisation process.

In order to provide consistency of presentation of appraisals being prepared for *Infrastructure Australia*, stakeholders should follow the following advice for the selection of key parameters.

D4.1 Base case and project case

Appraisals compare the costs and benefits of doing something (for example, building infrastructure) – the 'Project Case' - with a 'Base Case' - or the situation that would have occurred without the initiative.

The **Summary of Appraisal Key Results and Assumptions** should include a clear and specific explanation of the base case.

D4.2 Discount Rates;

Summary results should be presented for the real risk-free discount rates of:

- 4 per cent;
- 7 per cent; and
- 10 per cent.

This is in accordance with national, state and territory guidelines on CBA.

In cases where a different discount rate is used in an appraisal, the **Summary of Appraisal Key Results and Assumptions** should specify the basis for doing so and stakeholders should contact *Infrastructure Australia* for specific advice in each case.

D4.3 Appraisal period and residual values

Appraisals should typically be conducted using a **thirty (30) year** timeframe.

In cases where a different appraisal period is used (such as a telecommunications initiative with a shorter asset life), the **Summary of Appraisal Key Results and Assumptions** should specify the basis for doing so, and stakeholders should contact *Infrastructure Australia* for specific advice in each case.

For infrastructure assets with a life of more than 30 years, a **residual value** should be included, where appropriate.

The **Summary of Appraisal Key Results and Assumptions** should list the residual value, where one is included.

D4.4 Other parameters

Where best practice & standard parameter values are available (e.g. Austroads report for road appraisals), their use is encouraged.

D5 Sensitivity testing

Sensitivity testing of the CBA is a key element of risk assessment. The purpose of the sensitivity analysis is to acknowledge that there is always a degree of uncertainty and ultimately risk surrounding an initiative. Typically there are four sources of uncertainty surrounding an initiative:

- Capital costs;
- Construction duration and therefore opening date;
- Operating (including maintenance) costs; and
- Under and over estimation of the benefits (typically demand for the service).

A risk assessment should be undertaken to estimate the typical variations around these inputs with the sensitivity testing undertaken based on the variations.

D6 Equity and Distributional Impacts

Other important impacts, especially equity and distributional effects, should be assessed and reported separately from the above net benefit assessment.

No detailed guidance is provided here for undertaking equity and distributional analyses.

Stakeholders should describe and assess as best as possible who the gainers and losers are as a result of the initiative. An indication of the scale of those effects is also desirable.

This will be key information for assessing an initiative's performance.

Regeneration can be an important public policy goal. The economic benefits of regeneration are already captured in cost-benefit analysis, since such an approach appraises an initiative's economic costs and benefits. However, the specific spatial element is not fully described, and where this is a policy objective it may be appropriate to describe this impact qualitatively alongside the cost-benefit analysis.

D7 Reporting and Documentation

The results of the appraisal need to form a central element of the business case for each initiative submitted to *Infrastructure Australia*. The appraisal needs to comply with this guide. All appraisals will be closely scrutinised by *Infrastructure Australia*.

Stakeholders need to provide *Infrastructure Australia* with:

- **A Summary of Appraisal Key Results and Assumptions** (refer Appendix E); and
- Business Cases and any other supporting data and information with regard to the Business Case documentation.

The **Summary of Appraisal Key Results and Assumptions** will assist *Infrastructure Australia* in analysing the appraisals and understanding the costs and benefits and assumptions of the analysis.

If *Infrastructure Australia* requires further details about an appraisal, it will seek the full Appraisal Report from the stakeholder. The full Appraisal Report provides the opportunity for the stakeholder of each initiative to demonstrate that the appraisal is soundly based and defensible.

The appraisal needs to carefully define all inputs and the methodology used. Capital, maintenance and operating costs over the life of the initiative need to be documented with a credible degree of detail. All monetised benefits over the life of the initiative also need to be well documented. The parameters used to calculate benefits and costs should be outlined, properly sourced and referenced, and where appropriate justified for their use.

Appendix E – Summary of Initiative Appraisal - Key Results and Assumptions

Part A - Overview

Title of Initiative – *Insert title*

Stakeholder –

Insert name
e.g. Government of XXX
Department YYY
ABN ZZZ

Contact –

Ms Aaa Bbbbb
Director, XXXX
ZZZ Division
(ph) 0x xxxxxxxxx
(fax) oz zzzzzzzzz

(email) xxxx@cccccccc

(street address)

Summary of submission –

A half page description that covers scope, cost, timing and BCR

Appendix E – Summary of Initiative Appraisal - Key Results and Assumptions

Part B – Cost Benefit Analysis (CBA) – Monetised Benefits and Costs

B.1 Key Assumptions

Complete the following table. In doing so, ensure that all sources of data and information are adequately reference

Item	Assumption
Key drivers	What assumptions are made about future developments that will affect the need, and likely success, of the initiative, e.g. developments of new industries and conurbations, other initiatives being implemented
Base case	Describe the situation 'without' the initiative, including: <ul style="list-style-type: none"> • how the underlying problem will evolve over time • the time stream of future works, and associated capital, maintenance and operating costs, that would occur, and their impact on the problem
First year of construction	
Last year of construction	
Discount rate	State discount rate(s) used (if different from those in Table 1), and the basis for its selection.
Appraisal period	State appraisal period in years, and basis for its selection.
Remaining life	Remaining life of the initiative at the end of the appraisal period
Residual value	State the size of the residual value, and methodology used.
Benefit ramp up	Describe how benefits ramp up over the construction period (if at all), and basis for it.
Capital cost	Describe the basis for estimating all capital costs (for both base and project cases).
Maintenance costs	Describe the basis for estimating all maintenance costs, including growth rates over time (for both base and project cases).
Operating costs	Describe the basis for estimating all operating costs, including growth rates over time (for both base and project cases).
Benefit components	Describe the basis for estimating each benefit component, including growth rates over time.
Cost and benefit time streams	Attach an appendix showing the time stream for each benefit and cost component expressed in undiscounted 2008 \$s.
Other	List and describe any other key assumptions that have been made
Related initiatives	Are the benefits and costs closely related to another initiative(s). If so, explain how that has been accounted for in the BCA.

B.2 CBA Results

Complete the following table.

TABLE 1 – CBA RESULTS

	Discount Rate (%)		
	4%	7%	10%
BCR			
NPV (\$m, 2008 dollars) i.e. 'Net Benefit'			
NPV / \$			
IRR			

In the following table:

- Column 1 - List all cost and benefit elements that have been monetised
- Column 2 - State the \$ value of each cost and benefit element
- Column 3 - Include the % contribution of each cost and benefit element – adding to a total of 100% across costs; and 100% across benefits

If no benefit cost analysis has been undertaken, provide a rough estimate of the percentage of total benefits and cost and some assumptions that will be made in the future BCA.

TABLE 2 – MONETISED BENEFITS AND COSTS (\$m, 2008 dollars)

Monetised costs/benefits	Cost	
COSTS		
Capital Cost		
Operating Cost		
Etc		
	Value	Percentage
BENEFITS		
		100%

B.3 Sensitivity Testing

Complete the following table as a summary of the results of the sensitivity testing undertaken. The Appraisal Guidelines refer to four types of area of uncertainty to test:

- Capital costs
- Construction duration and therefore opening date
- Operating (including maintenance) costs
- Under and over estimation of the benefits (typically demand for the service).

TABLE 3: BCR SENSITIVITY TESTING RESULTS

Test #	Variation	BCR	% Increase from '0'
0	Starting result		
1	Discount rate 4%		
2	Discount rate 10%		
3			
4			
5			
etc	etc		

Appendix F – Further inputs for Initiative Selection

Part A - Overview

Title of Initiative – *Insert title*
Summary of Initiative –
A paragraph description.

Part B – Response

Complete the following table. In doing so, ensure that all sources of data and information are adequately referenced

Item	Response
Deliverability (risks, acceptability, staging, governance model surrounding project, ownership structure)	
Timing	
Packaging	

[Redacted]

From: [Redacted]
Sent: Wednesday, 29 October 2008 1:50 PM
To: [Redacted]
Subject: Fw: Majura parkway - business case templates
Attachments: Prioritisation proforma IA - App C - Appraisal - Key results and assumptions_Majura Parkway Stage 2.doc; Prioritisation proforma IA - App E - Appraisal - Key results and assumptions_Majura Parkway Stage 2.doc; Prioritisation proforma IA - App F - Appraisal - Key results and assumptions_Majura Parkway Stage 2.doc

----- Original Message -----

From: [Redacted]
To: [Redacted]
Cc: [Redacted]
Sent: Wed Oct 29 13:02:53 2008
Subject: Majura parkway - business case templates

[Redacted]

Here is the first draft I have put together on the templates you have forwarded to me. I have not included the revised BCR that SMEC gave me for the revised project scope but that can be added when various comments/edits have been applied.

Please have a look at what has been prepared and add/modify accordingly or discuss with me - I am back in the office from 3.30 pm.

It has taken me a while to put this together as it is a reasonable ask in the timeframe given.

Let me know what else needs to be provided and we can address together as necessary

Regards

[Redacted]
Roads ACT
29/10/08

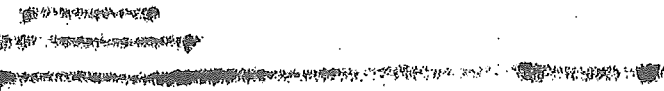


Australian Government

Infrastructure Australia

Outline of *Infrastructure Australia's* Prioritisation Methodology

Appendix C template



Appendix C – Summary of Initiative Profiling

Part A - Overview

Title of Initiative – Majura Parkway Stage 2
 Summary of Initiative –

Construction of 10 kilometres of dual carriageway road connecting the Monaro Highway, an important regional heavy freight route to the Federal Highway which forms part of the National road network.

Part B – Rating and Justification

Item	Expand Australia's productive capacity	Increase Australia's productivity	Diversify Australia's economic capabilities	Build on Australia's global competitive advantages	Develop our cities and/or regions	Reduce greenhouse emissions	Improve social equity, and quality of life, in our cities and our regions
Rating	Slightly	Moderately	Neutral	Neutral	Highly	Slightly	Moderately
How does the initiative meet/does not meet the strategic priority?	This initiative provides improved access for heavy freight and commercial vehicles from an important regional route – the Monaro Highway onto the Federal Highway which is part of the national road network connecting	Improving the Monaro Highway to be able to accommodate higher mass limited (HML) vehicles will contribute to a more efficient and productive freight industry. This is particularly important given that the freight task is forecasted to double by 2020.	Neutral	Neutral	Connecting the Monaro Highway to the Federal Highway will assist in the economic development of the Canberra Region by linking an important regional road with the national road network.	An upgraded Monaro Highway/ Majura Parkway will result in less greenhouse emissions from the nature of the grade separation of major intersections, the reduced vehicle operating costs and improved travel time along this route.	The amenity of residents in North Canberra in particular will benefit from the provision of additional capacity on the arterial road network which should result in a reduction of traffic using local streets.

<p>Provide data and evidence of how the initiative meets/does not meet the strategic priority</p>	<p>The current situation is that only sections of the Monaro Highway in NSW can be declared as part of the Higher Mass Limited vehicle network as the section of the road within the ACT does not meet the requirements. One of the major benefits of this initiative is that it enables more efficient and productive freight vehicles to use this important route and link into the national road network via the Federal and Barton highways.</p>	<p>The introduction of HML vehicles has resulted in a more productive freight industry by enabling higher loads to be carried in fewer vehicles. Given the freight task is forecast to double by 2020 by the NTC/ BITRE this initiative is important in this regards.</p> <p>Currently some 40,000 vehicles a day use the Monaro Highway in the ACT with a commercial traffic proportion in excess of 10 %.</p> <p>This initiative will attract more commercial traffic to</p>			<p>Improved accessibility to Canberra International Airport will also result as a consequence of these works and there will also be benefits to the region's eco and snow based tourist industries.</p>	<p>Canberra Airport will become an important regional transport hub over time for both passenger and freight requirements. Improved access from the Monaro Highway is an important consideration and cited in the Canberra Airport Master plan developed in 2008.</p> <p>The economic white paper which formed part of the Canberra Spatial plan prepared in 2002 and</p>	<p>These improved environmental outcomes by progressing this initiative are documented in the Economic assessment report prepared for the Majura Parkway in November 2007 by SMEC result</p>	<p>Work undertaken as part of the Gungahlin External Travel Study in 1989/90 indicated that the level of traffic using residential streets in North Canberra would double unless the two peripheral parkways were constructed in response to the development of Gungahlin.</p> <p>The construction of the Majura</p>
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<p>Provide an outline of how the initiative is dependant on policy, regulatory, demand pricing, efficiency and/or capital investment initiatives.</p>		<p>use the route by making it a more attractive and efficient route for freight.</p>			<p>provides the strategic direction for the development of Canberra identifies that the construction of the Majura Parkway is a key to the economic development of the Majura Valley and providing further opportunities in the wider Canberra region and national markets.</p>		<p>Parkway completes the peripheral parkways which have formed a feature of Canberra's planning for a number of years.</p>
<p>The initiative while improving the efficiency and capacity for freight traffic on an important regional route and providing a link to the national road network via the Federal and Barton Highways is dependent on capital investment to be realised. Pricing and registration of freight vehicles is being considered at a national level by SCOT and NTC and the benefits and productivity gains being sought can only be realised with appropriate road infrastructure in place.</p> <p>A part from contributing to the wider national transport reform agenda by increasing access to HML and PBS networks for the freight industry, the capital investment in necessary infrastructure will also improve accessibility to Canberra Airport which has the potential to become a regional transport hub. Canberra Airport is currently investing in major infrastructure upgrades to the terminal and runways with in excess of \$270 million committed to date.</p> <p>Improved access to the region will also benefit the eco and snow tourist related business that rely on the Monaro Highway for access.</p>							

Linked with the Canberra Airport development, the expansion of the HML freight routes in NSW on the Monaro and Federal Highways and the continued development of the Canberra Region which by 2031 will have a population in excess of 500,000



Australian Government

Infrastructure Australia

Outline of *Infrastructure Australia's* Prioritisation Methodology

Appendix E template

Appendix E – Summary of Initiative Appraisal - Key Results and Assumptions

Part A - Overview

Title of Initiative – Majura Parkway Stage 2

Stakeholder

ACT Government, Federal Government, NSW Government, Canberra International Airport

Contact

Mr Tony Gill
Director, Roads ACT
ACT Government
Phone 02 62076 588
Email tony.gill@act.gov.au

MacArthur House
12 Wattle Street,
Lyneham ACT 2602

Summary of submission –

The Majura Parkway will connect the Monaro Highway, an important regional road in the ACT and NSW with the Federal Highway which is part of the National Road Network.

The Monaro Highway is an important heavy vehicles freight route which has been declared as part of the expanded route for Higher Mass Limited (HML) vehicles in NSW. This HML route currently stops at the ACT border and continues again in NSW on the Federal Highway.

The construction of the Majura Parkway will address this gap in the HML network as well as providing improved access to Canberra International airport, the Fyshwick and Hume Industrial Estates in the ACT and regional areas of NSW. Given the forecasted doubling of the freight task by 2020, this upgraded freight route will add significantly to the economic development of the Canberra Region and provide improved connections with the Federal, the Barton and Hume Highways which are part of the National Road network

The scope of the project involves the construction of some 10 kilometres of dual carriageway road about 500 m to the west of the existing Majura Road including grade separated interchanges with the Federal Highway, Fairbairn Avenue and with the Monaro Highway

Stage 1 of the Majura Parkway is currently under detailed planning and design and will be funded through a shared funding arrangement in 2009/10 by the ACT and Federal Governments with a project cost of some \$50.0 million. Stage 1 works extends the Monaro Highway north of Fairbairn Avenue connecting it back into the existing Majura Road.

The planning and preliminary design for Stage 2 is also currently underway and extends the Stage 1 works to the Federal Highway as well as duplicating the road by providing another carriageway for south bound traffic.

The project cost estimate for Stage 2 works is \$250.0 million and the project could be ready for construction tenders to be called by July 2010. Assuming this time frame for construction, the Majura Parkway Stage 2 has a benefit to cost ratio of 2.8 when discounted over 25 years using a 7% discount rate.

Appendix E – Summary of Initiative Appraisal - Key Results and Assumptions

Part B – Cost Benefit Analysis (CBA) – Monetised Benefits and Costs

B.1 Key Assumptions

Item	Assumption
<p>Key drivers</p> <p>Commercial Freight and a doubling of the freight task by 2020</p>	<p><i>It is assumed that the Monaro Highway will continue to be an important national and regional heavy vehicle freight route and that by 2020 the level of freight activity will have doubled in comparison to the current requirements.</i></p>
<p>Expanded HML declared network across Australia</p>	<p><i>The declaration of routes for Higher Mass Limited vehicles and performance based vehicles will be well established and heavy vehicles routes will form part of a national network, seamless of jurisdictional boundaries and managed through a national transport regulatory framework established with the assistance of the Federal Government.</i></p>
<p>Expanded role of Canberra Airport in the region acting as a transport "hub".</p>	<p><i>The Canberra Region population will be approaching 500,000 by 2031 and that Canberra International airport will be an important regional freight /transport hub that shares more of the international and national passenger and freight demands than it currently does.</i></p>
<p>Increased importance of eco and snow tourist industries.</p>	<p><i>The snow and eco tourist industries in NSW and the ACT will continue to thrive and improved accessibility between regional and national road networks will be important in the way finding of tourists and for the commercial and economic development of the Canberra region.</i></p>
<p>Base case</p> <p>Do nothing with the existing road network and accept the limitations of the indirect connections between the Federal and Monaro Highways.</p>	<p><i>The base case is a "Do nothing" with the existing road network and accept the limitations in terms of addressing the demands of heavy vehicles and the potential that Canberra International Airport affords the Canberra Region as a regional freight hub.</i></p> <p><i>Given current planned developments in Canberra in Gungahlin and Molonglo and in the surrounding areas in NSW, a do nothing option will result in a heavily congested and inefficient road network that does not support the needs of either local traffic or those of commercial traffic using both the National road network via the Federal and Barton Highways and seeing to connect the Monaro Highway to service the wider Canberra and NSW regions.</i></p>

Freight capacity limitations and no ability to respond to increasing demands	<i>The current traffic and freight limitations are well documented in this area and while a package of works are being undertaken by the ACT/Federal Governments to provide some short to medium term relief, the construction of the Majura Parkway is a key to the economic development of the region and respond to the significantly increased freight task.</i>
First year of construction	2010/11
Last year of construction	2012/13
Discount rate	4%, 7% and 10%.
Appraisal period	25 years – typical for a major road infrastructure project.
Remaining life	5-10 year useful service life
Residual value	Written down value of 20-30% of its original value.
Benefit ramp up	<i>The construction of a major road works project has economic benefits throughout the region ranging from suppliers, professional services, construction labour and contracts to support and social services.</i>
Pre construction activities	<i>Once constructed there is activities associated with the ongoing management and maintenance of the built road asset.</i>
Construction activities	
On going maintenance and management activities of built road asset	
Capital cost	<i>\$250.0 million (2008 costs) – based on project cost estimate included in the Majura Parkway Preliminary Design Report of July 2008.</i>
Maintenance costs	<i>Annual routine and cyclic maintenance requirements which approximate to 2.5% of the total project costs per annum</i>
Operating costs	<i>Operating costs included as part of maintenance costs and would cover the costs associated with the provision of street and traffic lighting, stormwater networks and landscaping.</i>
Benefit components	<i>The vast majority of the benefits relate to travel time savings to general and commercial traffic (\$1.3 billion) but other benefits include vehicle operating costs (\$70.0 million) and road safety benefits by way of crash reduction (\$5.0 million). Transport modelling using PARAMICS as a micro simulation tool adjusted for ACT conditions and using values for travel time, vehicle operating costs and crashes as developed by the Roads and Traffic Authority NSW.</i>
Travel time savings	
Vehicle operating costs	
Reduced road safety costs	
Cost and benefit time streams	<i>A spread sheet covering the costs and benefits streams over time is included with the report at Attachment 1.</i>
Other	N/a
Related initiatives	<i>The overall costs and benefits can be related to a package of road works, part of which are being progressed by the ACT Government in advance of the Majura Parkway project. These road works will only realise their full potential benefits when the Majura Parkway is constructed.</i>
Airport Roads Stage 1/2	
Majura Parkway Stage 1	

B.2 CBA Results

TABLE 1 – CBA RESULTS

	Discount Rate (%)		
	4%	7%	10%
BCR	3.56	2.8	2.27
NPV (\$m, 2008 dollars) i.e. 'Net Benefit'	\$575 m	\$358 m	\$ 224 m
NPV / \$	2.3	1.43	0.9
IRR			

TABLE 2 – MONETISED BENEFITS AND COSTS (\$m, 2008 dollars)

Monetised costs/benefits	Cost	
COSTS		
Capital Cost	\$250.0 m	
Operating Cost	\$17.75 m	
Etc		
	Value	Percentage
BENEFITS		
Vehicle operating costs	\$70.0m	5%
Travel Time savings	\$1,300.0 m	94.7%
Accident cost savings	\$5.0m	0.3%
		100%

B.3 Sensitivity Testing

TABLE 3: BCR SENSITIVITY TESTING RESULTS

Test #	Variation	BCR	% Increase from '0'
0	Starting result- 7%	2.80	
1	Discount rate 4%	3.56	
2	Discount rate 10%	2.27	
3			
4			
5			
etc	etc		

Appendix E – Summary of Initiative Appraisal - Key Results and Assumptions

Part C – Non-Monetised Benefits and Costs

TABLE 4 – NON-MONETISED BENEFITS AND COSTS (\$m, 2008 dollars)

Cost/Benefit	Description	Rating
Residential amenity in Northern Canberra suburbs	Adequate capacity on the main road system will reduce the level of "through" traffic using local residential streets	High
Improved accessibility for eco and snow tourist activities	Encouragement to pass through the ACT to visit the snow or tourist areas and the associated commercial and economic spin off/ benefits.	Moderately

Part D – Appraisal Summary Table (AST)

Part D is OPTIONAL.

Part E – Information Sources

- Canberra Airport Roundtable report- October 2006.
- Majura Parkway / Pialligo Avenue Economic analysis report – November 2007
- Majura Parkway – Preliminary Sketch Plan designs and report – July 2008
- Canberra Spatial Plan – 2002
- Griffin Legacy Report - 2007.



Australian Government

Infrastructure Australia

Outline of *Infrastructure Australia's* Prioritisation Methodology

Appendix F template

Appendix F – Further inputs for Initiative Selection

Part A – Overview

Title of Initiative – Majura Parkway Stage 2

Summary of Initiative –

Construction of 10 kilometres of dual carriageway connecting the Monaro Highway, an important regional heavy freight route, to the Federal Highway which forms part of the national road network.

Part B – Response

Item	Response
<p>Deliverability including; Readiness, Complexity (Delivery) Feasibility (Technical) Affordability (ownership structure, funding sources) Acceptability (public/government/industry), Staging, Governance model</p>	<p>Preliminary designs have been completed and costed for the project and an environmental impact assessment has commenced and will be completed by mid 2009.</p> <p>This EIS covers an assessment of the environmental, social and cultural heritage and built infrastructure impacts of this major road works project.</p> <p>The project in general is not complex in a delivery sense although the traffic management arrangements and impact on existing traffic at key intersections would need to be managed carefully.</p> <p>The road would continue as a public road managed and maintained by the ACT Government unless it was included as part of the national road network where funding of maintenance would be shared with the Federal Government.</p> <p>Funding for other related works currently under construction as part of the Airport roads package of road works are being shared by the ACT and Federal Governments with a contribution from the Canberra International Airport group.</p> <p>The ACT Government would expect the matter of a shared funding arrangement for this initiative to be raised as part of the on going development of the project.</p>

	<p>The Majura Parkway has been identified on the Territory and National Capital Plans for many years and while there will be some details that will need to be resolved with stakeholders such as the department of Defence who operate out of Duntroon and other leaseholders along the route there is a general acceptance of the need for the road as Canberra and the region grows.</p> <p>The project would be managed as a public works project with involvement from the relevant ACT Government agencies.</p> <p>The actual form of procurement would be determined after a more detailed assessment of the project risks, the timing, the cash stream, the market capacity and likely response.</p>
<p>Timing</p>	<p>The project could be ready for calling of construction tenders by July 2010</p>
<p>Packaging</p>	<p>The project could be packaged in a number of different ways depending on procurement methodology, timing requirements and market capacity.</p>

ACT Procurement Solutions

Majura Parkway: Federal to Monaro Highway

Preliminary Sketch Plan Report
Conceptual Design

SEPTEMBER 2002

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Majura Parkway: Federal to Monaro Highway

Preliminary Sketch Plan Report

Conceptual Design

Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
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B	19/06/02	Verified Copy	D Daverin	
C	17/09/02	Response to Client Comments	M Nops	

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Executive Summary

Executive Summary

Background

The Majura Parkway forms part of the peripheral parkway system that forms the basic plan of Canberra. Currently the Majura Road lies within the corridor and forms the function of a semi urban / rural road. The arterial / parkway function of Majura Road is to be replaced by the proposed Majura Parkway in the Majura Valley.

There have been a number of previous studies for the Majura Parkway the most recent of which have been the SMEC study that examined the northern section from the Federal Highway to approximately 4 km south, and the Maunsell study that established a recommended network for the Monaro Highway / Fairbairn Avenue / Pialligo Avenue / Majura Road section.

The recommendations of these studies have been reviewed and where appropriate adopted in this current study.

There are a number of constraints within the study area that have affected the potential alignments for the Parkway. These include:

- The Campbell Park reserves at the southern end
- Existing leases
- Future developments such as the proposed drag-way and the possible High Speed Train HST (which although currently may appear unlikely it is essential that this facility not be planned out).
- Road network and transport needs for the eastern side of Canberra

Preliminary Design Features

This project required that a preliminary design be prepared upon which a Preliminary Environmental Assessment can be prepared.

The features of the preliminary design include:

- An alignment of the Parkway that will serve to not only provide a direct connection from the Monaro Highway to the Federal Highway but also a logical boundary to the Campbell Park reserve.
- A design speed of 110 km/h in the northern section and 80 km/h in the southern section
- Future dual carriageway that connects the Monaro Highway to the Federal Highway
- Retention of the existing Majura Road as a service road for future possible development
- A new link that connects Fairbairn Avenue to the Majura Parkway along the border between the ADFA playing Fields and the Campbell Park Reserve
- An overpass of Pialligo Avenue / Morshead Drive over the Monaro Highway
- Future widening of the Monaro Highway at the Molonglo River Bridge
- Kangaroo fencing at the northern end to discourage random crossing points for wildlife
- Realignment of two short sections of Woolshed Creek
- Provision for a future High Speed Train that terminates at the airport
- Provision for future duplication of Fairbairn Avenue

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- Future possible grade separation of the Monaro Highway at Dairy Flat Road
- Future possible grade separation of the Majura Parkway at its intersection with the new link road
- Future possible direct link from Fairbairn Avenue to Pialligo Avenue should the existing Fairbairn Avenue over Woolshed Creek need to be discarded to allow for the future HST
- Future extension of the Majura Road as a service road connecting with a similar road in NSW.

Significant Structures

There are a number of major structures in the project including:

- Overpass of Pialligo Avenue at Morshead Drive / Monaro Highway
- Additional bridge for Fairbairn Avenue over Woolshed Creek
- A future road overpass towards the northern connection of the Majura Parkway and Majura Road
- Property access underpass for one property
- Widened / lengthened underpasses to allow for wildlife corridors to pass under the road in a vegetated corridor

Lighting

It is proposed to only light the Parkway at intersections and interchanges except where the midblock section is too short where streetlighting is continuous. These sections are from Pialligo Avenue to Fairbairn Avenue and from Fairbairn Avenue to the new link road.

Pavements

Pavement analysis has shown that there are a range of pavements that will meet the forecast traffic loadings however the life cycle cost analysis showed some significant differences with estimates ranging from \$45 to \$71 /m². For design and cost estimating purposes a capital cost of \$50/m² has been used to ensure that site variables that are encountered during field investigations are taken into account.

Noise

The most significant impact of the project will be traffic noise as an addition to the existing aircraft noise. Existing noise levels have been recorded and future noise levels have been forecast. There are two existing residences on the Majura Road where noise levels may exceed the current guidelines. These noise levels will be higher than those emitted for the same traffic levels on the existing alignment.

Landscaping

The proposed landscaping is intended to reflect the existing open character of the southern part of the Parkway. At the northern end it is planned to enhance and strengthen the existing woodland species to reduce the impact of underpasses and associated batters. A commercial decision is required as to the desirability or otherwise of retaining the pine plantation in its current form. In other locations it is intended to plant native trees associated with waterways to afford some protection to existing properties.

Executive Summary

The future possible interchange between the Link Road and the Parkway is intended to have flatter batters so as to reduce the appearance of the vertical scale of the overpasses

Earthworks

There is a cut to fill volume of approximately 385,000 m³ leaving a shortfall that will require the importation of 195,000 m³ of fill. This volume could be reduced by adopting a more aggressive batter slope of 2:1 as is often used in rural NSW. There are few opportunities to amend the alignment and retain both the flood clearance and visual integrity of the road.

Indicative Cost

The total project cost for the intermediate design (pre HST construction) has been estimated for each section to allow review of the proposed program as follows:

Section	Estimated Cost
Majura Pky from Pialigo Ave to Faibairn Ave	\$1,872,269
Fairbairn Ave	\$2,574,314
Link Rd, north of Majura Pky	\$3,780,386
Majura Pky from Fairbairn Ave to Link Rd	\$4,173,920
Link Rd Majura Pky to Majura Rd	\$1,774,631
Majura Pky from Link Rd to access road to Majura Rd	\$31,327,577
Majura Pky from Majura Rd to Federal Hwy	\$8,327,445
Pialigo Ave/Morshead Dr Overpass	\$3,635,924
TOTAL COST (\$)	\$57,466,464

1 Introduction

1 Introduction

Canberra's road system is based on a hierarchical network with several important components:

- A peripheral parkway system, primarily for longer distance travel, particularly between non-contiguous towns
- Direct arterial connections between contiguous towns or other important origins and destinations
- Within towns a conventional hierarchical network; arterials, sub-arterials, distributors and collectors and access roads

In the east the Majura Parkway is planned to ultimately form part of Canberra's peripheral parkway system linking to the Monaro Highway. In its long term form it will carry traffic from the Federal Highway and North Gungahlin to central and southern destinations bypassing North Canberra and the City area.

Majura Road has already undergone some upgrading. The original Majura Lane was sealed with some minor realignment as part of the ACT rural roads programme in the late 70's and early 80's. At this time its name changed from Majura Lane to Majura Road.

With increasing traffic, particularly heavy vehicles, and the further development of Gungahlin there is now a need for development of the Peripheral Parkway to meet its increasingly important metropolitan function.

This project relates to the short term in the development of the Majura Parkway; the development of a concept design for the road and the preparation of a Preliminary Assessment.

1.1 Objectives and Scope of The Project

The objectives of this study are to combine the findings of the previous report and to prepare a conceptual design for the corridor. A Preliminary Environmental Assessment is also required for the preferred alignment.

1.2 Report Structure

In order to facilitate a logical report on all of these matters this report has been structured as follows: Chapter 2 reports upon existing conditions, Chapter 3 reviews previous reports, Chapter 4 presents options, and the preferred medium and long term alignments and discusses the associated engineering elements of the project, Chapter 5 discusses staging, economics and pavement options, Chapter 6 addresses the impacts of the project and Chapter 7 provides a summary and conclusions

The site of the project is shown in Drawing 16402/DI-01

2 Existing Conditions

2 Existing Conditions

2.1 Road Network

The road network is relatively straight forward in the study area. Majura Road is the extension of the Monaro Highway in the south to the Federal Highway in the north. It provides an alternative route to the National Highway and national north south routes through Canberra as well as a peripheral parkway function as embodied in the National Capital Plan.

Majura Road is a single carriageway road approximately 11 kms in length between Fairbairn Avenue and the Federal Highway. The road has a rural character with no kerbing, no footpaths, few property accesses and simple intersections at connecting side roads. Signposted speed is 100 km/h except at the intersection approaches at Fairbairn Avenue and Federal Highway where posted speed reduces to 80 km/h. There is no specific provision for cyclists either on or off road.

In the south Majura Road connects via an un-signalised intersection to Fairbairn Avenue, which in turn connects to Morshead Drive and to Pialligo Avenue. In the north it connects to the Federal Highway, and the soon to be constructed extension of Horse Park Drive, from Gundaroo Drive to the Federal Highway.

Majura Road is a key link between the Federal Highway and areas to the south of Canberra. In addition it is a designated truck bypass and an over dimensional vehicle route.

The existing Majura Road shows deficiencies in a number of areas, with inadequate or no shoulders, narrow traffic lanes, variable geometric standards, inadequate clear zones, substandard guardrail treatments, inadequate intersection layouts and a generally poor pavement condition, exhibiting cracking and rutting over most of the road length with frequent edge failures. The Give Way controlled intersection with Fairbairn Avenue is currently inadequate with significant queues occurring at peak times.

Interim improvements to address deficiencies along the Majura Road are proposed by the ACT Government in 2002 – 03 as part of its Traffic Congestion and Road Safety Improvements Program. This improvement program are a separate project to the Majura Parkway Alignment Study which is the subject of this report.

2.2 Traffic

Traffic flows for the year 2002 are approximately 600 vph in the AM peak. The split between north and southbound traffic is 63% southbound and 37% northbound. Daily flows are balanced with approximately 2300 vpd in each direction. Heavy vehicles account for 16.3% of all traffic (a very high proportion by Canberra standards) and the average speed is 78.3 km/h northbound and 85.1 km/h southbound. The 85th percentile speeds are 89.3 km/h and 96.2 km/h for north and southbound respectively which are both below the prevailing speed limit of 100 km/h.

2 Existing Conditions

2.3 Accidents

Over the three year period 1 January 1998 to 31 December 2000 there were a total of 27 reported accidents in the mid block section of Majura Road from Fairbairn Avenue to the Federal Highway.

Of these only four involved more than a single vehicle and nine involved animals of which it is understood that eight involved kangaroos. A further nine were reported as occurring off road.

The SMEC study reports that the accident rate for the sections between intersections on Majura Road was 50 casualties / 100 Million Vehicle Kilometres (MVK) compared to about 12 for rural NSW roads. Over the period 1995 to 2000 there was one fatal, two admitted to hospital, six that received medical attention and 24 property damage only.

The intersections at each end of the project were ranked at No's 323 (northern end) and 324 (at the southern end) for the period 1993 – 1999. Morshead Drive / Fairbairn Avenue was ranked 57 whilst the roundabout at Beltana Road / Pialligo Avenue was ranked 215.

The SMEC study concluded that excluding intersection accidents the annual cost of crashes on the Majura Road was \$2m - \$2.5m. Suggested remedial measures included road (lane and shoulder) widening and fencing (stock and guard rail).

2.4 Leases and Land Use

The existing land uses along the proposed road corridor are shown in Figure 2.2 and comprise:

- The Canberra International Airport
- Campbell Park Offices
- Australian Defence Force Academy
- Royal Military College Duntroon
- Pialligo small estates
- Estates / Leases of:
 - Aveloney
 - The Willows
 - Ms Underwood (Block 36)
 - McArdles (Blocks 571, 670 and 567)
 - Cherryburn,
 - Majura House and
 - Gladefield
- ACT Girl Guides Association (Innabaanya)
- Mt Majura Vineyards
- Canberra Rifle Club and Sporting Shooters Association
- ACT Forests
- ACT Housing
- Department of Foreign Affairs

2 Existing Conditions

2.5 Flora and Fauna

The road is currently located between the pine plantations and the woodlands area in the north and the scattered woodlands in the south.

There is an area of high value woodland in the southern area adjacent to Fairbairn Avenue. The previous studies have examined and selected a route that not only minimises the potential loss of trees in this area but also meets the required design standards and forecast traffic demands.

2.5.1 Fauna

The Majura Valley is home to a large number of species of Eastern Grey Kangaroos with two main populations in the northern area. One is located on the field firing range and the other on Mt Majura.

Previous studies have identified issues relating to flora, fauna, heritage and the flooding of Woolshed Creek which would constrain any road infrastructure in the southern part of the Majura Valley. In summary the identified constraints were:

- Areas of high woodland conservation value including areas of endangered woodland community along the northern section of the existing Majura Road, and to the west of the central section
- To the south there are areas of natural temperate grassland and associated threatened species. This may constrain the alignment in this area which in turn influences the corridor to the north
- The southern area of natural temperate grassland is also a habitat for threatened species such as *Delmar impar* (striped legless lizard), *Synemon plana* (Golden Sun Moth), *Tympanocryptis lineata pinguicolla* (Grassland Earless Dragon), *Rutidosis Leptorrhynchoides* (Button wrinklewort), and the vulnerable *Perunga* grasshopper

Details of ecological constraints in the Majura Valley are summarised in Table 2.1

Table 2.1 Ecological Constraints

Community or species	Status	Location	Comments
Yellow Box/Red Gum Grassy Woodland community	Endangered ecological community in the ACT	Eastern and western slopes of valley, mostly between 590 and 670m ASL.	Mostly high or very high conservation value. Records of three threatened bird species (see below) in Campbell Park woodlands, two in Newline Quarry area SE of airport.
Natural Temperate Grassland	Endangered ecological community in the ACT, and nationally (EPBC Act)	Lower part of valley, on airport and S end of Field Firing Range, and below Campbell Park Offices.	Habitat for two threatened lizards, two threatened insects and a threatened plant (see below).

2 Existing Conditions

Community or species	Status	Location	Comments
Grassland Earless Dragon <i>Tympanocryptis pinguicolla</i>	Endangered in ACT, NSW, Victoria and nationally	In predominantly native grasslands on airport, S end of Field Firing Range, 'Malcolmvale' property and leased land E of Campbell Park Offices.	Found in Natural Temperate Grassland (endangered community) and degraded native grassland/pasture.
Striped Legless Lizard <i>Delma impar</i>	Vulnerable in ACT, NSW and nationally.	Records in dense grassland in S part of valley – S part of Field Firing Range, leased land around Woolshed Creek and Campbell Park grassland.	Found in Natural Temperate Grassland (endangered community) and degraded native grassland/pasture.
Rosenberg's Monitor <i>Varanus rosenbergi</i>	Vulnerable in NSW	Has occasionally been recorded in forests and woodlands E, W and N of Majura Valley – e.g. Mt Ainslie, Kowen Reserve, Sutton area.	Individuals range over wide area. Roads present danger of being struck, and potential impediment to movements.
Hooded Robin <i>Melanodryas cucullata</i>	Vulnerable in ACT	Woodland in Field Firing Range, Campbell Park and Newline Quarry area.	Favours open forest and woodland with low branches, stumps and fallen timber for perch-and-pounce hunting.
Brown Treecreeper <i>Climacteris picumnus</i>	Vulnerable in ACT	Woodland in Campbell Park and Newline Quarry area.	Favours areas with abundant fallen timber and relatively intact native understorey.
Regent Honeyeater <i>Xanthomyza phrygia</i>	Endangered nationally, and in ACT, NSW and Victoria.	Campbell Park woodland – occasional records only including one breeding record.	Favours eucalypt woodlands with large profusely flowering trees. Majura Valley woodlands probably part of movement corridor for this species.
Golden Sun Moth <i>Synemon plana</i>	Endangered in ACT, NSW and Victoria.	Short native grassland dominated by Wallaby grasses <i>Austrodanthonia</i> spp. on airport, S end of Field Firing Range and S of Campbell Park Offices.	Adults appear briefly in early summer.
Perunga Grasshopper <i>Perunga ochracea</i>	Vulnerable in ACT.	Natural temperate grassland at S end of Field Firing Range and S of Campbell Park Offices.	
Canberra Raspy Cricket <i>Cooraboorama canberrae</i>	Not currently listed.	Majura Field Firing Range, Canberra Airport, Malcolm Vale.	Local range similar to that of Grassland Earless Dragon. Appears to be restricted to Natural Temperate Grassland in valleys in Canberra/Bungendore district. Inadequately known, probably threatened.
Button Wrinklewort <i>Rutidosia leptorrhynchoides</i>	Endangered nationally, in ACT, NSW and Victoria.	Large population at in Natural Temperate Grassland at S end of Field Firing Range,	

2 Existing Conditions

Community or species	Status	Location	Comments
		smaller numbers S of Campbell Park Offices and on W bank of Molonglo River E of Fyshwick.	
Other woodlands	Not listed	Mainly lower central part of valley and E slopes.	Valuable habitat and movement corridor for variety of native fauna, N-S and E-W. Includes threatened and declining woodland birds, and two species of bats listed as vulnerable in NSW.
Potential wetlands	Not listed. Potential habitat for Latham's Snipe, protected by two international migratory bird treaties to which Australia is a signatory.	Associated with Woolshed Creek, on the Duntroon Horse Paddocks (Block 1 Section 14) and land leased by Keir (Block 1 Section 13), Scott (Block 1 Section 8) and Block 2 Sections 9 and Block 8 Section 1.	Identified by officers of WRM from air photos, not ground truthed by ACT Government. Areas inspected 17 May 2001. Mostly damp, weedy, Phalaris-based pasture, ranging from very heavily grazed to ungrazed. Parts could occasionally provide some feeding habitat in summer for Latham's Snipe. Poor quality and unreliable habitat, especially compared with much larger area of wet grassland protected in the nearby Jerrabomberra Wetlands.

These features are shown on Drawing No 16402/SK-01.

2.6 Cultural and Heritage

A cultural and heritage survey identified that there are a number of important sites in the Majura Valley. Sites of importance and to be avoided in any road alignment include:

Table 2.2 Heritage Constraints

Site No	Description	GHD Management Recommendation
7	Lime Kiln Block	If archaeological remains found, avoid impacts and devise plan of management
8	Oak View	Record and assess if impact is anticipated. Subsurface archaeological testing and salvage may be required if impacted
9	"The Pines". Site of James Darmody House	Record and assess if impact is anticipated. Subsurface archaeological

2 Existing Conditions

Site No	Description	GHD Management Recommendation
		testing and salvage may be required if impacted
16	AIF 2. – Aboriginal isolated find. Single stone artefact	Collect if impact anticipated. Consult with ACT heritage regarding statutory requirements
38	Majura House	
45	Dove Cottage	
46	Area of former mortar range. Military	Conduct survey and assess and relics and ground features may occur research any features located
50	Duntroon Shearing Shed	
57	OC5 – Aboriginal open artefact scatter and quarried rock outcrop	Clarify extent of site. Unlikely to pose a development constraint. Minimise impact away from development areas. Consult with ACT Heritage regarding statutory requirements
60	OC9 – Aboriginal open artefact scatter	Collect artefact if impact anticipated. Consult with ACT Heritage regarding statutory requirements
62	OC 12 - Aboriginal open artefact scatter	Collect any artefact if impact anticipated. Consult with ACT Heritage regarding statutory requirements
69	OC 6 - Aboriginal open artefact scatter Aboriginal open artefact scatter	If impact anticipated re-survey area. This find may relate to continuation of Site 57
70	OC 10 - Aboriginal open artefact scatter	No further action required
71	OC 11 - Aboriginal open artefact scatter	No further action required
75	Site of "W Darmody Senior's" house	Record and assess if impact is anticipated, conduct further research to clarify history. Sun surface archaeological testing and salvage may be required if impact warranted
76	Majura Valley	Conduct comprehensive cultural heritage survey and assessment within all proposed impact areas within nominated are
159	Duntroon College Northern entrance "Gun Gates" House on lot 556 (owned by ACT housing) The geological monument of fossiliferous mudstone in Woolshed Creek near to the Fairbairn Avenue/Morshead Drive intersection The Narrabundah Ashstone Member exposed in the road cutting at the Fairbairn Avenue/Morshead Drive	

2 Existing Conditions

Site No	Description	GHD Management Recommendation
	intersection	

These sites are shown on Drawing no 16402/SK-03

Further assessment of the impact of the proposed Parkway on these sites will be undertaken following pegging of the alignment in the field.

2.7 Noise

Measurement of noise levels adjacent to the existing road have been undertaken. Importantly noise levels in the area are affected not only by the passing traffic but also by aircraft noise.

Noise monitoring has been carried out at three locations, selected to provide a representative indication of the current noise environment. The chosen locations are shown on Figure 2.1 and were Block 567 leased by Mr Mc Ardle English, Block 547 leased by Julie and Warwick Bailey and Block 1 leased by. The full report on noise is contained in Appendix A.

Locations A and B are towards the northern end of the proposed Parkway. Both were a similar distance from the airport and hence subject to similar overflights of aircraft using the north/south runway. Location A was in the yard of a house and approximately 28 m from the edge of Majura Rd. Views of this placement are shown in Figures 2.2 and 2.3. Location B was in the property used as a vineyard and approximately 250 m from Majura Rd. Views of this placement are shown in Figures 2.4 and 2.5.

Location C was towards the southern end of the alignment for Majura Parkway and approx 100 m from Fairbairn Ave. This area is used as horse paddocks. The logger was placed in an elevated location to avoid interference from the horses. The logger was placed on a sulky as shown in Figures 2.6 and 2.7.

The recorded noise levels at the three measuring positions are shown in Table 2.2

An ARL EL215 noise logger was placed at each monitoring location and left in location for a week. Each logger was programmed to store the data for the various noise level descriptors for each 15 minutes of the placements.

The criteria for assessing traffic noise impact in the ACT are currently based on the L_{A10} which is the level exceeded for 10% of the time period. This is measured over each hour and the $L_{A10(18hr)}$, which is the average value over the 18 hour period from 0600 to 2400 hrs, is then determined. The L_{A90} , the level exceeded for 90% of the time period, is also of interest as it indicates the background noise levels in the area.

2 Existing Conditions

Additional descriptors which may be used for noise assessments are based on the L_{Aeq} which is the level of a constant sound that would have the same energy as the time varying noise. The values for $L_{A10(18hr)}$ for each day of the placements are shown in Table 2.1. Additional descriptors, based on the L_{Aeq} , are included in Table 2.1 for comparison purposes.

The area is close to the airport and so subject to noise from aircraft overflights. When there are few other noise sources in the area, as is the case for the placements well away from the existing roads, an indication of the noise from the aircraft overflights may be obtained from the L_1 which is the level exceeded for 1% of the time period.

2 Existing Conditions

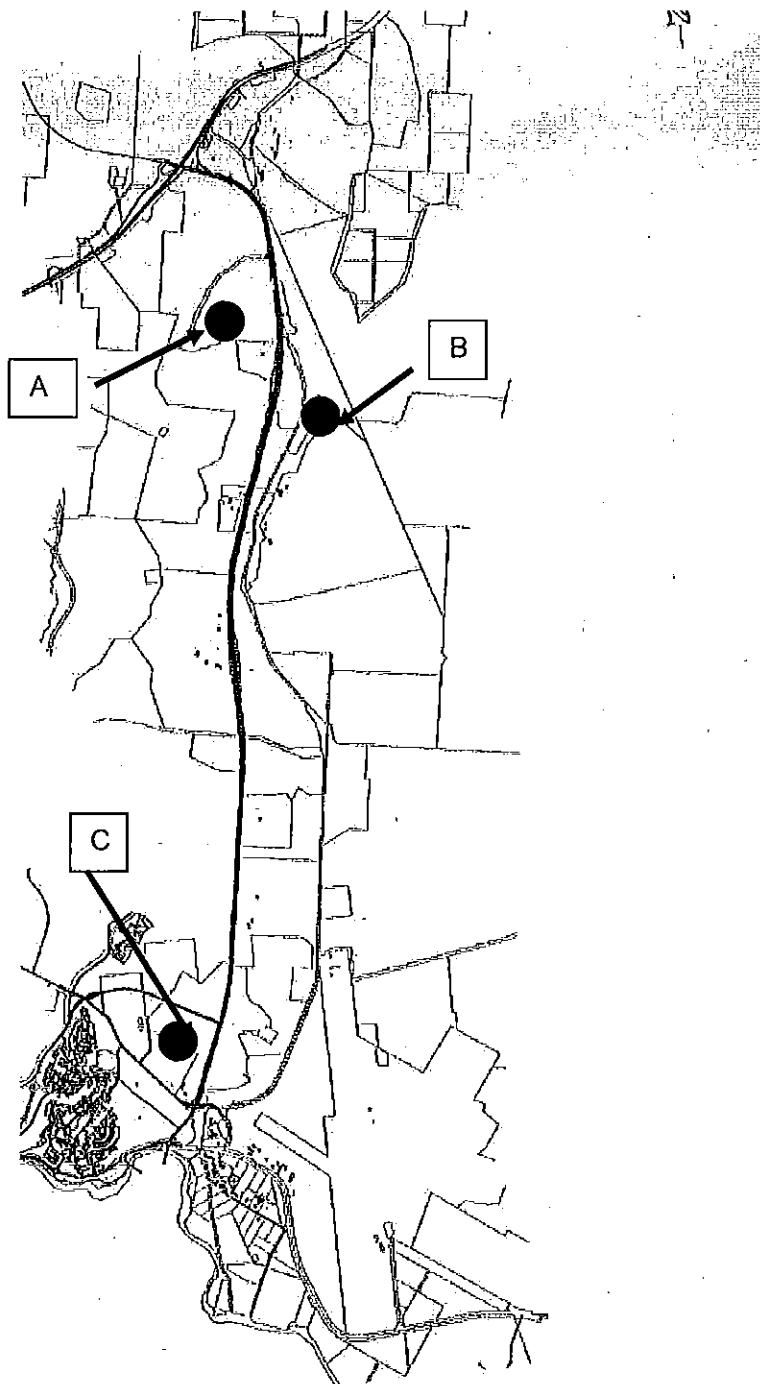


Figure 2.1
Location of Noise Loggers

2 Existing Conditions

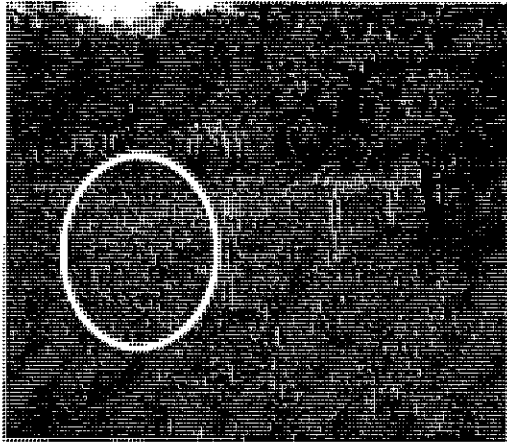


Figure 2.2 View from the road to the logger



Figure 2.3 View from the logger to the road

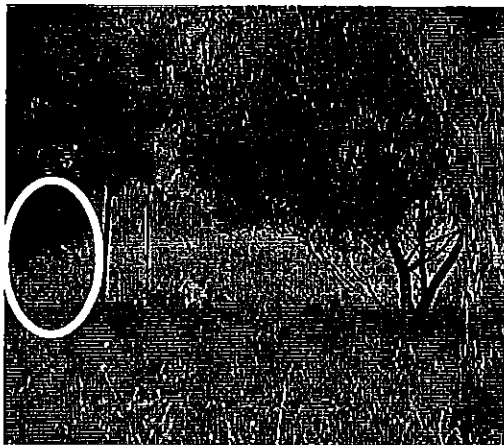


Figure 2.4 View of the logger at location B



Figure 2.5 View of the logger with the road in the far distance

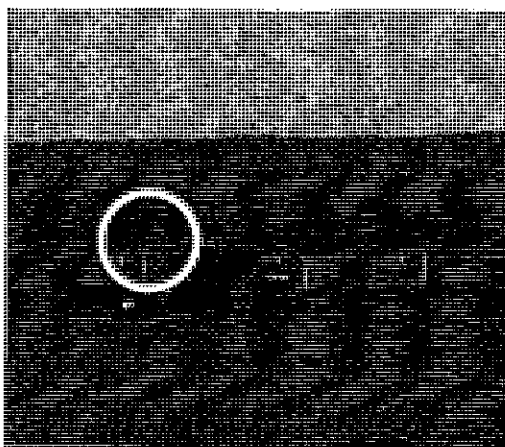


Figure 2.6 View across logger location C towards the airport

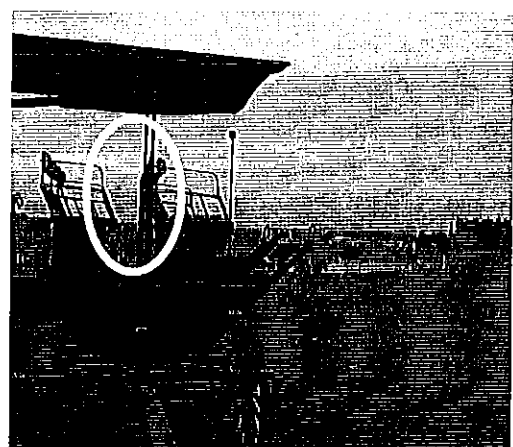


Figure 2.7 View of the logger at location C

2 Existing Conditions

Table 2.3 Noise level descriptors indicating the extent of noise impact. Note that day is from 0701 – 2200 and night from 2201 - 0700.

Location & Date	Day	L _{A10} 18 hr	L _{Aeq} 24 hr	L _{Aeq} day	L _{Aeq} night
A Near Majura Rd					
05-Apr	Fri	63.8	58.9	60.9	55.5
06-Apr	Sat	61.5	57.4	58.7	55.6
07-Apr	Sun	60.0	54.8	57.7	49.9
08-Apr	Mon	62.9	57.9	60.4	53.2
09-Apr	Tue	63.5	59.4	60.7	56.7
10-Apr	Wed	63.3	59.3	61.1	57.0
11-Apr	Thu	63.9	58.5	61.0	53.6
B In vineyard					
05-Apr	Fri	50.9	48.7	51.6	43.7
06-Apr	Sat	49.0	46.9	49.1	43.9
07-Apr	Sun	49.1	45.1	49.2	37.6
08-Apr	Mon	50.0	46.8	50.2	41.1
09-Apr	Tue	51.6	49.4	51.7	44.5
10-Apr	Wed	50.7	48.6	50.7	46.1
11-Apr	Thu	50.8	48.0	51.2	41.8
C In horse paddock					
09-May	Thur				
10-May	Fri	54.1	52.0	56.3	42.6
11-May	Sat	54.1	52.1	53.9	49.5
12-May	Sun	51.8	49.7	51.4	45.3
13-May	Mon	55.1	52.1	55.9	47.3
01-Jan	Tue				
01-Jan	Wed				

2 Existing Conditions

Location A.

This location, at 28 m from the edge of the road, was in line with the front façade of the nearby house. The temporal variation in noise levels, in terms of L_{10} , shows an increase during the morning and afternoon peak hours which is typical when road traffic is the dominant noise source. The $L_{10,18hr}$ ranges from 60 dB(A) on Sunday to 64 dB(A) on weekdays. The guidelines in the ACT for noise impact provide criteria for the noise level at 1 m from the façade (discussed in Section 6 of this report). At 1 m from the façade the noise level would be higher because of the additional reflection of sound. The additional 2.5 dB(A) would increase the noise level to 66.5 dB(A) for the front façade of this house.

Location B.

The noise from road traffic could only be heard as a distant source at location B which was approx 250 m from the edge of the road. As expected, the temporal variation in noise level in terms of L_{10} , does not show the same increase during the morning and afternoon peak hours as for location A. The $L_{10,18hr}$ ranges from 49 dB(A) on Sunday to 51-52 dB(A) on weekdays.

The noise levels show much greater variation throughout the day than for location A. It is understood there was little activity on the vineyard during the time of the placement so the major noise source would have been from aircraft overflights. The values for L_1 indicate that the noise resulting from these overflights was 70 to 74 dB(A).

Location C:

The noise from road traffic could only be heard as a distant source at location C which was approx 100 m from Fairbairn Ave. As expected, the temporal variation in noise level in terms of L_{10} , does not show the same increase during the morning and afternoon peak hours as for location A. The $L_{10,18hr}$ ranges from 52 dB(A) on Sunday to 55 dB(A) on weekdays.

Any activity close to the monitoring location would have been from horse movements and would not be expected to be very loud. A major noise source at this location would be from airport activities including aircraft using the east/west runway. The values for L_1 in Figure 2.12 indicate that the noise resulting from these overflights was 75 to 78 dB(A).

2.8 Contaminated Sites

One sheep dip site has been identified in the corridor in the vicinity of the preferred alignment at about Ch 7500 on block 48. The extent of this contamination will be determined after the alignment is established and the proximity to it can be accurately determined.

2.9 Engineering Services

A review of the recorded engineering services in the Majura Valley indicates that the following need to be considered in the concept design:

2 Existing Conditions

- Various overhead communications lines would be crossed by the proposed works.
- A major natural gas pipeline of 250 mm diameter crossing the Majura Parkway alignment just south of Mount Majura Road
- A major fibre optic cable lies along the western edge of the Majura Parkway alignment.
- Mt Majura communications cable would be crossed by the Majura Parkway alignment.

- 225mm and 150mm diameter watermains along Majura Road
- A watermain crossing the paddocks to the north of Fairbairn Avenue
- Various overhead power lines are crossed by the proposed works
- A sewer across the Majura Valley from the Campbell Park Offices linking to a sewer along the line of Woolshed Creek
- A sewer from the Fairbairn RAAF base
- A sewer to the south of the Molonglo River
- Communications cabling along the eastern edge of the Monaro Highway
- Effluent re use pipe from the Fyshwick sewerage treatment plant to Duntroon and the airport following the Monaro Highway to the Duntroon Playing fields
- 100mm water main following the alignment of Dairy Flat Road

These engineering services are shown on Drawing No. 16402/SK-02

2.10 Landscape and Trees

The following section outlines the existing landscape character of Majura Road as viewed travelling north from the Monaro Highway to the Federal Highway. The roadway and its surrounds can be characterised by a number of distinct landscape character units as described below.

2.10.1 Unit A Monaro Highway to Fairbairn Avenue

The landscape in this section is predominantly an exotic landscape characterised by plantings of Willow and Poplar species along the Molonglo River, Pine and a range of deciduous trees within RMC Golf Course and Poplars and Conifers to either side of Morshead Drive between RMC Oval No 1 and RMC touch football fields. The dense

2 Existing Conditions

plantings with a high proportion of mature specimens tend to almost envelope the road in places and create a closed tunnel like landscape with filtered views and short glimpses to the surrounding landscape. With the recent removal process of Willows from the River and Poplars from the eastern side of Duntroon Oval No 1 the landscape has become more open and allows views through to the surrounding landscape.

2.10.2 Unit B Fairbairn Avenue to Chainage 6000

This section is typified by an open grassland with little or no vegetation except for the isolated planting of Willows along Woolshed Creek and those associated with existing scattered farm houses and associated buildings. To the east the view is dominated by the open landscape of Canberra Airport and adjacent paddocks to its north. To the west the vegetated slopes of Mt Ainslie / Majura slopes and ridgeline dominate. There is a particularly strong contrast where the line of woodland begins part way up the slope paralleling the alignment of the roadway

2.10.3 Unit C Chainage 6000 to 8000

From approximately Chainage 6000 heading north the landscape tightens up with areas of woodland to the west backed by pine plantation and the Ainslie / Majura ridge and to the east, open woodland following the alignment of Woolshed Creek again backed by pine plantation and rising ground.

2.10.4 Unit D Chainage 8000 to The Federal Highway

Having passed through the pines the landform tightens up with rising slopes to the east and the slopes of Mt Majura to the west. The road corridor is dominated by high quality road side trees which flank the roadway. To the west open woodland associated with the creek masks the rifle range and old road alignment. To the west a vineyard dominates the lower slopes prior to the Majura access road. On approach to the Federal Highway the existing road skirts the base of Mt Majura before turning north west where it terminates.

2.10.5 Unit E Link Road

The proposed link road passes through the eastern side of the road with natural temperate grasslands on the northern side of the boundary and the ADFA oval to the south.. As the road approaches Fairbairn Avenue it passes through an area containing endangered community of Yellow Box / Grassy Woodland community.

The road passes across Fairbairn Avenue and through the thinly planted pine trees within ADFA.

2.11 Future Land Use

The future land use of the site is controlled by statements in the Territory Plan that designate this area as broadacre as shown in Figure 2.8.

2 Existing Conditions

Figure 12.8 Territory Plan

The Territory Plan defines and controls broadacre usage as follows:

There is a continuing demand for non-urban and special-use areas on the periphery of the urban areas for a range of purposes, including semi-rural activities and outdoor recreation, education, research and defence establishments, municipal services, technological facilities, commercial, entertainment/recreation developments and community and tourist facilities.

The Broadacre Policies provide principally for developments which require large sites or clearance from other development and which do not adversely impact or visually intrude on the landscape and environmental quality of surrounding rural land or the Territory's open space system. Broadacre areas may also provide a land bank for future urban development. Consequently it is important that non-urban development does not adversely impact on the future use of land which may be required for urban purposes.

The intention in visual terms is to maintain a clear distinction between city and countryside, providing land for non-urban uses with a predominantly rural setting on the urban fringe so that they do not hasten the breakdown of the scale and appearance of the rural countryside or lead to the loss of the essential visual character of the ACT.

. OBJECTIVES

The objectives of the Broadacre Land Use Policies are:

- a. to make provision in a predominantly rural landscape setting for a range of uses which require larger sites and/or a location outside urban areas
- b. to make provision for activities requiring clearance zones or protection from conflicting development
- c. to ensure that development does not adversely impact on the environmental quality of the locality
- d. to ensure, where appropriate, that development and the use of land does not undermine the future use of land which may be required for urban and other purposes.

2. CONTROLS

2.1 Land Use [V54] [V81]

Subject to the provisions of the Broadacre Land Use Policies below, land described on the Map as Broadacre may be used for one or more of the purposes listed in the schedule below.

2 Existing Conditions

<i>SCHEDULE 1 - BROADACRE LAND USE</i>	
<i>Purposes for which land may be used</i>	
Agriculture	Municipal depot ⁺
Animal care facility	Nature conservation area
Animal husbandry	Outdoor recreation facility ⁺
Caravan park/camping ground ⁺	Parkland
Cemetery	Place of worship
Communications facility ⁺	Road ⁺
Community activity centre	Scientific research establishment ⁺
Corrections facility ⁺	Special care establishment
Defence installation ⁺	Special care hostel
Educational establishment	Tourist facility
Emergency services facility	Transport depot ⁺
Veterinary hospital	Health facility
Land management facility	Woodlot
MAJOR UTILITY INSTALLATION ⁺	
<p>⁺ May be subject to mandatory preliminary assessment under the Land Act (see Appendix II)</p> <p>Notwithstanding the provisions of this schedule, land may be used for temporary uses, minor uses and uses ancillary to the principal use of the land, provided there is no conflict with the objectives in section 1. Subject to the National Capital Plan, land may be used for the purpose of educational, recreational, cultural, community, research, farm tourist development or other rural business which is an adjunct to the primary permitted use of the land and which does not adversely impact on the environmental quality of the locality.</p>	

[V54: word "Equestrian facility"; was deleted 10/4/97 (Variation No 54)]

[V81: add to Schedule 1 "Road +"; 12/12/97 (Variation 81)]

2.2 Land Use Restrictions

Agriculture

In environmentally sensitive areas livestock grazing shall only be permitted for the purpose of environmental management such as vegetation management or fire hazard reduction.

2.3 Scale and Type of Development

Development shall be of a scale and type that:

- requires a large site which is not available within the urban area, or
- requires or would benefit from a non-urban location for reasons of safety or effective operation.

2 Existing Conditions

2.4 Development Conditions

- a. *Development approval may be granted in respect of proposed building works where:*
 - *it is designed in character with its rural setting with external colours of earth tones of low reflective quality, and*
 - *it does not adversely affect distant views from public places to major regional features.*
- b. *Conditions may be included in a lease, or in an agreement collateral to a lease.*
- c. *Conditions may require that a visual assessment of the site is recorded showing the location of existing and proposed buildings and intensity of existing and proposed development and landscaping.*
- d. *The following matters may be included in conditions:*
 - i. *protection of natural site characteristics, visual diversity and the general character of the landscape*
 - ii. *protection of woodlands, native grasslands, forests and waterways*
 - iii. *retention, regeneration and planting of vegetation*
 - iv. *maintenance and strengthening of tree cover along streams and on hills and ridges*
 - v. *reinforcement of a clear definition between urban and rural landscapes so as to avoid diminution of the rural setting at the urban interface*
 - vi. *siting of development in a manner which does not adversely impact on the ecology or visually intrude on the landscape character of the locality*
 - vii. *the extent of change and nature of landscape works to be carried out as part of the development so as to minimise any adverse impact on adjacent land*
 - viii. *provision for environmental and landscape maintenance both during and after development*
 - ix. *provision for fire hazard reduction.*
- e. *Where a lease of land does not include development conditions, a development approval in relation to proposed building works may be made subject to conditions of a class described in this subclause.*

2 Existing Conditions

2.5 Special Conditions for Environmental Protection

Special conditions may apply to Broadacre areas adjacent to land in River Corridors and Hills, Ridges and Buffer Land Use Policy Areas. These special conditions may include controls on stocking rates, the use of fertilisers, pesticides and weedkillers, pasture improvement, irrigation and the like. The use of septic systems shall require the approval of the relevant authorities.

Special conditions may apply on land adjacent to the Molonglo River and Woolshed Creek which has potential for horticultural production to protect their value for horticultural uses.

3. PUBLIC NOTIFICATION AND APPEAL PROVISIONS[V88]

Part VI of the Land Act makes provision for the public notification of development applications and for review of decisions relating to those decisions relating to those applications by the Administrative Appeals Tribunal. Exemptions from these provisions are set out in the Land (Planning and Environment) Regulations.

[V88: Changes made to Section 3 12/12/97 Variation 88]

4. AREA SPECIFIC POLICIES

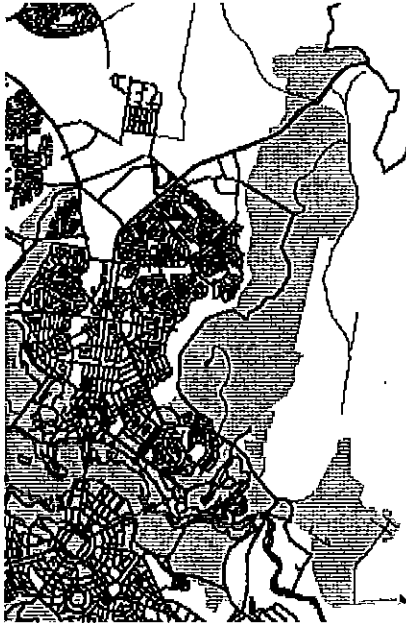
The Area Specific Policies identify specific objectives and/or controls relating to the sub-areas within the overall land use policy areas. These sub-areas are identified on Figures 1 - 5 and on the Map by red bordering and the corresponding Map code.

2.12 National Capital Plan

The National Capital Plan designates the land adjacent to the road corridor as designated land.

The area specifically designated is shown in Figure 2.8.
Figure Extract from National Capital Plan showing Designated Areas

2 Existing Conditions



2.13 Geotechnical Conditions

The new Parkway route is through the Majura Valley on the Woolshed Creek floodplain, and lies between the meandering creek and the north aligned ridgeline formed by Mt. Ainslie and Mt. Majura to the west. The route in the southern half is within about 300m of the west bank of the creek, and up to about 750m distant in the mid-section, then is adjacent to a tributary of the creek at the northern end. The route is about 1.5km from the foot slopes of the western ridgeline, and less than 0.5km in the northern half.

The proposed Parkway route passes through cleared pasture and grazing land, and through some plantation pines at the northern end. The ground surface along most of the route dips E/SE toward Woolshed Creek at slopes less than 2°.

The 1:50,000 Geology of Canberra, Queanbeyan and Environs map indicates bedrock of the Majura Valley floor comprises Canberra Formation sedimentary rock including siltstone, mudstone, shale and minor sandstone; interbeds of volcanic tuff and ashstone are also present. A copy of this map is enclosed as Figure 2.8.

The ridge west of the valley comprises younger rock of the Ainslie Volcanics including dacitic ignimbrites, tuff and agglomerate, which overlie the Canberra Formation. The Duntroon Fault, which runs N/NE along the footslopes of the ridge, separates the volcanic rock of the ridge area from the relatively upthrust Canberra Formation rock of the valley floor. Apart from a few remnant outliers, the volcanic rock has been completely eroded from the valley area, leaving Canberra Formation rock. The few volcanic outliers are typically exposed on the upper valley floor as broad, low, sometimes bouldery hillocks. The eastern edge of one such hillock is located adjacent to the route between CH2000 and CH2500.

2 Existing Conditions

Colluvial soil deposits overlie the bedrock on the footslopes of Mt. Ainslie and Mt. Majura. These thin out onto the floodplain where the Canberra Formation bedrock is overlain by deep alluvial soils. The colluvial deposits typically include angular and sub-angular volcanic gravels in a silty or clayey matrix, which in places may be cemented to form conglomerate rock. The floodplain alluvium consists of clays, silts, sands and gravels; water-bores drilled in the past along the west bank of Woolshed Creek indicate the alluvium may extend to depths up to about 15m.

A representative section of the Narrabundah Ashstone Member within the Canberra Formation, is exposed in the road cutting on the north side of Fairbairn Avenue at the Morshead Drive intersection. These beds conformably overly fossiliferous mudstone beds of the Canberra Formation which outcrop in the nearby Woolshed Creek. The mudstone outcrops contain the first Silurian age fossils found in 1878 in Australia (Reference 1). The site is an important geological monument, and understood to be on the Register of the National Estate. The road cutting is also an important geological feature. Previous geotechnical investigations of the area, including a 1999 preliminary investigation (Reference 2) undertaken as part of a feasibility study of the Majura Valley Transport Corridor, indicate that most of the Parkway route is underlain by deep alluvial soils. The 1999 investigation found low and low to medium plasticity alluvial silty clays, sandy silty clays, silty clayey sands and sandy clays to 1.5m/3m depth, overlying alluvial sands, gravelly sands, sandy gravels, clayey sands and gravelly clayey sands to greater than the 4m depth investigated.

2 Existing Conditions

Figure 2.2 1:50,000 Geology of Canberra

2 Existing Conditions

The alluvium to about 2m depth was found to be very stiff or hard, and the underlying predominantly sandy/gravelly soils were medium dense with some moist/wet or wet layers and some moderately flowing seepages.

It is expected that more angular, coarser grained colluvial and slopewash soils will be increasingly present in the northern section of the route, possibly interlayered with or overlying finer grained alluvial soils.

Canberra Formation sedimentary rocks, as well as some volcanoclastic beds of tuff and ashstone are expected at shallow depth in the southern section of the route between Fairbairn Avenue and the proposed intersection with the future link road at about CH1500. The bedrock in this section is likely to be at less than 1.5m depth, overlain by mainly colluvial and slopewash soils. Narrabundah ashstone exposed in the road cutting is closely jointed but very strong. The tuff rock further west along the cutting is less strong, but more massive.

A number of water bores have been developed in the past along Woolshed Creek for irrigation of crops and market gardens, and for stock drinking water. These have been taken to about 15m depth, apparently tapping into aquifers in basal gravelly alluvium. Groundwater may also be present in fractured siltstone or mudstone bedrock below the alluvium. Moderate seepages can also be encountered from perched aquifers within 3m of the ground surface, although flow rates from these may vary seasonally.

The geological monument of fossiliferous mudstone in Woolshed Creek near to the Fairbairn Avenue/Morshead Drive intersection is understood to be of considerable historic and scientific value. The Narrabundah Ashstone Member exposed in the road cutting at this intersection is also significant. The Geological Society of Australia, the Australian Heritage Commission and other interested bodies should be consulted to ensure that new development is sensitive to the preservation of these features.

At this stage no consultation has taken place pending general agreement to the route from DUS.

2.14 Terrain

Relatively flat grades prevail along the Majura Valley with the levels gradually rising from 0.2% at the southern end to 4% at the northern end.

2.15 EPBC Act

The project brief indicates that an appropriate referral is to be made to Environment Australia under the Environment Protection and Biodiversity Conservation ACT 1999.

The act came into force on the 16th of July 2000. The EPBC Act replaces five Commonwealth statutes:

- Environment Protection (Impact of Proposals) Act 1974

2 Existing Conditions

- Endangered Species Protection Act 1992
- National Parks and Wildlife Conservation Act 1975
- World Heritage Properties Conservation Act 1983 and
- Whale Protection Act 1980

Under the assessment and approval provisions of the EPBC Act, actions that are likely to have a significant impact on a matter of national environmental significance are subject to a rigorous assessment and approval process.

The Act currently identifies six matters of national environmental significance:

- World Heritage properties
- Ramsar wetlands of international significance
- Listed threatened species and ecological communities
- Listed migratory species
- Commonwealth marine areas and,
- Nuclear actions

It is not anticipated that the proposed works will affect any known areas of national environmental significance. However the following species are close by:

Button Wrinklewort
Rutidosia leptorrhynchoides.

Perunga Grasshopper
Perunga ochracea

Golden Sun Moth
Synemon plana

Yellow Box/Red Gum Grassy Woodland community

Natural Temperate Grassland,

Grassland Earless Dragon
Tympanocryptis pinguicolla,

Striped Legless Lizard
Delma impar,

2 Existing Conditions

Rosenberg's Monitor
Varanus rosenbergi

Hooded Robin
Melanodryas cucullate

Brown Treecreeper
Climacteris picumnus

A referral form shall be submitted in due course to ensure that Environment Australia agree with this assessment. The known locations of these species are shown on Drawing 16402/SK-01.

2.16 Summary of Constraints and Conclusions

In summary the constraints which will affect the alignment of either the proposed Majura Parkway or associated road connections are:

- The area of native grasslands which are habitat to the Button Wrinklewort, Perunga Grasshopper, Golden Sun Moth, , Grassland Earless Dragon, Striped Legless Lizard, Rosenberg's Monitor, Hooded Robin, Brown Treecreeper
- Other ecological constraints including the Yellow Box/Red Gum Grassy Woodland community and the Natural Temperate Grassland
- The possible future alignment of the High Speed Train
- A number of heritage sites:
 - 1 Majura House – Site 38
 - 2 Dove Cottage – Site 45
 - 3 Duntroon Shearing shed – Site 50
 - 4 Duntroon College Northern entrance "Gun Gates" site 159
 - 5 W Darmody Senior House Site 75
 - 6 House on Lot 556 (Owned by ACT Housing)
 - 7 The geological monument of fossiliferous mudstone in Woolshed Creek near to the Fairbairn Avenue/Morshead Drive intersection
 - 8 The Narrabundah Ashstone Member exposed in the road cutting at the Fairbairn Avenue/Morshead Drive intersection

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3 Review of Previous Reports

3.1 SMEC Study – Majura Road Upgrade Study

The Majura Road Upgrade Stage 1 Design Options report was prepared by SMEC in August 2001. The project specifically examined the section of proposed Parkway from the Federal Highway to 4.5 km south which is just to the south of the Girl Guides Association site.

The project involved the collection of the following data:

- Visual assessment of trees
- Visual assessment of existing pavement condition
- Completion of a Road Safety Audit of the full length of Majura Road
- Determination of ecological constraints
- Determination of heritage constraints
- Determination of location of existing services and identification of proposed services
- Assessment of land management constraints
- Noise issues including aircraft noise
- Stormwater evaluation
- High Speed Train (HST) impacts
- Review of previous traffic forecasts, and
- Stakeholder consultation

A Road Safety Audit identified significant deficiencies on the existing Majura Road, including inadequate clear zones, shoulders, protection for errant vehicles from trees and culverts, missing or inadequate guard rail, sight distance deficiencies and lack of access and intersection provision.

The study identified primary controls of:

- Provision for the HST corridor
- Unnamed tributary to Woolshed Creek
- Proposed Majura Parkway Stage 2 (southern end)
- Memorial plantings along the Federal Highway (constrains the HST alignment)
- Vegetation and ecological communities

The study also identified secondary controls of :

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- Significant lease improvements (Vineyards, DOFA site roads and buildings, houses and pine plantations)
- Major services of high pressure steel gas main and fibre optic cable
- Existing Majura Road and HST alignment

Tertiary constraints that were identified controls included:

- Lease boundaries
- ACT Girl Guides Camp
- High conservation value vegetation
- Property access locations
- Access to Mt Majura and ACT Gun Clubs and
- Identified heritage sites

Eight options were developed including six for the HST alignment with a complimentary parkway alignment as well as two road options with common HST alignments. Of these eight that were investigated five were dismissed due to incompatibility with the HST alignment. A further option was rejected on the basis of severe impact on the DOFA site and the difficulties of constructing the road under traffic.

The recommended alignment was selected on the basis of having a superior integration with the HST alignment and also with the existing and future land use pattern of the Majura Valley including the retention of the existing road as a local access for adjacent properties.

The estimated cost for the southbound carriageway for the SMEC section from the Federal Highway to approximately 4km south was estimated at \$9.0m

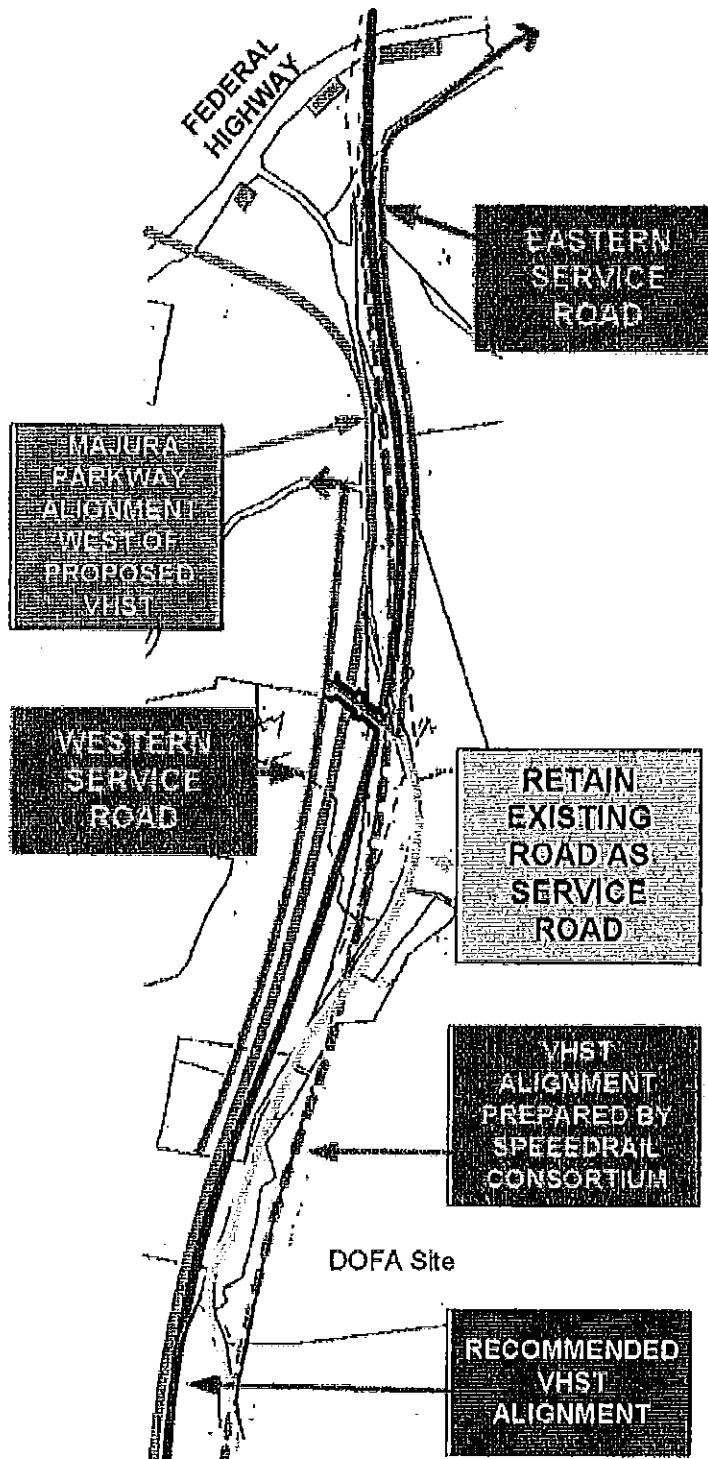
SMEC traffic forecasts envisage that two way AM peak hour traffic will grow from 588 in 2002 through 1386 in 2011 to 3600 in 2031 and will continue to grow at 2.5% pa

One of the key constraints for the SMEC study and that has also been incorporated into the requirements for this study is the need to retain the future possible reservation for the HST. This requirement is the key reason for the placing of the parkway to the west of the proposed HST alignment and relegates the existing road to that of a future service road to minimise the number of rail crossings.

The recommended alignment for the Parkway from this study is shown in Figure 3.1.

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Figure 3.1
Proposed Majura Parkway
SMEC Study



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3.2 Maunsell Study – Majura Valley Transport Study

The Majura Valley Transport Study was prepared by Maunsell in November 2001.

The project brief from the client identified the broad study requirements as:

- A network planning exercise to identify the relevant transport demands
- A road network development exercise to examine road network options, determine their feasibility and select a preferred scheme which meets all the needs of the arterial road system in the area

This report documented the work carried out as part of the study:

- A review of previous studies and other work which could impact on the planning of the road network in the area
- An analysis of the existing or future conditions which might constrain or, indeed provide opportunities for future road links
- Forecasting of future travel demands in and through the area
- The development and assessment of possible road network options
- The selection and further development of a recommended road network for the area

Traffic forecasts indicate that traffic in the Majura Corridor will grow from 1296 v.p.h. in 2002 (assuming the completion of Horse Park Drive) through to 2134 v.p.h. at 2011 and to 4691 v.p.h. in 2031 assuming no change in usage of public transport and other modes.

The previous studies and work in the area identified a range of issues which would impact on or constrain possible road network options in the area:

- Both flora and fauna constraints in the southern part of the Majura Valley
- A number of heritage sites
- Flooding associated with Woolshed Creek
- A possible future alignment for a High Speed Train route (HST) into Canberra terminating at the airport
- Some major services in the Fairbairn Avenue corridor
- Bishop Austrans demonstration project and possible future Airport – City link

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- An Obstacle Limitation Surface (OLS) for Runway 30, Canberra International Airport

The alignment of Majura Road is constrained by:

- Areas of ecological resources of high to very high value
- Heritage and cultural sites of significance
- The alignment of a possible HST link to the Canberra International Airport.
- The Obstacle Limitation Surface (OLS) for Runway 30 at the airport
- Molonglo River
- Land use planning at Canberra International Airport
- Woolshed Creek floodplain

Other factors taken into consideration include:

- Property access
- Severance of leases and ADFA
- Bishop Austrans pilot track
- Local access routes
- Engineering services
- Possible Environmental Technology Development Zone (ETDZ)

Using broad estimates of future travel demand and analysis of constraints and opportunities a number of broad network options were developed. Through a process of design development these options were reduced to four main alternatives. These options were then used to develop a preferred scheme.

The study report concluded that the preferred option, shown in Figure 3.2, responds to the main traffic demands with road links conforming most closely to travel desire lines. This option was also assessed against environmental and economic impacts.

Features of the preferred option are:

- A new northern road connecting Majura Parkway to Fairbairn Avenue along the edge of the conservation area
- Upgraded Fairbairn Avenue to meet demands from Pialligo Avenue to Fairbairn Avenue

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- Upgraded Pialligo Avenue to meet the demand from Pialligo Avenue to Morshead Drive and
- A new Majura Parkway link between Monaro Highway and Fairbairn Avenue

Refinements to this base network were also assessed which included the duplication of Fairbairn Avenue as follows:

- Fairbairn Avenue between Anzac Parade and Northcott Drive and Northcott Drive single carriageway
- Both Fairbairn Avenue between Anzac Parade and Northcott Drive and Northcott Drive duplicated
- Fairbairn Avenue between Anzac Parade and Northcott Drive single carriageway with Northcott Drive duplicated

A detailed intersection analysis of all the key intersections within the study area was conducted with the following conclusions reached for the preferred alignment:

- Possible to have an at grade intersection at Pialligo / Morshead / Majura with three through lanes on all approaches
- It is the only option that successfully can operate without the need for grade separation albeit at the cost of another bridge over the Molonglo River
- All options require increased capacity at the Kings Avenue / Morshead Drive roundabout
- The Majura Parkway needs to be a four lane divided road

Construction of the Parkway would over a 30 year period, through 3 stages, and consist of:

Stage 1:

- Reconstruct two lane single carriageway Fairbairn Avenue
- Construct new northern link road from Majura Road to Northcott Drive

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Figure 3.2
Majura Valley Road Network
Recommended Scheme from
Maunsell Study

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- Grade separate Monaro/Morshead/Pialligo
- Signalise intersections of Fairbairn/Majura and Fairbairn/Morshead
- Add right turn from Monaro Highway to Dairy Flat Road if Monaro /Morshead/Pialligo is grade separated

Stage 1 should be constructed by around 2005 when Horse Park Drive is opened. The indicative cost for Stage 1 would be approximately \$10.2M including GST

Stage 2:

- Construct a two-lane single carriageway Majura Parkway to link back to existing Majura Road near the northern boundary of the airport.
- Realign Northcott Drive to match new northern link
- Construct new link between Majura Parkway and Pialligo Avenue and signalise intersection with Morshead Drive. This link allows the preferred VHSR alignment to access the airport without crossing any roads in the south of the Majura Valley.
- Construct roundabouts on Russell Drive at Causeway Ave and the eastern link road.

Indicative cost of works for Stage 2 = \$8.3M including GST. Stage 2 should be implemented by 2011.

Stage 3:

- Duplicate Majura Parkway between Morshead Drive and the existing alignment of Majura Road (approximately 3km north of the airport boundary).
- Construct link to northern airport precinct. The scale of this link is dependent on future development of this area.
- Duplicate Fairbairn Avenue from Majura Parkway to Anzac Parade
- Construct duplicated Majura Parkway between northern link (to Northcott Drive) and the existing alignment of Majura Road (approximately 3km north of the airport boundary)

Indicative cost of works for Stage 3 = \$21.3M including GST. Stage 3 should be constructed at approximately 2020.

The upgrading of the intersection of Kings/Parkes/Morshead is required as soon as possible to overcome increasing a.m. capacity deficiency at this location.

A cost benefit analysis of the preferred option was carried out over a 30 year period and showed that the Benefit Cost Ratio (BCR) varied between 10.1 and 15 for discount rates of 10% and 4% respectively.

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The long term arrangement for the preferred option has a number of attractive features:

- provides efficient traffic operation
- presents good legibility for motorists
- minimises adverse environmental impacts
- minimises adverse heritage, cultural and social impact
- has excellent staging potential
- allows for the preferred VHSR alignment
- avoids the OLS for Runway 30, and
- minimises earthworks required in the Woolshed Creek floodplain.

The total estimated cost for the three stages of the preferred alignment was \$39.8million at 2001 costs.

The preferred option would require changes to the Territory Plan and National Capital Plans for Fairbairn Avenue, Majura Parkway, Pialligo Avenue and the Monaro Highway.

3.3 Conclusions

3.3.1 HST Alignment

A review of the most recent studies for the Majura parkway has confirmed the findings of those studies and of the recommended alignments proposed. One of the most significant influences that affected these recent studies was the possible alignment of the HST. PALM has confirmed that the alignment for the HST needs to be retained even though the current proposals have been shelved. This requirement is a controlling influence on the alignment of the parkway and assumes that the HST if constructed will terminate at the airport. Should the HST proceed there is no guarantee that the airport will be the location for a station in the ACT. However, in the absence of any other station location proposals, the alignment of the HST along the Majura Valley has been accepted as a constraint on the alignment of the Majura Parkway.

3.3.2 Forecast Traffic Demands

The SMEC and Maunsell forecasts both indicate that there will be a high traffic demand on the parkway with both forecasts showing that there is a need for duplication in its final form. If the current very high proportion of trucks on the parkway is maintained it will adversely affect the capacity of the road and accelerate the need for duplication.

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Both studies identified that the parkway need only be one lane in each direction until about 2011. Both studies also confirmed that grade separation will be required in the long term future but that signal controlled intersections will be adequate in the initial stages.

The relevant traffic forecasts from the two studies are shown in Figures 3.3 and 3.4.

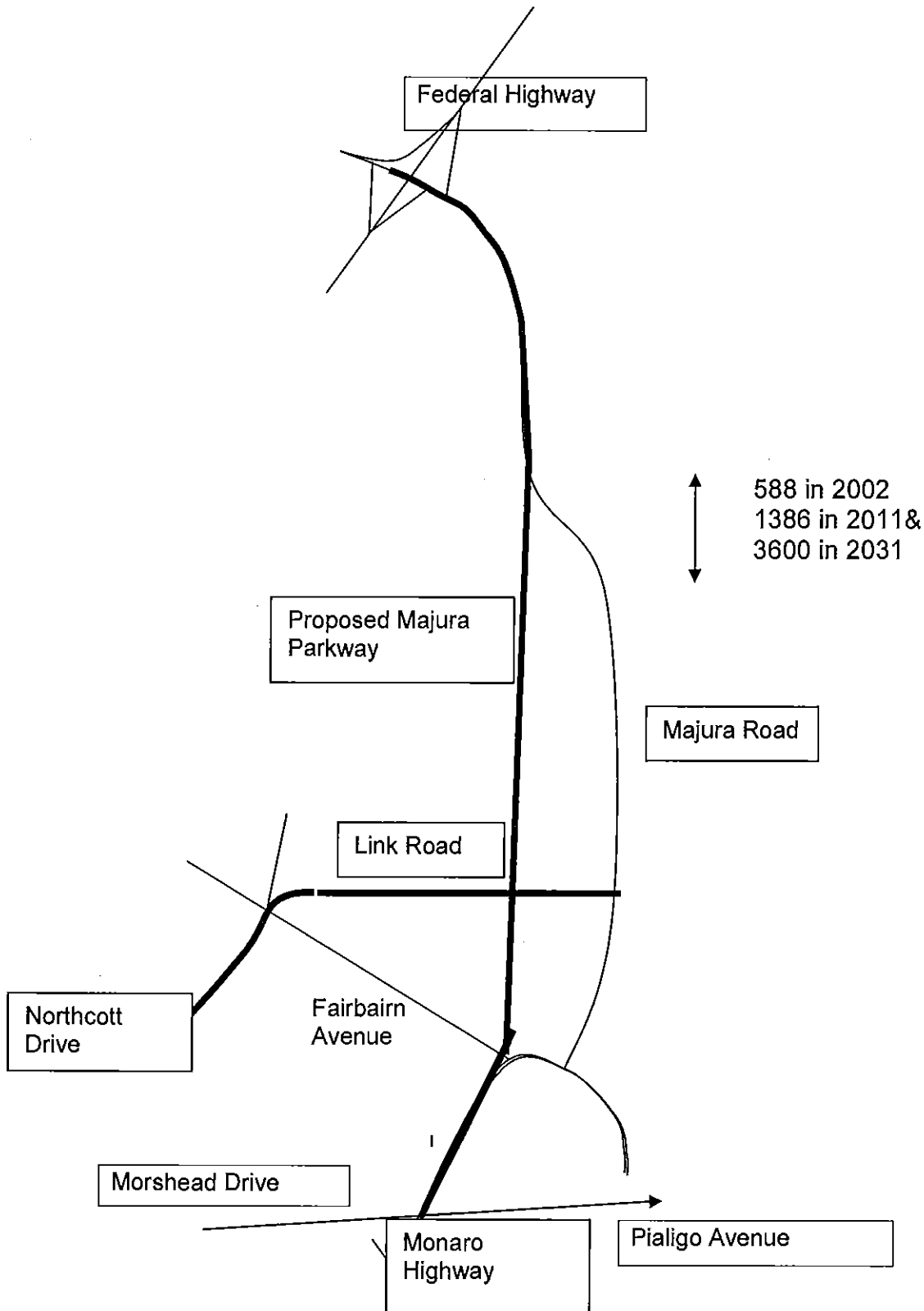
3.3.3 Intersection Forms

The findings from the previous studies concluded that the following intersection forms are appropriate:

- Full tee intersections for access to the gun club access (remain as is) Type B intersection with Mt Majura access and Type C intersection with the eastern service road
- In the very long term (eg post HST) an overbridge would connect the eastern and western sides at Chainage 8200. A left in left out at this location combined with a service road connection to Mt Majura also with a left in left out would provide full interchange access.
- Fairbairn Avenue link road to Majura Parkway would initially be signalised intersection and eventually become a single point interchange upon either the extension to the existing Majura Road or the construction of the HST
- Fairbairn Avenue / Majura Parkway would initially be a signalised intersection. Upon construction of the HST Fairbairn Avenue would pass directly over the Majura Parkway with no connection.
- Monaro Highway / Pialligo Avenue would initially be a simple grade separation with Morshead Drive / Pialligo Avenue passing over the existing roundabout. Upon construction of the HST this would be a simple flyover with no connections.
- Dairy Road / Monaro Highway would initially be a signalised intersection eventually converting to a partial clover leaf to provide connections lost in the removal of the Pialligo Avenue roundabout.
- The two interchanges of Fairbairn Avenue link road / Majura Parkway and Monaro Highway / Dairy Road would provide for all movements between the Parkway and the arterial road network.

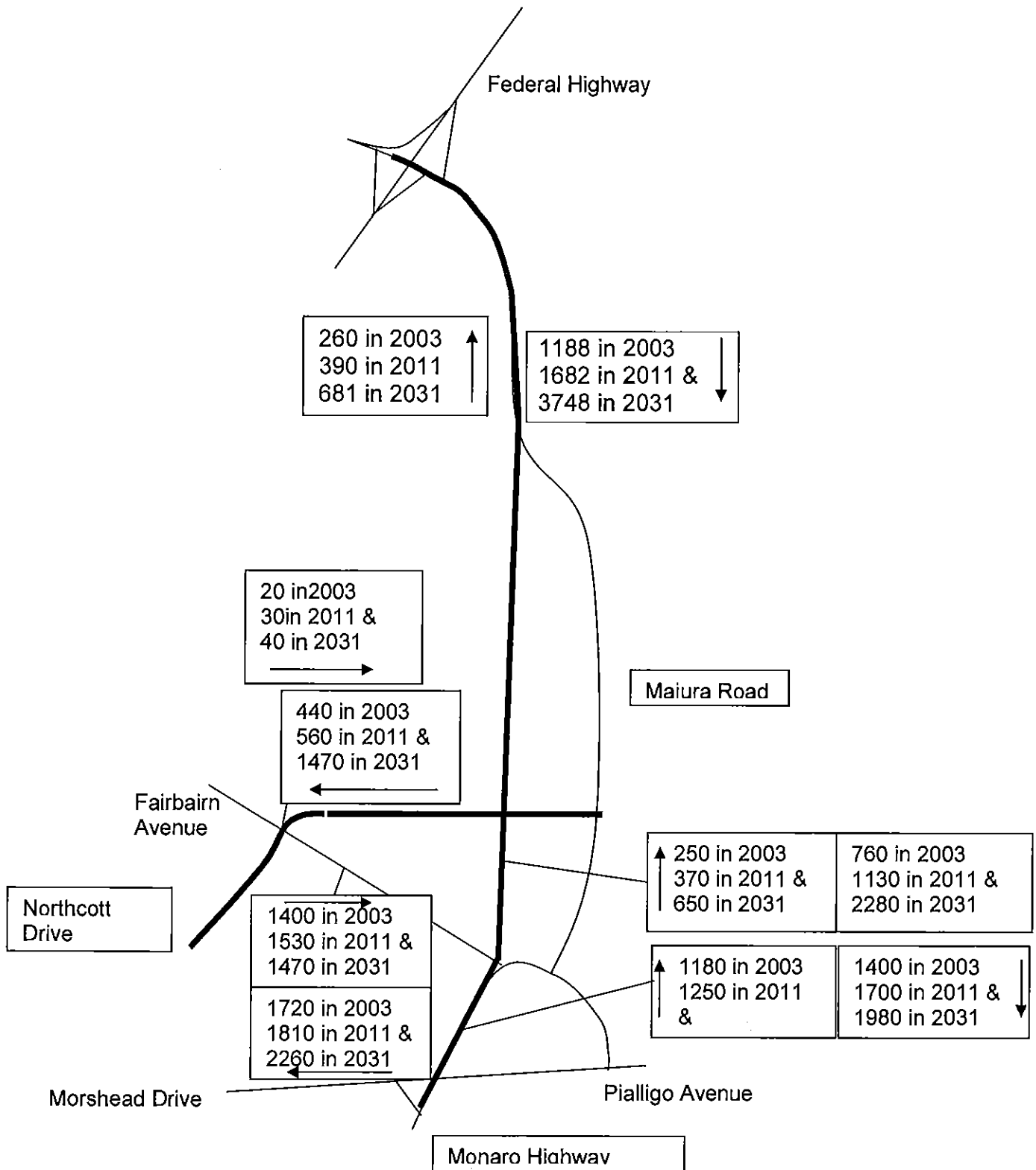
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Figure 3.3
SMEC Traffic Forecasts
AM Peak Hour Flows



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Figure 3.4
Maunsell Traffic Forecasts
AM Peak Hour



4 Development of Preferred Alignment

4 Development of Preferred Alignment

4.1 The Preferred Network Option

In the two previous studies reviewed in Chapter 3.0 a series of route alignment options for both the Majura Parkway and the associated roads of Fairbairn Avenue, Morshead Drive and Pialligo Avenue were developed and assessed for the northern and southern sections of the corridor respectively. The outcomes from these two studies were recommendations as to preferred alignments for key components of the Majura Parkway and its main connections.

Given the particular fact of the two studies their findings have both been used in the identification of the preferred alignment for the Majura Parkway system between the Federal Highway and Monaro Highway across Dairy Flat:

- For the northern section of the Majura Parkway the SMEC conclusion as to the preferred alignment has been adopted with the existing road being maintained as a local road servicing access to the local properties.
- For the southern part of the network the Maunsell study findings provide the basis for the preferred arrangement. A minor further enhancement has been adopted with the east west Link Road to provide a more clearly defined edge to the Natural Temperate Grasslands and Golden Sun Moth Reserve area.

The preferred option developed in this project to Preliminary Sketch Plan Stage (PSP) provides a network which responds to the main traffic demands with road links which conform closely to the travel desire lines: The preferred option seeks to spread the traffic loads by creating one extra major traffic route. This was done to respond more directly to traffic demands and potentially reduce the intensity of traffic thereby requiring smaller scale facilities in the short to medium term. In particular the link road provides access to the employment areas of Russell, Campbell Park as well as City East from Horse Park Drive / Federal Highway.

The preferred option was shown to be superior in terms of traffic efficiency and construction cost whilst providing the most comprehensive network catering for all traffic movements east to west and north to south.

The preferred option largely avoids environmentally sensitive areas and takes account of other constraints such as the Woolshed Creek flood plain and the preferred HST alignment.

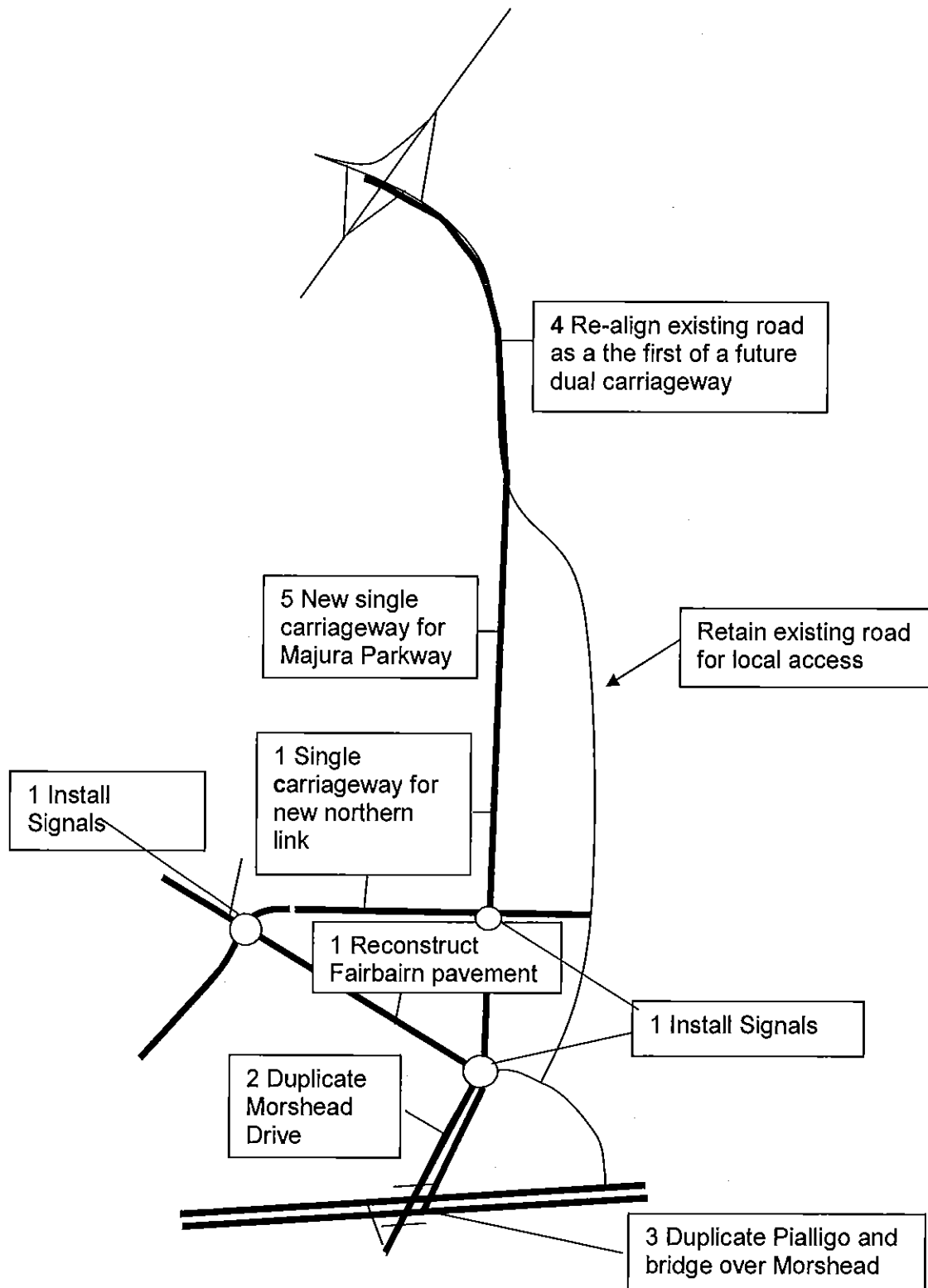
4.2 Staging

Based on the forecast traffic demands a suitable staging of the Parkway and its associated connections has been considered.

Details of the individual components of each of the main stages are described below.

4 Development of Preferred Alignment

Figure 4.2
Short Term Layout With Priority Order Indicated



4 Development of Preferred Alignment

4.2.1 Short Term Layout (completion by 2011) – see Figure 4.2

- Reconstruct two lane single carriageway Fairbairn Avenue, dependent on structural assessment. This is needed to repair the existing pavement
- Construct new two lane single carriageway northern link road from Northcott Drive to Majura Road. This link will defer the need for duplication of Fairbairn Avenue and establish the link to Northcott Drive. This link will also require a bridge across Woolshed Creek
- Construct two lane single carriageway Majura Parkway, along southbound carriageway of final dual carriageway alignment, from Federal Highway to Departure of existing Majura Road to Proposed Parkway. (May be carried out in stages as funds permit). This road will overcome the safety and capacity deficiencies of the existing road and avoid conflicts with the many access connections to properties
- Construct southbound carriageway of final dual carriageway alignment of Majura Parkway from Federal Highway to Fairbairn Avenue. (May be carried out in stages as funds permit with the section between the Highway and where the deviation from the existing corridor commences being able to be undertaken in several stages. However the link from the deviation to Fairbairn Avenue needs to be undertaken as a single project.
- Widen Morshead Drive to four lanes (two lanes in each direction) between Fairbairn Avenue and Pialligo Avenue, excluding widening / duplication of the bridge over the Molonglo River. This provides for increased traffic loadings on this route
- Duplicate Morshead Drive/Pialligo Avenue to dual carriageway and grade separate over Monaro Highway. This reduces conflicts and increases capacity to meet the demands
- Signalise intersections of Fairbairn Avenue/Majura Road and Fairbairn Avenue/Morshead Drive/Majura Parkway. This is required for safety and capacity reasons

Existing property access to all existing properties will be maintained during this phase via the under and overpasses. However the residence on block 574 will probably need to be relocated or the property resumed.

4.2.2 Medium and Long Term layout (completion by 2025) – see Figure 4.3

- Duplicate Majura Parkway between Federal Highway and Fairbairn Avenue (may be carried out in stages as funds permit).
- Duplicate Fairbairn Avenue from Majura Parkway to Anzac Parade
- Grade separate interchange at Monaro Highway/Dairy Road

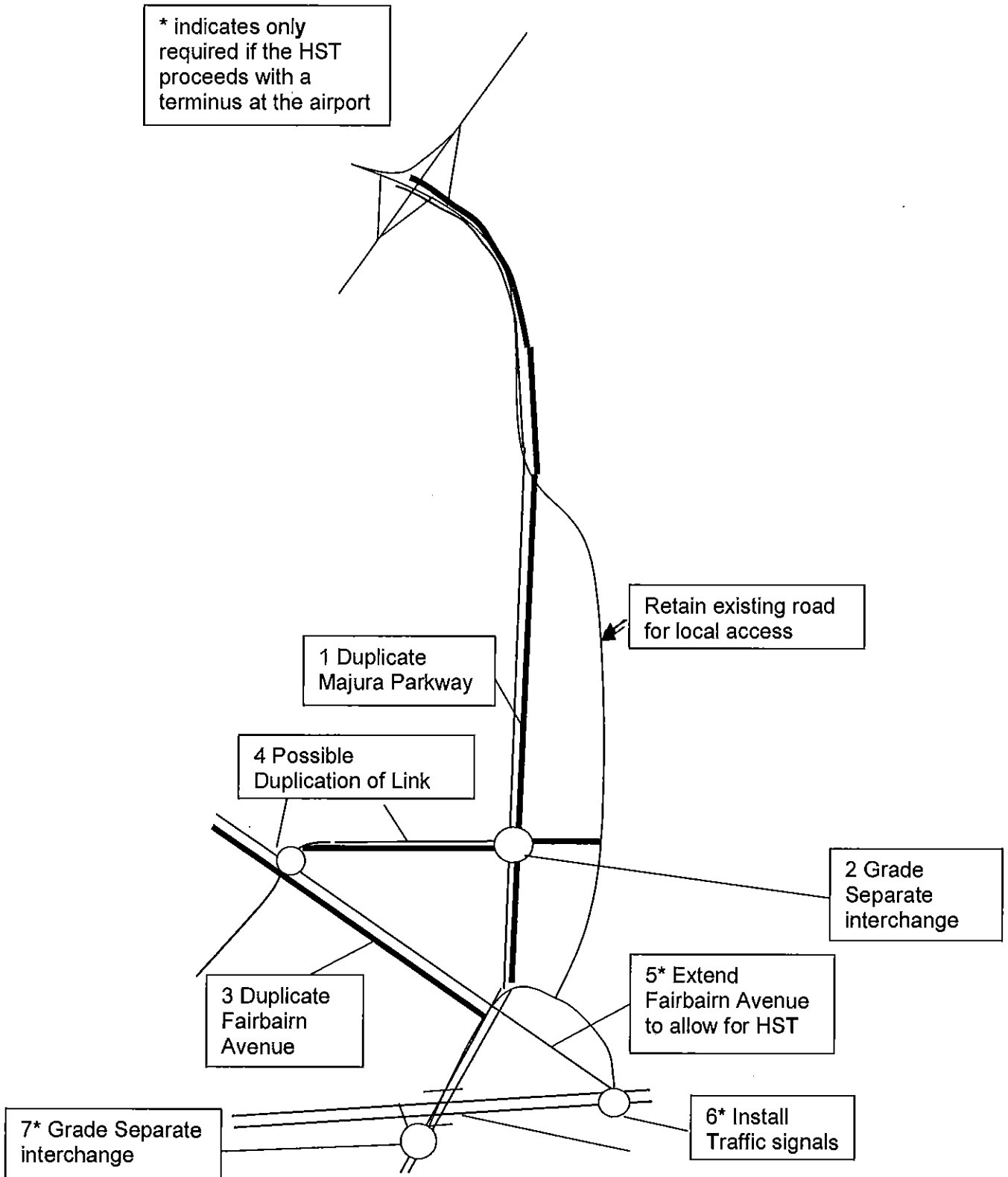
4 Development of Preferred Alignment

- Duplicate northern link road between Fairbairn Avenue and Majura Parkway.
- Construct grade separated interchange between the northern link road and Majura Parkway
- Realign Fairbairn Avenue (East) across Morshead Drive to Pialligo Avenue with a traffic signal intersection at Morshead Drive. Fairbairn Avenue closed between realignment and Majura Road. This link allows the preferred HST alignment to access the airport without crossing any roads in the south of the Majura Valley and therefore should only be implemented if the HST were to proceed.
- If the Fairbairn Avenue extension occurs install traffic signals at the intersection of Pialligo Avenue/realigned Fairbairn Avenue.

Access to all existing properties will be maintained via the existing Majura Road by the construction of under and over passes.

4 Development of Preferred Alignment

Figure 4.3
Medium and Long Term Layouts in Priority Order



4 Development of Preferred Alignment

4.3 Design Standards - Design Speed, Geometric Standards and Cross-section

4.3.1 Design Speed

Design speeds, posted speeds and geometric alignment standards would be common to the short, medium and long term layouts.

At the southern end, Morshead Drive and Majura Parkway between Monaro Highway and just north of the northern link road, due to their constrained corridor, proximity of intersections/interchanges and existing posted speeds on adjacent sections of road are proposed to have a posted speed of 80km/h with a design speed to suit viz 80 km/h.

Similarly the northern link road would be designed and sign posted as 80km/h.

Majura Parkway from just north of the northern link road to south of the Federal Highway (on the approach to the 580m horizontal radius curve), being a Parkway (freeway standard) high quality, high speed connection with ultimately controlled access, would have a posted speed of 100km/h, with a design speed of 110km/h corresponding to the topographical and environmental constraints.

The existing interchange between Majura Road (to become Majura Parkway) and the Federal Highway has been constructed to an 80km/h design speed and is proposed to be posted as such, to allow for the future signalisation of the interchange ramp intersections with Majura Parkway. In addition the future extension of Majura Parkway as Horse Park Drive through to Gungahlin is expected to be to arterial road standards and posted as 100 km/h between Wells Station Drive and the Federal Highway and 80km/h for the remainder. Consequently the approach to the Federal Highway interchange would be posted and designed for an 80km/h speed from a point on the approach to the 580m radius (from the south).

4.3.2 Geometric Standards

Geometric parameters applied to each section described above have been applied in accordance with the NSW RTA Road Design Guide and Austroads Guide to the Design of Rural Roads.

4.3.3 Cross Section

The proposed cross section of Majura Parkway, in its long term dual carriageway configuration, is split into three discreet sections from the perspective of defining the required cross-sections.

At the southern end from the Monaro Highway to Fairbairn Avenue, Ch 0 to 700, the cross section for Morshead Drive is chosen to suit the narrow road corridor available between Duntroon Oval and Duntroon Golf course, and to restrict the impact on the existing trees on either side of the existing road. A cross section of 4 x 3.5m traffic lanes (2 in each direction) and 2m shoulders with kerbing either side and with no

4 Development of Preferred Alignment

central median is proposed. This is the only section of the Monaro Highway and Majura Parkway with a median barrier. This would reflect the short section between intersections and the more developed nature of this section of road. The 2.0 m shoulder is suitable for on road cycling.

From Fairbairn Avenue to the north east the intersection with the northern link road to the northern limit of the nature reserve, Ch 700 to 4200, the Majura Parkway cross section would be that of a rural road, with no kerbing and with "over the edge" drainage to grassed roadside swale drains. To limit the combined road and high speed rail link (HST) corridor width and road impacts on the nature reserve to the west and the Woolshed Creek floodplain to the east, a cross section comprising dual carriageways of 2x 3.5m traffic lanes with 3m outer and 1m inner shoulders and a central median of 10m is proposed. Again the shoulder will be suitable for on road cycling.

In the northern section from the northern limit of the nature reserve to the Federal Highway, Ch 4200 to 11000, the Majura Parkway cross section would be similar to the preceding central section but with a wider 20m central median, reflecting the fewer land and environmental constraints along this section and consistent with median width requirements applicable to rural 100km/h roads.

The proposed cross sections are shown in Drawing Numbers 16402/TC-01 TO 16402TC-04 inclusive. These sections have been developed to achieve a uniform corridor width that allows for potential future engineering services to be installed if required.

4.3.4 Staged Cross Section

In staging the construction of Majura Road up to Parkway dual carriageway standard, initially Majura Parkway would be constructed as a single carriageway, two way road following the southbound carriageway of the long term layout. This interim cross section was chosen to share the same paved width as the long term southbound carriageway, requiring only simple changes to linemarking for the future conversion and avoiding costly widening and reconstruction. In consequence the interim single two way carriageway Majura Road cross section would be 2 x 3.5m travel lanes with 2m wide paved shoulders either side. Similar to the long term section and in keeping with the rural nature of the road this interim section would not be kerbed and would drain "over the edge" to grassed swales as appropriate. This arrangement allows for on road cycling but is less than the minimum desirable width. Given the staged nature of the road this arrangement is considered satisfactory. The desirable minimum shoulder width for on road cycling on this section of parkway is 3m. The alternative of using the existing Majura Road as the southbound carriageway and the new road as the northbound carriageway of a dual carriageway was addressed by SMEC and their conclusion that there are insufficient connections and the connections are too widely spaced to be able to be readily interpreted as a dual carriageway road. This conclusion is supported as the adoption of the carriageway pair of the existing and new road. The need to provide for peak events at the possible proposed Dragway is concurred.

This interim cross section is indicated in Drawing No 16402TC-03

4 Development of Preferred Alignment

The northern link road through to Majura Parkway, initially would comprise a single carriageway cross section of 2 x 3.5m traffic lanes with 2m paved shoulders each side, 1m wide verges and embankment slopes at a minimum 1V:4H. The southern or future eastbound carriageway has been selected to allow the boundary between the ADFA playing fields and the road to be established.

Ultimately this section may need to be upgraded to dual carriageways each comprising 2 x 3.5m travel lanes, 3m outer and 1m inner shoulders and 1m verges. Carriageways would be separated by a 5m central median depending upon the development that actually occurs in the TDMZ Zone. This section however will vary to provide for lesser batter slopes in the long term for the long term grade separated interchange linking to Fairbairn Avenue.

4.4 Footpaths, Cycleways and Equestrian Trails

Along Morshead Drive, between Monaro Highway and Fairbairn Avenue, no off road cycleway would be provided due to the restricted road corridor and need to retain some of the existing trees. On road cycling would be accommodated within the 2m wide shoulders. Footpaths could be provided within the roadside verge, aligned to avoid those trees retained at the roadside.

Along Majura Parkway and the northern link road, in both the long term dual carriageway and interim single carriageway two way road configurations it is not proposed to construct any off road footpaths or cycleways. Cyclists will be accommodated within the 3m wide outside shoulder in the long term Majura Road layout and within the 2m wide shoulders on each side of the road in the interim road layout of Majura Road and the northern link road..

Should the provision of footpaths or cycleways be required in the future there would be sufficient space within the defined road corridor to accommodate this.

There are no currently identified equestrian trails in the area and at this time it is not proposed to provide any dedicated equestrian road crossings.

4.5 Public Transport Requirements

There are no proposals for dedicated public transport facilities along the Parkway. Opportunities exist within the cross sections for the future provision of additional lanes, transit lanes or a public transport corridor within the median.

4.6 Drainage

4.6.1 Cross drainage and drainage structures

One of the main drainage issues for the project is the retention of Woolshed Creek. The 100 year flood levels of this creek are shown on Drawing 16402DM-01. The road

4 Development of Preferred Alignment

has been designed to provide a minimum of 600mm free board to the 100 year flood level.

Road culverts will be required to take stormwater run-off and creek flow from the western slopes to Woolshed Creek. Table drains would be required along the upslope, western side of the road, connecting to these culverts.

In order to minimise the impact to watercourses, a total of 16 stormwater crossing locations were identified, along with two crossings of Woolshed Creek itself. The watercourse locations were identified using a combination of current survey and topography maps at 1:100,000 scale.

Details of the sixteen stormwater sub-catchments identified are provided in Table 4.2.

Table 4-2: Stormwater Catchment Information

Sub Catchment No.	Bottom Outlet Distance (km)	Top Outlet Distance (km)	Length (km)	Area (km ²)	Top Contour (m)	Bottom Contour (m)	Mean Width (km)
1	0	5	5	3.11	830	563	0.622
2	0	1.9	1.9	0.80	690	565	0.421
3	0	2	2	0.54	730	574	0.270
4	0	1	1	0.29	610	575	0.290
5	0	2.7	2.7	1.70	740	583	0.630
6	0	2.2	2.2	1.02	780	590	0.464
7	0	1.2	1.2	0.73	720	594	0.608
8	0	1.2	1.2	0.22	720	598	0.183
9	0	0.8	0.8	0.16	700	600	0.200
10	0	1	1	0.36	700	602	0.360
11	0	1.2	1.2	0.23	830	604	0.192
12	0	1.1	1.1	0.19	800	606	0.173
13	0	1.2	1.2	0.32	840	607	0.267
14	0	1.1	1.1	0.57	870	608	0.518
15	0	0.8	0.8	0.17	750	610	0.213
16	0	1.8	1.8	0.66	850	611	0.367
17	0	0.7	0.7	0.26	700	615	0.371
18	0	1.2	1.2	0.34	750	619	0.283
19	0	0.9	0.9	0.29	710	621	0.322
20	0	0.6	0.6	0.06	700	623	0.100
21	0	0.6	0.6	0.13	700	624	0.217
22	0	0.6	0.6	0.10	710	626	0.167
23	0	0.4	0.4	0.09	690	628	0.225

Using the details provided in Table 4.2, the Time of Concentration and Intensity for a 1 in 100 year ARI flood event was determined for each catchment. These values are provided in Table 4.3.

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Table 4-3: Calculating Time of Concentration (T_c) and Intensity (I)

Sub Catchment No.	Mainstream Length (km)	Distance from Outlet (km)	Top Contour (m)	Equal Area Slope (m/km)	Equal Area Slope (m/m)
1	5	5	830	53.400	0.053
2	1.9	1.9	690	65.789	0.066
3	2	2	730	78.000	0.078
4	1	1	610	35.000	0.035
5	2.7	2.7	740	58.148	0.058
6	2.2	2.2	780	86.364	0.086
7	1.2	1.2	720	105.000	0.105
8	1.2	1.2	720	101.667	0.102
9	0.8	0.8	700	125.000	0.125
10	1	1	700	98.000	0.098
11	1.2	1.2	830	188.333	0.188
12	1.1	1.1	800	176.364	0.176
13	1.2	1.2	840	194.167	0.194
14	1.1	1.1	870	238.182	0.238
15	0.8	0.8	750	175.000	0.175
16	1.8	1.8	850	132.778	0.133
17	0.7	0.7	700	121.429	0.121
18	1.2	1.2	750	109.167	0.109
19	0.9	0.9	710	98.889	0.099
20	0.6	0.6	700	128.333	0.128
21	0.6	0.6	700	126.667	0.127
22	0.6	0.6	710	140.000	0.140
23	0.4	0.4	690	155.000	0.155

¹Notes:

$$T_c = 58L/(A^{0.2}S^{0.1})$$

Using the average storm intensities derived in Table 4.3, the flow was calculated for the catchments in both m³/s and L/s. The flow rates varied between 1.812m³/s for sub-catchment "M" to 11.324m³/s for sub-catchment "P" and are outlined in Table 4.4.

Using the calculated flows, the required pipe sizes were determined (refer to Table 4.4).

Table 4-4: Flow Calculations and Pipe Size Determination

Sub Catchment No.	Runoff Coefficient C ₁₀₀	Av Rainfall Intensity I _x ¹⁰⁰	Area (km ²)	$\frac{Q_{100}}{=0.278} \times C_{100} \times I_x \times A$ (m ³ /s)	Q ₁₀₀ (L/s)	Approx. Pipe D ¹ (mm)
1	0.335	32.925	3.110	9.536	9536	2500
2	0.335	58.976	0.800	4.394	4394	1500
3	0.335	56.706	0.540	2.852	2852	1350

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Sub Catchment No.	Runoff Coefficient C_{100}	Av Rainfall Intensity $^{100}I_x$	Area (km ²)	Q_{100} $= 0.278 \times C_{100} \times ^{100}I_x \times A$ (m ³ /s)	Q100 (L/s)	Approx. Pipe D ¹ (mm)
4	0.335	75.867	0.290	2.049	2049	1200
5	0.335	48.289	1.700	7.645	7645	2100
6	0.335	56.235	1.020	5.342	5342	1800
7	0.335	82.031	0.730	5.577	5577	1800
8	0.335	76.015	0.220	1.557	1557	1050
9	0.335	97.074	0.160	1.446	1446	1050
10	0.335	84.999	0.360	2.850	2850	1350
11	0.335	82.100	0.230	1.759	1759	1200
12	0.335	84.812	0.190	1.501	1501	1050
13	0.335	84.053	0.320	2.505	2505	1350
14	0.335	93.791	0.570	4.979	4979	1800
15	0.335	100.846	0.170	1.597	1597	1050
16	0.335	65.250	0.660	4.011	4011	1500
17	0.335	106.630	0.260	2.582	2582	1350
18	0.335	78.541	0.340	2.487	2487	1350
19	0.335	91.427	0.290	2.469	2469	1350
20	0.335	107.614	0.060	0.601	601	1050
21	0.335	112.180	0.130	1.358	1358	1050
22	0.335	111.776	0.100	1.041	1041	1050
23	0.335	138.410	0.090	1.160	1160	1050

Note: Hydraulic Gradient is assumed to be 0.4%

Notes:

$$Q_{100} = 0.278 \times C_{100} \times ^{100}I_{Tc} \times A$$

All above drainage points represent crossings of watercourses or small tributaries which link to Woolshed Creek. There are two adjacent crossings of Woolshed Creek at the location where the creek features a 180° bend. Due to the comparatively high flow of the river, the crossings would need to be either bridge structures or large culvert structures.

An alternative option and recommended in this study as the most cost effective is to re align the watercourse so that it remains on the eastern side of the proposed Majura Parkway.

The catchment areas and the proposed drainage structures required are shown on the drainage plan Drawing No 16402DM-01

Woolshed Creek is proposed to be realigned about ch 1800, 9300 and in the area of the future possible service road to NSW.

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These realignments are generally quite localised and the extent of disturbance restricted to the minimum area possible that is in keeping with the natural form of the creek. It is not proposed to line the creek over these deviations.

4.6.2 Pavement surface drainage

Pavement surface drainage will be provided by the 3% crossfall grading directly to the verge and swale drains.

The interim single carriageway Majura Parkway will ultimately form the southbound carriageway. The single carriageway will therefore be constructed with a single crossfall away from the future median. As the Majura Parkway has been designed with a minimum horizontal radius of 3000m, there is no requirement for the application of superelevation, resulting in a constant crossfall of 3% along its full length.

4.6.3 Pavement sub-soil drainage

Subsoil drains would be placed along the low side of all pavements with outlets into adjacent grassed swales at appropriate intervals.

On duplication, the added southbound carriageway would similarly have subsoil drains along the low side of this carriageway. As the proposed median is to be dished to a central grassed swale drainage channel there would be no requirement for subsoil drains on the high, median side of carriageways.

Along the northern link road, the road would fall from the centreline to each edge with subsoil drains along each edge of the pavement. At the 600m horizontal radius, superelevation would be applied. Around this curve subsoil drains would be included on the low side of the pavement only.

Sub soil drains are proposed in accordance with ACT Roads standard details.

4.7 Excavation and Earthworks

Alluvial, slopewash and colluvial soils may be removed by backhoe or excavator, or after light ripping by bulldozer or grader, can be removed by scraper. The topsoil zone to about 0.15m/0.3m depth is expected to be silty and sandy, and prone to becoming boggy in wet weather.

Canberra Formation siltstones, shales and mudstones should be diggable and rippable to greater than 5m depth, whereas volcanoclastics such as tuff and ashstone may require heavy ripping and/or rock hammering below about 2m depth. Outliers of remnant extrusive rock of the Ainslie Volcanics may be encountered (one possibly located between CH2000 and CH2500). These are highly varied in weathering, strength and therefore ease of excavation, ranging between deeply weathered, very weak rock contained boulder-sized corestones of very strong rock which should overall be diggable, to strong and very strong, massive rock which may require rock hammering or blasting.

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This preliminary design for the medium term (four lanes on the Majura Parkway without the HST) results in a cut to fill volume of 395,000 m³ and a requirement to import 195,000 m³ of additional fill. This requirement could be reduced if the fill batters were to be steepened to a ratio of 2H:1V as adopted by the RTA in rural road environments. However an increase in the batter slope will increase the scale and presence of the road in a landscape sense and also lead to increased requirement for barrier fencing along some section of fill.

~~The shortfall in fill material may be able to be sourced from the Horse Park Drive corridor.~~

4.7.1 Contaminated Sites

The only known contaminated sites at this stage is the sheep dip site identified in Chapter 3. This is not expected to be a major issue and any contamination restricted to a very small area that can be managed.

4.8 Engineering Services

Engineering services potentially affected by the various works are listed in Section 2.9. None of the services identified are expected to pose a significant constraint on the proposed works.

It will be necessary to accurately locate all services within the area of the proposed works during detailed design. Where conflicts occur, relocations, diversions or protection measures will need to be agreed with the various service authorities.

Services that may be affected include:

- ~~• Rising main sewer from Campbell Park Offices to Majura Road~~

4.9 Intersections and Interchanges

4.9.1 Majura Parkway/ Federal Highway

The three existing priority intersections which form part of this interchange would be signalised in the short to medium term with the construction of Horse Park Drive. If this is not achieved then the Federal Highway off ramp should be signalised as soon as funds permit.

4.9.2 Majura Parkway / Rifle Club Access

This intersection would be a Type B priority T intersection in the short / medium term. Upgrade to a wide median intersection on duplication of Majura Parkway in longer term.

Ultimately the connection would be removed from Majura Parkway with access to the facility provided via the new service road.

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4.9.3 Majura Parkway / Mt Majura Road

This intersection would be a Type B priority T intersection in the short / medium term. It will be upgraded to a wide median intersection on duplication of Majura Parkway in the longer term.

Ultimately the connection would be removed from Majura Parkway with access provided via the new service road. No U turn facility is proposed since there is this opportunity at the next intersection to the south.

4.9.4 Majura Parkway / Majura Road

This intersection would be a Type C priority T intersection in the short / medium term. This will be upgraded to a wide median intersection on duplication of Majura Parkway in longer term.

Ultimately Majura Road intersection would be removed from Majura Parkway and accessed via a new interchange providing service road connections, including Majura Road. The bridge at Ch 8150 is proposed at this stage to ensure that the integrity of the parkway is established with no direct property access provided.

4.9.5 Majura Road / Northern Link road

This intersection would be provided as a type C priority intersection. The intersection initially provides the connection from the existing Majura Road to Fairbairn Avenue and Northcott Drive to the west, pending the construction of Majura Parkway.

Once Majura Parkway is operational Majura Road would be downgraded to a service road. The Type C connection would remain.

4.9.6 Majura Parkway / Northern Link road

This intersection would initially be provided as a traffic signal controlled intersection with the two way single carriageway Majura Parkway.

On duplication of the Parkway the intersection would be upgraded to an expanded traffic signal intersection.

Ultimately the connection would be further upgraded to a grade separated single point diamond interchange with all connections between Majura Parkway and Northcott Road extension (Northern Link). The HST alignment passes very close to this intersection and an extension of the bridge over the parkway is required to pass over the HST alignment. The ramps on the eastern side of the interchange are likely to require construction from reinforced earth.

4.9.7 Majura Road / Fairbairn Avenue

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In the short term traffic signals would be installed. Observations show that the intersection is currently operating at close to capacity because of the large gaps required by large commercial vehicles. Signals should be installed prior to the opening of Horse Park Drive.

4.9.8 Majura Parkway / Morshead Drive / Fairbairn Avenue

In the short term, prior to construction of Majura Parkway the existing intersection of Morshead Drive and Fairbairn Avenue would be signalised. The intersection is approaching capacity especially for sufficient gaps for large commercial vehicles leading to the conclusion that the intersection should be signalised in advance to the construction of the link road. The Majura Parkway leg of the intersection would be added during construction of the Parkway.

In the long term, following the construction of the HST, the realignment of Fairbairn Avenue will be required, a new traffic signal controlled intersection between Morshead Drive / Fairbairn Avenue / Majura Parkway would be constructed and the short term intersection removed on the closure of the redundant section of Fairbairn Avenue. Following completion of Majura Parkway as a dual carriageway, the realigned Fairbairn Avenue would be grade separated, passing over Morshead Drive. Connections with Morshead Drive and Majura Parkway would be lost with the removal of the traffic signal intersection. This is only likely to occur if the HST is constructed.

4.9.9 Morshead Drive / Pialligo Avenue / Monaro Highway

In the short term the existing roundabout and connections to Morshead Drive and Monaro highway would be retained with Pialligo Avenue grade separated, with Pialligo Avenue passing over Monaro Highway / Morshead Drive with a single lane in each direction to provide for through movements along Morshead Drive.

In the medium term when the roundabout capacity is exceeded it will need to be removed with the connection to Monaro Highway / Majura Parkway via Dairy Road.

4.9.10 Pialligo Avenue / Fairbairn Avenue / Beltana Road

In the long term, on realignment of Fairbairn Avenue resulting from the HST, the existing roundabout would be removed to be replaced with a signal controlled intersection.

4.9.11 Monaro Highway / Dairy Road

In the long term construct a full movement partial cloverleaf grade separated interchange between Dairy Road and Monaro Highway is provided. However this may not be required if the capacity of the roundabout Piailigo Avenue / Monaro Highway is not exceeded.

Access to the existing water ski / recreation area would be via a left in left out arrangement.

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4.9.12 Fairbairn Avenue / Northern link road

In the short term, when the northern link road to Majura Road is constructed, construct a new signal controlled intersection on Fairbairn Avenue. The existing section between Northcott Drive and the existing roundabout should be removed. The Roundabout at Campbell Park may also be able to be removed, however the requirements for Fairbairn Avenue are currently the subject of another study.

In the long term, when Fairbairn Avenue is duplicated to Anzac Parade, upgrade the signals to include the duplication.

4.9.13 Intersection Performance

The performance of each of the intersection has been assessed previously in the Maunsell report. The results of this analysis are presented in Appendix A

4.10 Bridges and Underpasses.

In the short and medium term two main bridges are required. The first is the grade separation of Pialligo Avenue / Morshead Drive/ Monaro Highway where the overbridge will comprise simple super Tees of 1750 depth and a 200 mm deck. Reinforced earth walls will support the approaches to the bridge. Details of the bridge are shown on Drawing 16402GA-B1

In the short / medium term the roundabout will remain in operation under the bridge. In the long term there will be a need for removal of the roundabout on capacity grounds and traffic between Pialligo Avenue/ Fairbairn Avenue and the Majura parkway will be required to use either the Dairy Road / Monaro Highway interchange or the Fairbairn Avenue link to Majura Parkway interchange.

Footings for bridge and underpass and culvert structures can consist of shallow spread footings founding on alluvial soils or bedrock (where shallow), or bored piers founding through deeper alluvial soils to the bedrock. Indicative allowable bearing pressures for spread footings are 150kPa in alluvium and 600 kPa in weathered sedimentary or volcanic rock. Higher values would apply to bored pier footings, typically 750 kPa in weathered rock, and 1500kPa in moderately weathered or less weathered, strong rock. These parameters would be confirmed following on site geotechnical investigations.

The proposal for the new bridge over Woolshed Creek is shown on Drawing No 16402-GA-B2.

The main unresolved bridge design issue at this preliminary stage is that relating to the detailed sub structure of the bridge widening over Woolshed Creek and, in particular, the method of protecting the fossils existing under the existing bridge. This detail will be resolved in the next stage of design.

There are two other bridges proposed for the project at chainages 7460 and 8170. These bridges are shown on Drawings 16404 GA B3 and 16402 GA-b4 respectively.

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A new bridge is also proposed for the Northern Link Road across Woolshed Creek.

Property access underpasses are proposed and in the northern area these are proposed to be widened to not only provide for vehicular traffic but also to encourage and provide for wildlife crossings. The underpasses have therefore been lengthened to allow for a vegetated corridor to be constructed alongside the vehicular underpass. Fences will direct wild life to these crossing points. The proposal for these underpasses is shown on Drawing No 16402 GA –UP1

4.11 Landscape Design

The following proposals seek to ensure the ' best fit ' of the proposed roadway into the landscape. As for the Existing Character units described in Clause 2.10 this is best described through the character units outlined below. The road proposal envisages that the median treatments will be dry grassing except where the width is too narrow such as from Pialligo Avenue to Fairbairn avenue where no landscaping treatment is proposed.

4.11.1 Unit A Monaro Highway to Fairbairn Avenue

The largest impact in this section will be where the roadworks remove the existing conifers adjacent to the RMC touch football fields between Moreshead Drive and Fairbairn Avenue. This planting should be reinstated in keeping with the landscape character of the area to afford protection to the fields and balance the plantings along the edge of the historic RMC Oval No 1. The plantings proposed would be a mixture of conifers and deciduous trees.

4.11.2 Unit B Fairbairn Avenue to Chainage 6000

The proposed alignment cuts directly through a small knoll on the edge of Woolshed Creek. Earthworks in this area should aim to minimise the impact of this cutting with sensitive shaping. Additional planting will be require to screen the exposed outbuidings associated with the house located on Fairbairn Avenue immediately west of the intersection with the Monaro Highway extension.

Beyond this the road alignment traverses open grassland where the impact will be extensive. To minimise this all road batters should be laid back at a minimum of 1 : 8 and preferably 1 : 10 to ensure they at least attempt to tie into the surrounding landscape. No panting is envisaged in this area. The Northcott Drive extension will be similar except for where it cuts through an area of quality woodland prior to crossing Fairbairn Avenue. Tree loss should be kept to minimum in this area. The only planting envisaged in this area would be isolated planting of native tree species along Woolshed Creek to afford protection to existing houses and along road side batters to reinstate severed plantations.

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4.11.3 Unit C Chainage 6000 to 8000

Where the road passes through the pine plantation trees will need to be removed to construct road batters. Supplementary planting of pines will be required (if the pines are considered a long term option) once the edges have been exposed within the existing plantation.

4.11.4 Unit D Chainage 8000 to The Federal Highway

Having passed through the pines the proposed alignment merges with the existing alignment where the road-side trees are the highest quality along the entire route. Every effort should be made to retain these trees wherever possible. The existing woodland to the east should be supplemented with additional planting to reduce the impact of the proposed underpass and screen the Rifle Range and associated facilities.

4.11.5 Tree Removal.

At this stage the alignment has not been pegged for a site inspection and therefore the extent of tree removal has not been ascertained. The plans overlain on the aerial photos do however show those trees that are likely to be affected by the proposal and will need removal

4.12 Land Use and Lease Boundaries

The proposal locates the parkway as close as practical to the grasslands reserve and thus will generally provide a natural edge to the existing leases. The effects of each lease are briefly listed in Table 4.1.

Table 4.1 Impacts on Lease Boundaries

Leasee	Block	Impacts
Girl Guides	555	Access retrained from Majura Road, Guides likely to oppose proposal on noise access and trees
ACT Forrests	165, 171, 586, 620, 621	Proposed road will sever the pine plantations. May be significant enough for the plantation to be closed
Craig Hall	48	Block currently severed by existing road. Lease expires in 2005. Hill behind property is home to Kangaroo mob.
DOFA	622	Old Police driver training centre. Access maintained but DoFA are likely to demand access to Parkway
Majura Vinyards	666	Seeking tourist access to site. Existing bore would be segregated from property with proposal
Gavin McArdle English	571, 670, 567	No significant issues
Julie and Warwick Bailie	574	

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Jean Underwood	36	Residence likely to require relocation or the property resumed.
ACT Housing	556	House likely to require demolition with preferred alignment. Grave could be relocated to another site
Trevor Brogan	51	No Impacts
Nicholas Weber and Anne McGrath	59	Block will be cut by proposal.
Sporting shooters Association	561, 559, 562, 559	No impact on lease boundaries etc

Note that consultation with other potentially affected leaseholders is required to complete this table

4.13 Fencing

Fencing is a critical element to the project from both road safety and fauna protection perspectives.

It is known that there are two colonies of Kangaroos that cross Majura Road in the Northern Section. There is therefore a need to provide for kangaroo crossings in this area and to control these locations. In the event of an accident involving a kangaroo the road safety need to control movements is one that could have reasonable be foreseen and therefore to exclude this would place the Territory at risk of claims should it not be installed on a new facility.

It is proposed to install kangaroo fencing for the 5 Km section to the immediate south of the Federal Highway and for an overpass at chainage 8200 to provide an opportunity for them to safely cross with the aid of kangaroo fencing. This strategy has been discussed with David Shorthouse who agrees with the general approach.

The precise locations of the fencing extent will be determined following the flora and fauna field surveys planned for after the receipt of comments on the proposal by ACT government agencies

It is understood that kangaroos soon learn the location of access routes and that there are no ecological issues with this proposal.

The remainder of the road is proposed to be fenced with stock fencing adjacent to the reserves. However adjacent to the ADFA playing fields it is proposed to install a 1.8 m fence to reduce the likelihood of pedestrians running onto the road.

4.14 Road Lighting

Existing roads being upgraded and where already served by road lighting, will have their lighting installations upgraded to maintain their appropriate level of illumination. All intersections will continue to be lit.

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Majura Parkway as a single carriageway road or when duplicated would not be lit between the northern link road and the approach to the Federal Highway. The immediate approach to the Federal Highway interchange would be remain as currently lit.

Majura Parkway between Fairbairn Avenue and the northern link road would be lit in both its interim single carriageway and dual carriageway configurations due to the proximity of adjacent intersections.

New intersections and interchanges along the length of Majura Parkway would be lit to category V3 of AS/NZS 1158

The northern link road would not be lit between the intersections with Fairbairn Avenue and Majura Road.

Suitable electricity supply connection points for the road lighting installations would be determined during detailed design.

4.15 Pavement Design

Several options for the pavement design have been investigated during this preliminary design stage. These options are preliminary only and have been undertaken using a desk top geotechnical review. These findings may change following filed investigations. Detailed field investigations have not been conducted for this stage as this will occur for each section during detailed design. In all twelve pavement options have been assessed in this study.

Preliminary data used in pavement designs are summarised in Table 4.5.

A design subgrade CBR of 5% has been used for preliminary pavement designs. This value is appropriate for in-situ alluvial subgrades and for engineered fill constructed of these soils. Higher subgrade CBR values may be appropriate for in-situ gravelly colluvial soils and bedrock subgrades (6% to 15%), and for compacted fill of these materials (6% to 10%) CBR values for detail design would be confirmed following the carrying out of on site geotechnical investigations.

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Table 4.5 - Pavement Design Data

Road Design Speed (kph)	Travel Speed used in pavement design (kph)	Design Life (Years)	Design Traffic (ESAs) ¹	Design Subgrade CBR (%) ²
100	80	25	1.77 x 10 ⁷	5

1 A design reliability factor of 1 has been used in the designs

2 A working platform of CBR 15 has been used in the designs.

4.15.1 Materials

Asphalt

Dense graded asphalt with class 320 bitumen binder has been used for all structural asphalt throughout the design and a high bitumen content asphalt fatigue layer was incorporated into the designs where applicable. Design was carried out in accordance with the Austroads Guide to the Structural Design of Road Pavements (1992) and RTA Form 76.

The asphalt mixes used in all the pavement designs were as shown in Table 4.6:-

Table 4.6 Design Asphalt Mixes

Course	Materials
Wearing surface	40mm AC14 with 10% by volume Class 320 bitumen content
Base asphalt	AC20 with 10% by volume Class 320 bitumen content.
Base asphalt	AC28 with 10% by volume Class 320 bitumen content
High Bitumen asphalt layer	AC20 with 13.5% by volume Class 320 bitumen content

Unbound Granular Materials

For all pavements the selected subgrade layer has been considered as an unbound granular layer with a CBR value of 15% (vertical modulus 150 MPa). Various thicknesses of this layer have been considered in the designs.

RTA Technical Direction 99/7 of 2nd July 1999 recommends "The selected material zone consists of material with a 10 day soaked CBR of at least 10% (15% is preferred) and with a minimum thickness of 300mm. When the CBR is less than 30%, the top 150mm is to be modified with a suitable binder, preferably 2% lime."

Although the above instruction only refers to cuttings, it is considered sound practice to apply it to all situations, particularly over relatively soft subgrades, as it provides a uniform working platform for construction and also a sound layer on which to compact the structural asphalt and cemented base materials. Designs have therefore been prepared with select layer thicknesses of 300mm, 200mm and 150mm.

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Cemented Materials

Where cemented materials have been used a modulus value of 5,000MPa and a Poisson's Ratio of 0.2 have been used. This corresponds to a heavily bound material with about 4-5% cementing agent.

Design Calculations

The pavements were analysed using CIRCLY Version 4.

4.15.2 Full Depth Asphalt

The results of these analyses for full depth asphalt pavements are summarised in Table 4.7.

Table 4.7 - Majura Drive – Full Depth Asphalt Design Summary of Design Thicknesses

Pavement Layer	Thickness (mm)		
	Full Depth Asphalt Option 1	Full Depth Asphalt Option 2	Full Depth Asphalt Option 3
Wearing surface AC14	45		
Base layer AC20	100	95	90
Fatigue layer AC20 Hibit	60		
Working Platform CBR 15	150	200	300
Asphalt Thickness	205 mm	200 mm	195 mm

- No AC28 base layer was incorporated into the pavement designs as the design thicknesses were less than the recommended minimum construction layer thickness. As AC20 is generally easier to place with less risk of segregation than AC28, improved integrity of the pavement structure should occur

All designs satisfy the RTA requirement (RTA Technology Directorate Direction 95/5) that the asphalt fatigue layer is covered with at least 125mm of structural asphalt.

4.15.3 Composite Pavement (Asphalt on Cemented)

Composite pavement designs are summarised in Table 4.8.

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Table 4.8 – Composite Pavement Options (150mm asphalt).

Pavement Layer	Thickness (mm)		
	Composite Pavement Option 1	Composite Pavement Option 2	Composite Pavement Option 3
Wearing surface AC14	45		
Base layer 2 AC20	105		
Cemented Layer 5,000 MPa	195		190
Working Platform CBR 15	150	200	300

- These designs satisfy the RTA criteria (RTA Technical Director 96/15) that a minimum thickness of 150mm of dense graded asphalt over cemented sub-base is recommended for heavy duty applications ($>10^7$ ESAs) to limit the reflection of cracks from the sub-base. However, where a free draining sub-base, such as slag has been used, this thickness may be reduced where local experience has indicated that a lower thickness is acceptable.

It is understood that composite pavements have been successfully constructed in Canberra with less than 150mm of asphalt so further alternative composite pavement designs for 100mm asphalt thickness have been produced for consideration and are summarised in Table 4.9.

Table 4.9 – Composite Pavement Options (100mm asphalt)

Pavement Layer	Thickness (mm)		
	Composite Pavement Option 1	Composite Pavement Option 2	Composite Pavement Option 3
Wearing surface AC14	45		
Base layer 2 AC20	55		
Cemented Layer 5,000 MPa ¹	240	235	230
Working Platform CBR 15	150	200	300

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1. If these designs are adopted the cemented layer should be compacted as a single layer to minimise the chance of delamination which can lead to very significant loss of load bearing capacity.

4.15.4 Unbound Granular Pavement

Unbound granular pavement options are summarised in Table 4.10. All pavements were designed on the assumption that modified compaction is achieved in all pavement layers.

Table 4.10 – Unbound Granular Pavement Options

Pavement Layer	Thickness (mm)		
	Unbound Granular Pavement Option 1	Unbound Granular Pavement Option 2 ³	Unbound Granular Pavement Option 3
Wearing surface Prime + double/double sprayed seal	✓	✓	✓
Granular Base thickness compacted to 100% Modified Density	225 ¹	225 ¹	225 ¹
Granular Subbase thickness compacted to 100% Modified Density	115	100 ²	0
Working Platform CBR 15	150	200	300

1. Minimum recommended base thickness for design traffic
2. Minimum practical construction thickness
3. An alternative pavement composition would be 290mm base and 0mm subbase

4.15.5 Comparison of Pavement Type

Full Depth Asphalt

- Has been widely used in Canberra and elsewhere with good long term performance
- Relatively easy to construct by competent contractor, no curing requirements
- If well constructed should have low routine maintenance requirements
- Rehabilitation is usually straightforward by resurfacing
- Relatively impermeable so not sensitive to moisture unless poorly constructed

4 Development of Preferred Alignment

Composite Pavement

- Has been used successfully as a heavy duty pavement with good long term performance, particularly where 150mm of asphalt has been used
- Not difficult to construct by competent contractor but there are curing issues for the cemented layer, particularly at low temperatures when rate of strength gain is low
- Is sensitive to overloading in early life
- If there are materials related problems with the cemented material, it is often costly to fix
- Maybe sensitive to moisture ingress if cemented layer cracks

Unbound Granular Pavement

- Has been successfully used in similar situation but requires good control of materials and construction practices to achieve good long term performance
- Is difficult to get good long term performance from an asphalt wearing surface (if used) because of the relatively low stiffness of the granular materials, hence sprayed seal wearing surface preferred
- Highest routine maintenance cost of alternatives considered.
- Can be insitu stabilised to upgrade pavement strength in the future.
- Sensitive to moisture ingress

4.16 TCD Plans

The general arrangement for the proposed short / medium term traffic control devices are shown on the design Drawing Nos 16402 SP-01 - SP 09 inclusive for the interim design and on 16402 - SPU -01 - SPU-09 for the long term design. TCD plans for the individual stages will be prepared during the detailed design stage.

5 Cost Estimates, Staging and Economics

5 Cost Estimates, Staging and Economics

5.1 Cost Estimates

Relatively detailed cost estimates have been prepared for the medium / long term development that provides for a duplicated Majura Parkway but without the infrastructure costs associated with the HST. No cost estimates have been prepared for the long term (post HST) solution.

The summary of these interim design estimates for each section are as shown in Table 5.1:

Table 5.1 Project Cost Estimates (excluding project management, design and construction supervision fees)

SECTION	Estimated Cost Interim Design \$m
Majura Pky from Pialigo Ave to Fairbairn Ave	\$2.3
Fairbairn Ave	\$3.0
Link Rd, north of Majura Pky	\$4.5
Majura Pky from Fairbairn Ave to Link Rd	\$5.1
Link Rd Majura Pky to Majura Rd	\$2.2
Majura Pky from Link Rd to access road to Majura Rd	\$38.3
Majura Pky from Majura Rd to Federal Hwy	\$10.3
Pialigo Ave/Morshead Dr Overpass	\$4.4
TOTAL COST (\$)	\$70.1

Note that the sub items exclude land acquisition costs however the total does include these costs

Details of this estimate are provided in Table 5.5 at the end of this section. Note that to avoid duplication of program items this estimate excludes items currently being undertaken as part of the Majura Road Safety Improvements project such as the intersection of Majura Road / Fairbairn Avenue and the Majura Road pavement rehabilitation.

5.2 Staging

The proposed staging developed from the as earlier discussion is as follows:

5.2.1 Stage 1 (completion by 2005)

These stages are listed in priority order

- 1 Duplicate Morshead Drive between Monaro Highway and Fairbairn Avenue excluding duplication of the bridge over the Molonglo River Indicative Cost \$5.13m
- 2 Construct new intersection and approaches for Fairbairn Avenue / Majura Road Not costed refer to SMEC proposal with cost estimate of \$0.94m
- 3 Install signals at Fairbairn Avenue / Morshead Drive \$0.2m

5 Cost Estimates, Staging and Economics

- 4 Construct two lane single carriageway Majura Parkway from Fairbairn Avenue to approximately 4km south of the federal Highway \$31m
- 5 Construct new northern link road, from Northcott Drive to Majura Road \$6.2
- 6 Signalise the new intersection Northern Link Road / Majura Parkway \$0.4m
- 7 Duplicate Morshead Drive / Pialligo Avenue to dual carriageway and grade separate over Monaro Highway with a single lane in each direction. \$4.43m

5.2.2 Medium Term Stage 2 (completion by 2011)

- 1 Construct two lane single carriageway Majura Parkway from Federal Highway to tie in to existing Majura Road, approximately 4km to the south \$6.1m
(Note SMEC estimate of \$8.9m appears high)
- 2 Reconstruct / re align Federal Highway to the above section. Not included.

5.2.3 Long Term Stage 3 (completion by 2020)

- 1 Duplicate Majura Parkway between Federal Highway and Fairbairn Avenue (may be carried out in stages as funds permit) \$18.63
- 2 Possibly duplicate link to northern airport precinct. The scale of this link is dependent on future development of this area. Not costed.

5.2.4 Ultimate Stage 4 (completion post HST)

- 1 Possibly duplicate the northern link road between Fairbairn Avenue and Majura Parkway depending upon land use demands in the Majura precinct. Not costed
- 2 Construct grade separated interchange at the northern link road / Majura Parkway Not costed
- 3 Realign Fairbairn Avenue across Morshead Drive to Pialligo Avenue with a traffic signal intersection at Morshead Drive. The remnant section of Fairbairn Avenue would be disconnected from Morshead Drive and Pialligo Avenue. This realignment is dependant upon and allows the preferred VHSR alignment to access the airport without crossing any roads in the south of the Majura Valley. Not costed
- 4 Install signals at the intersection of Pialligo Avenue and the realigned Fairbairn Avenue. Not costed
- 5 Grade separate the Dairy Road / Monaro Highway / Morshead Drive link. Not costed
- 6 Duplicate / widen the Molonglo River Bridge Not costed

5.3 Economic Analysis of Project

The project has assumed that there will be several stages during construction. The analysis undertaken for the planning study has been represented here to demonstrate the benefits of the whole project including the upgrading of Fairbairn Avenue for the intermediate stage of the project. The timing for the long term requirement for full grade separation is not able to be determined at this stage as it depends to a large extent upon the development proposals for the Majura Valley. The results are shown in Table 5.2

5 Cost Estimates, Staging and Economics

Table 5.2 Economic Evaluation of Preferred Staging Option

Performance Indicator	Discount Rate		
	4%	7%	10%
PV Costs \$m	-25,414	-19,143	-15,014
PV Benefits \$m	381,869	233,765	151,622
NPV \$m	356,455	\$214,622	136,608
BCR	15.03	12.2	10.1

These results show that there are substantial benefits from implementing the project. It is clear that for the project to not be worthwhile either the construction cost estimates need to be either significantly underestimated or the benefits significantly overstated. The clear reason for the project returning such an enormous benefit is the expected continued growth of Gungahlin and the need for efficient transport links out of this growing town. The capital cost estimates have increased by 25% since this initial estimate which result in the BCR decreasing to 75% of the above stated values. Nevertheless this still represents outstanding results for the project.

5.4 Economic Analysis of Pavement

An economic analysis has been undertaken for each of the twelve preliminary pavement designs. It should be noted that these pavement designs have been prepared on the basis of estimated field CBR's and that their composition may change following field testing of subsurface conditions. It should also be noted that the design may change depending upon the availability of suitable platform materials at CBR 15

Nevertheless the estimated whole of life costs are shown in Table 5.3 below to provide an indication of the likely range of whole of life pavement costs.

Table 5.3 Whole of Life Pavement Cost Comparison

Rate	Option No											
	1	2	3	4	5	6	7	8	9	10	11	12
4%	\$68.42	\$69.77	\$73.33	\$75.45	\$77.85	\$82.29	\$55.59	\$57.60	\$62.02	\$66.48	\$59.78	\$64.59
7%	\$63.10	\$64.41	\$67.86	\$69.37	\$71.71	\$76.02	\$50.08	\$52.02	\$56.32	\$55.04	\$50.53	\$55.20
10%	\$59.36	\$60.63	\$63.99	\$64.91	\$67.19	\$71.38	\$46.14	\$48.03	\$52.22	\$48.03	\$44.91	\$49.46

The indications are that the most likely pavement option is a composite bound pavement. For the purposes of this preliminary design we have assumed a whole of life cost of \$70/m² or an initial pavement cost of \$43/m².

5.5 Temporary Traffic Management

Construction of the various elements of the project is expected to occur as shown in Table 5.4:

5 Cost Estimates, Staging and Economics

Table 5.4 Temporary Traffic Management

Element	Method	Comment
Pialligo Avenue bridge over Monaro Highway	Widen Morshead Drive and Pialligo Avenue on the northern side as a side track and construct reinforced earth wall and bridges under traffic retaining one lane in each direction.	
Duplication of Morshead Drive Pialigo Avenue to Fairbairn Avenue	Construct side track closest to Duntroon oval and widen on Duntroon side of road. Upon completion of this section switch traffic to new works and construct on Old Duntroon Oval side.	Care required to protect trees and preserve Duntroon Oval
New Link Road	Construct new intersection with Fairbairn Avenue under traffic. Otherwise green field construction	Green field construction protection to reserve required
New section of Majura Parkway	Green field construction Tie in on one side of existing road only	
Existing section of north Majura Road	Rehabilitation done under traffic as per SMEC design. New carriageway adjacent to existing able to be constructed with minimum interference to existing traffic.	

Table 1

SECTION	Majura Pky from Pialigo Ave to Fairbairn Ave	Fairbairn Ave	Link Rd, north of Majura Pky	Majura Pky from Fairbairn Ave to Link Rd	Link Rd Majura Pky to Majura Rd	Majura Pky from Link Rd to access road to Majura Rd	Majura Pky from Majura Rd to Federal Hwy	Pialigo Ave/Morshead Dr Overpass	Sub Total	Rate per item (\$)	TOTAL COST (\$)
LENGTH (m)	440	400	1,460	880	700	6,940	1,730	390	12,940	N/A	N/A
EARTHWORKS											
Clearing and Grubbing	110	100	360	210	170	1,690	420	90	3,150	\$5,000	\$15,752,009
Topsoil Removal	110	100	360	210	170	1,690	420	90	3,150	\$0.30	\$945
Trees Removal (per fire)	25	20	25	0	0	15	900	30	1,015	\$200	\$203,000
Cut to Fill (m ³)	975	30,000	10,066	9,046	5,000	311,516	17,898	0	384,501	\$9	\$3,460,509
Fill Shortfall (m ³)	800	2,688	1,238	29,240	2,688	139,722	18,221	0	194,597	\$19	\$3,697,343
UNDERGROUND SERVICES											
Culverts size	0	0	0	3,200	0	15,000	15,000	0	33,200	\$1	\$0
Endwalls (each)	0	0	0	8	0	30	48	0	86	\$1,000	\$86,000
Subsoil Drainage (m ²)	714	649	2,369	1,428	1,136	11,263	2,808	633	21,000	\$20	\$420,000
Utilities (approx)	\$17,002	\$15,456	\$56,414	\$34,003	\$27,048	\$268,161	\$66,847	\$15,070	500,000	\$1	\$500,000
PAVEMENT CONSTRUCTION											
Pavement (m ²)	9,680	8,800	14,600	19,360	7,700	152,680	38,060	17,600	268,480	\$65	\$17,451,200
Kerb and Gutter (m)	880	800	800	1,760	800	800	800	800	7,440	\$36	\$267,840
STRUCTURES											
Bridge Type A (m)	0	0	0	0	0	1,420	0	0	1,420	\$1,000	\$1,420,000
Bridge Type B	0	361	0	0	0	1,043	0	803	2,206	\$1,500	\$3,309,000
Retaining Wall (m)	0	0	0	0	0	0	0	4,240	4,240	\$75	\$318,000

5 Cost Estimates, Staging and Economics

SECTION	Majura Pky from Pialigo Ave to Fairbairn Ave	Fairbairn Ave	Link Rd, north of Majura Pky	Majura Pky from Fairbairn Ave to Link Rd	Link Rd Majura Pky to access Majura Rd road to Majura Rd	Majura Pky from Link Rd to Majura Rd from Federal Hwy	Pialigo Ave/Morshead Dr Overpass	Sub Total	Rate per TOTAL item (\$) COST (\$)
Dam Relocation (each)	0	0	0	1	0	0	0	1	\$10,000 \$10,000
River Relocation (m)	0	0	0	0	0	9,900	0	9,900	\$9 \$89,100
FENCING AND GUARDRAILS									
Fencing Stock (m)	220	200	730	440	350	3,470	865	6,275	\$9 \$56,475
Chain	220	200	730	440	350	3,470	865	6,275	\$10 \$62,750
Guardrails (m)	0	0	0	200	0	1,200	3,200	4,600	\$110 \$506,000
Pavement Marking Lane (m)	880	800	2,920	1,760	1,400	13,880	3,460	25,880	\$2 \$51,760
Edge	1,760	1,600	5,840	3,520	2,800	27,760	6,920	51,760	\$1 \$51,760
Merge	170	160	560	340	270	2,680	670	5,001	\$6 \$30,003
Barrier	170	160	560	340	270	2,680	670	5,001	\$1 \$5,001
Signage Standard (per sign)	8	8	8	8	8	26	26	100	\$500 \$50,000
Guide	2	1	1	1	1	2	2	12	\$1,500 \$18,000
SIGNALS (per signal)	0	1	2	0	0	0	0	3	\$150,000 \$450,000
LIGHTING (per light)	22	20	0	44	8	0	0	114	\$4,500 \$513,000
LANDSCAPING									
Topsoil (m ²)	22,500	0	0	30,000	0	40,000	122,500	215,000	\$0.60 \$129,000
Grass (m ²)	22,500	0	0	30,000	0	40,000	122,500	215,000	\$0.90 \$193,500

5 Cost Estimates, Staging and Economics

SECTION	Majura Pky from Prialigo Ave to Fairbairn Ave	Fairbairn Ave to Majura Pky	Link Rd, north of Majura Pky	Majura Pky from Fairbairn Ave to Link Rd	Link Rd Majura Pky to Majura Rd	Majura Pky from Link Rd to access road to Majura Rd	Majura Pky from Majura Rd to Federal Hwy	Prialigo Ave/Morshead Dr Overpass	Sub Total	Rate per item (\$)	TOTAL COST (\$)
Shrubs (per strub)	11,250	0	0	15,000	0	20,000	61,250	0	107,500	\$15	\$1,612,500
Trees (per tree)	2,250	0	0	3,000	0	4,000	12,250	0	21,500	\$50	\$1,075,000
ease Withdrawal	0	0	6	3	4	12	7	0			
SECTION COST (\$)	\$1,701,063	\$2,248,716	\$3,335,789	\$3,755,844	\$1,582,849	\$28,325,092	\$7,594,067	\$3,279,475	N/A	N/A	\$51,789,695
PLUS CONTINGENCY (20% plus Preliminaries (8% Plus Design, project management (5%	\$2,296,435	\$3,035,767	\$4,533,315	\$5,085,389	\$2,156,846	\$38,298,875	\$10,286,990	\$4,427,291	N/A	N/A	\$70,120,908

6 Impacts Of Proposal

6 Impacts Of Proposal

6.1 Introduction

At this stage the impacts have been identified for those areas where sufficient information is currently available. Detailed data collection and analysis of flora and fauna, heritage etc will be undertaken once agreement to the alignment has been obtained in order to allow the route to be pegged and the issues more able to be clearly identified. At this stage the route has not been inspected on site and all observations are from a desk top study only.

6.2 Cultural and Heritage Impacts

There are virtually no cultural or heritage impacts of this project. The impacts that do occur will be fully addressed in the Preliminary Assessment that will be prepared on the basis of this preliminary design

6.2.1 Flora and Fauna Impacts

The proposed road will lie outside of the reserve areas and will form a boundary between the leases and the reserves.

Approximately 105 trees will need to be removed plus approximately 900 plantation trees. The exact impact on the trees and the opportunity to reduce this impact will be assessed following the pegging of the proposed road centreline and prior to the PA being finalised.

The underpasses and overpasses have been especially selected to provide for fauna movement across the proposed Parkway with a narrow wildlife corridor being planted adjacent to the vehicle travel paths to encourage safe crossing points.

At the northern end the road will be fenced with Kangaroo fencing to prevent random crossings and this fencing will direct the kangaroos towards the under and overpasses.

For the northern link road there are a number of trees that will require removal near the intersection of Fairbairn Avenue and Northcott Drive. These trees are at the edge of the area of high value. The option to remove these allows the remaining trees to be integrated with the balance of the forest area.

There are no significant flora and fauna impacts

6.2.2 Stock

Standard stock fences are proposed along the middle and southern sections of the proposed road. Access across the road will be provided by under and overpasses.

6.3 Hydraulic Impacts/Dams

The proposed road will alter some drainage patterns however the watercourses will remain in their general locations except for between chainages 1800 and 1900 where a short deviation of the existing watercourse is proposed and also from Ch 9200 to

6 Impacts Of Proposal

9400 where Woolshed Creek needs to be diverted to allow the construction of the second carriageway of the Parkway.

Key longitudinal and cross drainage proposals are shown on the plans. Minor locations will be serviced by local culverts. Since the road is quite close to Woolshed Creek the impacts from changed creek flow paths from be almost negligible in terms of impact on the environment as the flow paths and flow rates will be virtually unchanged.

The potential of spills of contaminated loads although not increasing in the risk of such a spill, the impact will be significantly greater as the ability to contain spills prior to entering Woolshed Creek and its tributaries is less.

However in keeping with practice for arterial roads crossing watercourses serving Lake Burley Griffin it is not proposed to install any GPT's along the road.

Two stock dams will be affected as follows:

Chainage	Description	Proposal
900	Existing dam on tributary to Woolshed Creek adjacent to Keirs' property within earthworks limits for proposed road	Relocate dam slightly upstream of existing location
5950	Existing dam on tributary to Woolshed Creek within earthworks limits for proposed road	Relocate dam slightly upstream of existing location

The proposal for stormwater

6.4 Noise

The sources of noise from the proposed development would be road traffic and construction noise. The predicted impact from road traffic noise is discussed in the following sections of this report.

The noise from construction will depend on the type of equipment necessary to construct the road. The proposed alignment is substantially at grade with only small sections requiring either cut or fill. Thus the plant and equipment necessary for the road construction would include excavators, graders and road surfacing machinery. Excavation using blasting techniques is unlikely. The work will comply with the normal requirements for such construction work in the ACT.

6.4.1 Noise Standards

The criteria for assessing traffic noise impact in the ACT are currently based on the L_{A10} which is the level exceeded for 10% of the time period. This is measured over each hour and the $L_{A10(18hr)}$, which is the average value over the 18 hour period from 0600 to 2400 hrs, is then determined. The draft ACT Noise Management Guidelines

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stipulate that noise, in terms of $L_{A10(18hr)}$, from road traffic [ACT Planning Authority 1996] for new roads or new residential areas should not exceed:

Table 6.1 Noise Guidelines

Land Use	Level	Location
Residential and community facilities	63 dB(A)	at 1 m from the building facade
Commercial facilities	75 dB(A)	at 1 m from the building facade
Private open space	58 dB(A)	at 1 m inside the nearest boundary of the private open space

For upgraded roads where the existing noise levels are greater than 63 dB(A), the noise levels from the road traffic after the completion of the works should not be greater than the traffic noise level prior to construction.

6.4.2 Noise Predictions and Mitigation Measures

The noise predictions were undertaken using the TNOISE software package which was developed by Main Roads in Western Australia and is based on the Calculation of Road Traffic Noise (CORTN) method developed in the UK. This software was used to predict the noise levels along the route. An adjustment of -3.7 dB(A), as recommended by ACT Urban Services, was applied. The prediction method was also used to determine the distance from the proposed alignment within which the criteria would be exceeded and hence mitigation measures may be required.

The predictions are based on the traffic flow data, the alignment of the road and the relative positions and heights for the developments in the area. The aim of this investigation was to identify the areas of the site which may be subject to excessive noise impact and a number of assumptions were made in the predictions. The ground on either side of the road was assumed to be level and the road itself was assumed to have a gradient of 1 %. A sign-posted traffic speed of 100 km/h was used.

For selected sections along Majura Parkway the predicted noise levels are listed in Table 6.2. A sensitivity analysis was carried out to determine the minimum distance from the road for the traffic noise criteria to be met. Drawing No's 16402 NC-01 and NC-02 show the locations of the relevant predicted noise levels with lines representing the location for the 63 dB(A) at the façade contour and the 58 dB(A) contour for the 2031 traffic volumes.

*Values indicated by * would meet the criterion of 63 dB(A) at 1 m from the façade once 2.5 dB(A) is added to allow for the additional reflected sound.*

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Table 6.2 Predicted Noise Levels Majura Parkway

Chainage	Year	Vehicle Flow	% Heavy vehicles	Distance from road	Predicted Noise Level dB(A)
Road at grade Applies along most of the length of the parkway					
	2003	14,000	10	20	65.3
	2031	45,000	5	20	69.5
	2003	14,000	10	50	59.8
	2031	45,000	5	50	64.0
	2031	45,000	5	90	*60.3
	2031	45,000	5	130	58.0
Road in cutting					
8200	2003	14,000	10	50	59.8
8200	2031	45,000	5	50	64.0
8200	2031	45,000	5	70	*60.4
8200	2031	45,000	5	90	58.0
8200	2003	14,000	10	150	50.2
8200	2031	45,000	5	150	54.4
Road elevated					
5200	2003	14,000	10	50	60.9
5200	2031	45,000	5	50	65.1
5200	2031	45,000	5	110	*60.2
5200	2031	45,000	5	150	58.2
South of Northcott Drive link					
1000	2031	20,000	5	40	59.9
1000	2031	20,000	5	55	58.0
Northcott Drive link					
1000 w link	2031	30,000	5	50	*60.3
1000 w link	2031	30,000	5	75	58.0

For the estimated traffic volumes in 2031 the criterion of 63 dB(A) at 1 m from the façade will be met at a distance of approximately 90m along the main length of

6 Impacts Of Proposal

Majura Parkway. To meet the criterion of 58 dB(A) for private open space the distance from the road needs to be approximately 130 m.

For the portion of Majura Parkway where the road is in a cutting the distances at which the two criteria will be met are reduced to 70 m and 90 m respectively.

For the portion of Majura Parkway where the road is elevated the distances at which the two criteria will be met are reduced to 110 m and 150 m respectively.

Towards the northern end of the Parkway, approx chainage 8730, there is one property approx 28 m from the current alignment of Majura Road. The alignment for Majura Parkway is such that this house will be a similar distance from the road. The measured noise level, in terms of $L_{10,18hr}$, at this location was up to 64 dB(A). This is in good agreement with the predicted noise level for the traffic volumes in 2003 of 65 dB(A) at 20 m. With the increased traffic volumes for 2031, the predicted noise level at this location increases by 4 dB(A) and so mitigation measures are required. One such measure would be a barrier along the edge of the road. It is estimated that a 3 m high barrier at 5 m from the edge of the road should reduce the noise to close to 60 dB(A) which would then satisfy the criterion of 63 dB(A) allowing for the façade reflection. Should the current noise level of 64 dB(A) be taken as the basis for the criterion, as is the case for upgraded roads, a 2 m high the barrier would be required at 5 m from the edge of the road. Alternatively additional noise reduction could be provided for the building façade to ensure that the internal noise levels are satisfactory. Another option would be for the house to be purchased and not used as a residence.

The Girl Guides Association has previously advised that they are concerned about the increase in noise level. However the predicted noise level is within the applicable standard for both private open space and for the building itself even though the increase in noise level is expected to be in the order of 8dB L_{A10} 18 hr.

At the southern end of the Parkway a new northern link road is proposed linking Northcott Drive with Majura Parkway. A significant volume of traffic would use this route to the east with a consequent reduction in traffic continuing south towards Morshead Drive and the Monaro Highway.

For the main route to the south the traffic noise criteria would be met at distances of 40 and 55 m respectively.

For the northern link road the distances to meet the criteria would be 50 and 75 m respectively. This link road passes approximately 30 m from the buildings at the northern end of the Australian Defence Force Academy (ADFA) site. These buildings do not contain spaces used for educational purposes and so would be considered as commercial facilities and the criterion of 75 dB(A) at 1 m from the building façade would apply. The predicted noise levels show that this criterion would not be exceeded for these buildings.

The minimum distance between the proposed link road and buildings on the ADFA site which include student classrooms, is approximately 150 m. These buildings are

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not the main lecture blocks but do include some classrooms. The applicable criteria in the ACT Noise Management Guidelines for educational buildings state that they should 'meet the noise levels set out in AS2107'. This standard, 'Acoustics Recommended design sound levels and reverberation times for building interiors' specifies the recommended range for noise levels in class rooms of 30 to 35 dB(A). It is expected that the noise reduction from the building enclosure should be sufficient to ensure that the criteria are met. Once the alignment has been finalised, a check should be made on the location of the teaching spaces within the nearest buildings to confirm that the noise reduction provided by the building enclosures will be sufficient.

6.4.3 Noise during construction

The main source of significant noise will be the section from ch 7800 to 8200 where there is a large cut of about 7m. At this depth of cut there will probably be a need for blasting which will result in noise. However this section is about 1km from the Girl Guides hall, 400 from Block 36 residence but only 150m from the Mt Majura Vinyards residence. There is therefore only the single residence that is likely to be affected by noise during construction.

6.4.4 Conclusion on Noise Impacts

Majura Parkway is proposed as an important link from the Federal Highway to the remainder of Canberra. As such it is estimated that the traffic volumes in 2031 will reach 45,000 vehicles per day.

For those properties close to the current Majura Rd the traffic noise is the dominant source. One house is currently around 28 m from Majura Rd and the current noise levels, in terms of $L_{10,18h}$ were found to as high as 64 dB(A). At greater distances from the current roads, the noise levels are dominated by aircraft noise due to the proximity to the airport. The noise levels, in terms of $L_{10,18h}$, at approx 250 m from the current Majura Rd ranged from 49 to 52 dB(A). In the horse paddocks to the west of the airport, the noise levels ranged from 52 TO 55 dB(A).

The criteria applicable in the ACT for new roads are shown in Table 6.3

Land Use	$L_{A10(18hr)}$	Applicable Location
Residential and community facilities	63 dB(A)	at 1 m from the building facade
Commercial facilities	75 dB(A)	at 1 m from the building facade
Private open space	58 dB(A)	at 1 m inside the nearest boundary of the private open space

For upgraded roads where the existing noise levels are greater than 63 dB(A), the noise levels from the road traffic after the completion of the works should not be greater than the existing noise level immediately prior to construction.

6 Impacts Of Proposal

The predicted noise levels for the main section of Majura Parkway using traffic volumes for 2031, indicate that the criteria for private open space and at a residential façade will be met at approx 130 m and 90 m respectively along much of the length of the parkway. Where the parkway is in a cutting the distances to meet the criteria will be reduced to 90 m and 70 m respectively. In the area of chainage 400 to 560, where the parkway is on an embankment, the distances would be 110 and 150 m respectively.

There is currently one house close to the alignment of the parkway. A barrier of 2m to 3 m at 5 m from the edge of the road will be needed to meet the criteria at the front façade of this house. Alternatively the noise reduction of the building enclosure could be increased or the property could be acquired and used for a non-residential purpose.

At the southern end of the Parkway, the distances to meet the criteria would be 40 and 55 for the main road heading south. For the northern link road between Northcott Drive and the Parkway the distances would be 50 and 75 m respectively. Some of the buildings on the ADFA site are approximately 20m from this link road. As these are non teaching spaces the criteria for commercial buildings would not be exceeded. Buildings on the ADFA site, which are approximately 10 m from the alignment, do include teaching spaces. It is anticipated that the building enclosure would provide sufficient noise reduction but, once the alignment has been finalised, further checks should be made to confirm this.

The figures in Appendix A show the proposed alignment with lines representing the location for the 63 dB(A) at the façade contour and the 58 dB(A) contour for the 2031 traffic volumes.

6.5 Land Use and Lease Impacts

It is currently proposed to construct a full length 400m drag strip in the northern half of Majura Road. However it is reported that the ACT government has not approved the proposal nor is willing to provide financial assistance to the proposed development and therefore it is considered unlikely that the proposal will proceed in the foreseeable future.

In addition there is the possibility of an industrial or High Tech zone being established in the Majura Valley. The extent of this development or its timing is not known.

The proposal forms a boundary to the Campbell Park Reserve and separates existing properties from this reserve.

There are several property and lease adjustments impacts that will arise from the project with the key issues as follows:

- Building on Block 574 is likely to require demolition as it will be too close to the proposed parkway
- Girl Guides are opposing the proposal due to its proximity to the Guides hall, impact on trees and perceived impact on a grave site.

6 Impacts Of Proposal

- Block 59 will be divided by the construction of the road
- The pine forest will be reduced in area and may become financially not viable
- The retention of the existing Majura Road as a local access road is not supported by DOFA as they see a requirement for their site to retain direct access to the Parkway.

Blocks that will be severed by the proposed road are listed in Table 6.4

Table 6.4 Leases Severed by Proposed Parkway

Block	Lessee	Severance	Dam / Water / Noise	Access	Comment	
555	Girl Guides	No	No	Noise levels increase by about 8dB(A) by 2031 but is within ACT standards	Access remains in current location with underpass at Parkway	Could install / visual screening noise wall to retain privacy and reduce impact.
165, 171, 586, 620, 621	ACT Forests	Yes	No	No	Existing access retained	Loss of trees may result in forest being uneconomic
48	Craig Hall	Yes. Property already severed by Majura Road	No	Existing residence within 58dB(A) predicted noise contour but outside of 63 dB(A)	Existing alignment of access retained with new underpass.	Lease expires in 2005
622	DOFA	No	No	No	Existing access to Majura Road retained	DOFA want access to new road.
666	MT Majura Vinyards	No	Yes. Vinyards currently watered from Woolshed Creek	Within applicable standards	Existing access to Majura Road retained	Future service road between proposed access and Mt Majura Road will require acquisition of a 30m strip along the

6 Impacts Of Proposal

Block	Lessee	Severance	Dam / Water / Noise	Access	Comment	
					Majura Road frontage	
571, 670, 567	Gavin McArdle English	No but acquisition required along Majura Road for the construction of the Parkway	No	No	All access in the future will need to be via Mt Majura Road	
574	Julie and Warwick Baillie	No	Woolshed Creek requires realignment within lease	Noise levels will reduce from existing	Existing access from Majura Road retained	Narrow 50m wide strip at northern end requires acquisition to allow for construction of Parkway
36	Jean Underwood	Yes	No	Yes. If house remained occupied noise levels will exceed guidelines	Existing access location restricted to left out proposed.	House will require acquisition
556	ACT Housing	Yes	Yes	Yes	Yes	Existing block is completely severed by proposal and house to be demolished
51	Trevor Brogan	No	No	Reduction from existing	Not affected	Adjacent to existing road and not affected by parkway proposal
59	Nicholas Webber, Anne McGrath	Yes	No	Less than with existing road	Existing access retained	Suggest that severed piece of land become part of Campbell Park reserve
559, 560, 561,	Canberra Rifle Club	No	No	No change	No change with interim medium	Service road to connect Majura Road

6 Impacts Of Proposal

Block	Lessee	Severance	Dam / Water / Noise	Access	Comment
562 and part 151					term but relocated to Highway service road proposed for in long term future and requires discussion with RTA NSW.
130					
135		Minor	No	No	Not required ACT Conservation area
52		No	No	Lower than existing	Retain existing Proposed dragway site
642		No	No	Lower than existing	Retain existing
636		No	No	Lower than existing	Retain existing
637		No	No	Lower than existing	Retain existing
686		No	No	Lower than existing	Retain existing
660		No	No	Lower than existing	Retain existing
587		No	No	Lower than existing	Retain existing
3		Yes	Yes	Yes	Yes
2/9		No	No	Lower than existing	Existing retained
10		No	No	About the same as existing	Existing retained
11		No	No	About the same as existing	Existing retained
2/12		Yes	Access to Woolshed Creek severed	Increase but there are no residences	Existing retained
3/12		Yes	Woolshed Creek embankment	N/A	N/A
1/12					
1/13		Yes	Access to Woolshed Creek restricted	Increased from existing	Existing retained No residences on property

6 Impacts Of Proposal

Block	Lessee	Severance	Dam / Water / Noise	Access	Comment
1/8		Yes	No	Yes	Restricted Existing to Canberra reserve Nature Park Campbell Park Reserve
1/14	Kiers	No	No	Increase but within guideline limits	No change

Full details of these preliminary assessment of impacts will be presented in the Preliminary Environmental Assessment following the pegging of the alignment on site and consultation with the leaseholders.

6.5.1 High Speed Train Alignment

The proposal generally treats the HST alignment as a constraint. However in the southern end at approximately ch 1600 at the Northern Link interchange there is either a need to :

- Divert the HST alignment to the east by 20m. A possible alignment is shown on Drawing No.?????
- Move the road interchange to the west by 20 thereby intruding into the habitat and buffer area of the Campbell Park reserve
- Construct the eastern side road ramps either on structure or by reinforced earth.

At this stage it has been assumed that the reserve area is more significant than the HST alignment and therefore taken precedence.

6.5.2 National Capital Plan

Preliminary advice from the NCA is that the alignment is consistent with the intent of the Parkway reserve on the national Capital Plan and therefore the proposed alignment will not require a variation to the National Capital Plan

6.5.3 Territory Plan

Advice from PALM is that the proposed alignment is consistent with the intent of the Parkway as currently shown on the Territory Plan and therefore will not require a variation to the Territory Plan

6.5.4 Lease Holders

No further discussions have been held with the leaseholders at this stage. Since the lease holders have had a number of approaches and discussion over recent years including during the SMEC study it is considered more appropriate that further discussion await responses and advise from the various government agencies.

6 Impacts Of Proposal

6.5.5 Reserves

The proposed road will form a boundary between the existing reserves and the leases thus reducing the opportunities for infestations by weeds and other foreign species.

6.6 Future Rail Alignment

The proposed alignment provides for the future construction of the HST. However there is no guarantee that should the HST be constructed that it will either use the alignment or terminate at the airport.

At the Northern Link Road interchange the road and rail are very closely spaced. The ramps for the interchange would need to be constructed with reinforced earth in order to provide clearance for the HST, or the alignment of the road moved to the west partly into the Campbell Park Reserve, or the alignment of the HST slightly adjusted.

Since the future of the HST is uncertain this design has assumed that a slightly lower approach speed will apply and the radius of 920m for a length 300m to continuation of 670m r for a length 250m.

This will require a minor reduction in speed from that assumed in previous rail studies but is considered a reasonable compromise given the uncertainty of a future HST being constructed and a further greater uncertainty about the airport being a suitable terminus / station for such a service; ie a future service if provided may terminate in City, or Gungahlin as per the VFT proposal or elsewhere.

6.7 Engineering Services

There are only generally only minor engineering services affected by the proposal. However at the northern end from chainage 8500 to 10,000 where communications, power, gas lie within the existing road reservation but will require relocation in order for the Parkway to be constructed.

6.8 Airport Clearances

The proposal does not impact upon the clearances required from the Canberra airport

6.9 Consultation

The SMEC study undertook consultation with the leaseholders in the northern area however the Maunsell study was more strategic in nature and did not include consultation. There may therefore be some issues that are raised during the next phase of consultation as part of the preparation of the Preliminary Environmental Assessment.

The likely issues that may be raised and are as yet unresolved include:

- Girl Guides simply oppose the project and will strongly promote the upgrading of the existing road
- The viability of the remaining pine plantation requires assessment

6 Impacts Of Proposal

- A proven road safety measure to overcome the potential trauma of Kangaroo road kills and risk to road users
- Finality of the road proposals to allow financial conclusions on proposed improvements to be realized for some lease holders.
- The details of obtaining water from bores and other means and the apparent draw down of the water table as an ongoing activity have not been further investigated in this study
- Acquisition of Block 36
- Demolition of ACT Housing residence
- Agreement with NSW RTA regarding the extension of Majura Road as a service road into NSW.

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Submission of Final Development Application & Preliminary Assessment

7/6/2002

7.0 BUDGET

7.1 PROGRAM PROVISION

The consultant is to report and progressively refine and update the construction cost estimate at each stage as the design is developed. Estimates must include all work necessary to make the project function properly and include all ancillary costs.

7.2 DATE TO WHICH PROJECT ESTIMATES ARE TO BE ESCALATED

Estimates of cost are to be based on costs expected to apply at current market rates.

8.0 QUALITY ASSURANCE

8.1 ACT PROJECTS REQUIREMENTS

General

The Consultant shall undertake the design in accordance with Quality Assurance requirements detailed in Attachment 'A' (forms CWF944-956 as applicable).

Design Verification

In particular, the Consultant shall submit a design plan and/or a design verification plan in accordance with Quality Requirements - Document Submission Form **CWF945**.

Design Changes

The consultant shall notify ACT Projects in writing where the need for a significant design change becomes evident and shall obtain ACT Projects's written approval for any significant design change.

A significant design change is a change to a ACT Projects approved design which;

- (i) significantly affects the basis of the ACT Projects design approval, or
- (ii) significantly affects a formal commitment regarding the design made directly by ACT Projects to another agency, or
- (iii) affects ACT Projects's specified requirements.

9.0 LIAISON

All liaison with ACT Projects is to be through the Project Officer, **Andrew Readshaw**,

- Telephone (02) 62075423
- Facsimile (02) 6207 5439

PROJECT NO.	DATE	REVISION NO.	FILE NAME
			Site Draft

- e-mail address - andrew.readshaw@act.gov.au.

ATTACHMENT A QUALITY REQUIREMENTS FORMS

Note: For simplicity only the relevant portion of forms CWF 944-956 are provided as part of this project brief. When used individually the full form should be utilised. Copies of the full forms are available from ACT Projects

PROJECT NO: 2001-0340	Page Revision No: 1	Page 18 of 15
G:\Projects\Projects\Malura Parkway Study & Concept Plans\Incoming Documents\Consultant Brief\PA\Task_06\CATEM\PA Consultant Brief\PA\Task.doc	Date: 11/1/2002	Status: Draft
G:\Projects\Projects\Malura Parkway Study & Concept Plans\Incoming Documents\Consultant Brief\PA\Task_06\CATEM\PA Consultant Brief\PA\Task.doc		

Attachment A

**ACT Projects
Quality Requirements**

FORM CWF 944

PROJECT: _____ PROJECT No: _____

SERVICE: Project/Construction/Works Manager/Consultant/Contractor (*delete as applicable*)

SERVICE PROVIDER (if known): _____

QUALITY STANDARD: AS /NZS ISO 9001 and 9002 as interpreted by AS/NZS 3905.2

QUALITY REQUIREMENTS INDEX

Where form is to be used enter Sheet No. in Sheet No. Box
Where form is not used enter "NA" in Sheet No. Box

Sheet No.	Form No.	Form Title
2	CWF945	Document Submission
NA	CWF946	Design Verification Methods
NA	CWF947	Design Review Points
NA	CWF948	Measurement/Design Data
NA	CWF949	Notification of Intention to Commence Project Work Activities
NA	CWF950	Traceability Requirements
NA	CWF951	Special Processes
NA	CWF952	Witness and/or Hold Points Applying to Construction Phase
NA	CWF953	ACT Projects Supplied Products
3	CWF954	Notification of Nonconformances/Corrective Actions
NA	CWF955	Documentation for Servicing Work
4	CWF956	Quality Records



Attachment A

**ACT Projects
Quality Requirements**

FORM CWF 945

DOCUMENT SUBMISSION				
Document	No. of Copies	When to be Submitted	To be Available for Inspection on Request	Comments
Company Quality Manual	1		Yes	
Project Quality Plan	1	Design -1 week after acceptance of proposal	Yes	
Design Verification Records(s)	1		Yes	
Inspection and Test Plan(s)	1	Design -1 week after acceptance of proposal	Yes	
Quality Procedures/ Instructions	1		Yes	
Technical Procedures/ Instructions	1		Yes	



Attachment A

**ACT Projects
Quality Requirements**

FORM CWF 953

FORM CWF 954

**NOTIFICATION OF NONCONFORMANCES /
CORRECTIVE ACTIONS**

ACT Projects shall be notified of any nonconformances:

- which have the potential to delay the project works
- where the proposed corrective actions will result in noncompliance with the project specification requirements
- where the nonconformances are a result of deficiencies in the specification
- which create a health or safety hazard.

These requirements shall apply to all design, construction and related activities.

Other nonconformances and proposed corrective actions shall be brought to the attention of the ACT Projects / Project Manager / Consultant / Superintendent (*delete as applicable*) as follows:



Attachment A

**ACT Projects
Quality Requirements**

FORM CWF 956

QUALITY RECORDS					
Type of Record	No. Copies	Submit		Retention	
		To Whom	When Required	Retain By Whom	Minimum Period (Years)
Project Quality Plan				Consultant	7
Design Verification Plan				Consultant	7
Design Calculations				Consultant	25
Inspection Measuring and Test Results				Consultant	7



Department of Treasury



Mr Andrew Cappie Wood
Chief Executive
Chief Minister's Department
GPO Box 158
CANBERRA ACT 2601

Mr Mike Zissler
Chief Executive
Department of Territory and Municipal
Services
GPO Box 158
CANBERRA ACT 2601

Ms Sandra Lambert
Chief Executive
Department of Disability, Housing and
Community Services
GPO Box 158
CANBERRA ACT 2601

Ms Renee Leon
Chief Executive
Department of Justice and Community Safety
GPO Box 158
CANBERRA ACT 2601

Dr Michele Bruniges
Chief Executive
Department of Education and Training
PO Box 1584
TUGGERANONG ACT 2901

Mr Mark Cormack
Chief Executive
ACT Health
GPO Box 825
CANBERRA CITY ACT 2601

Mr Neil Savery
Chief Planning Executive
ACT Planning and Land Authority
GPO Box 1908
CANBERRA ACT 2602

Mr Michael Costello
Managing Director
ACTEW Corporation Limited
GPO Box 366
CANBERRA ACT 2601

Re: AGENCY INPUT TO THE NATIONAL INFRASTRUCTURE AUDIT

As you may be aware the Australian Government recently established *Infrastructure Australia* (IA), a statutory body reporting to the Council of Australian Governments (COAG), with the aim of addressing Australia's national infrastructure needs to boost the economy's productive capacity.

A working group has also been established under COAG to support the work of IA to allow for better coordination of infrastructure planning and investment across the nation, and to identify bottlenecks and remove blockages to enable productive investment in infrastructure.

I have provided the Infrastructure Australia forward work program, and the implementation plan for the Submission to COAG at *Attachment A and B* respectively for further information.

The first task of IA, and the working group, is to conduct an infrastructure audit to determine the adequacy, capacity and condition of nationally significant infrastructure, taking account forecast growth. The audit will form the development of a National Infrastructure Priority List which is to be submitted by IA to COAG by March 2009.

For more detailed information on the current activities of the working group please see the ACT's Infrastructure Working Group brief at *Attachment C*.

The purpose of the audit is to provide an analytical overview of the infrastructure needs and requirements in each jurisdiction, taking account of future challenges. In preparation for the audit, Treasury will be coordinating the ACT's response and is seeking input from all respective agencies on nationally significant infrastructure projects (existing and prospective) concerning the future capacity of:

- water infrastructure;
- energy infrastructure;
- transport infrastructure (including roads, airports and ports); and
- communications infrastructure.

The focus of the audit is on identifying gaps, deficiencies, impediments and bottlenecks. As a guide, agencies should consider those nationally significant infrastructure projects with a minimum value of \$5 million over a timeframe of five years. The outcomes of the audit will be on current and future projects, key issues and economic-related outputs that are likely to eventuate if these key issues were addressed.

Matters that agencies may wish to examine in their responses, include:

- the economic impact from operation of the infrastructure and its strategic role for the productive capacity of the region;
- whether infrastructure provides an essential service or vital input into an essential production process;
- whether the infrastructure is critical in linking other infrastructure sectors;
- does the infrastructure form a key part of an export or trade related process; and
- whether the infrastructure will play an important role in addressing future economic challenges.

It should be noted that while much of the focus is on identifying infrastructure gaps or opportunities, jurisdictions may also wish to identify the need for changes or reforms to existing systems and processes eg with respect to industry regulation across borders or opportunities to better coordinate infrastructure delivery.

The information provided for future projects must stem from planning (such as master plans), research, economic analysis, government policy plans and feasibility studies undertaken, or planned to be undertaken within the next 12 months. This will support and justify the projects and avoid unsubstantiated items of a speculative nature.

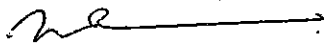
As a guide to the type of information required please find the audit template at *Attachment D*.

Agency responses to the audit are due by the **23 May 2008**. This due date is necessary to provide Cabinet with sufficient time to consider and agree to the Submission before the audit is forwarded to Infrastructure Australia. Given the short timeframe, agencies are asked to ensure that their responses focus on identifying core strategic priorities and issues.

The Commonwealth Government has assured the Working Group that all information will be maintained strictly Cabinet-in-Confidence for the purpose of the audit.

If you have any queries please do not hesitate to contact Neil Bulless on 6207 0264 or Marsha Guthrie on 6207 3998 for further advice and assistance.

Yours sincerely



Megan Smithies
Under Treasurer

28 April 2008

Cc: Departmental CFO's



AGENDA ITEM 7

FORWARD WORK PROGRAM FOR INFRASTRUCTURE AUSTRALIA

RECOMMENDATION

That the Infrastructure Working Group agrees

- that the National Infrastructure Audit, the Infrastructure Priority List and the National PPP Guidelines are the immediate priorities of Infrastructure Australia, and
- that the extensive list of other potential priorities for the Infrastructure Australia Forward Work Program be developed for consideration by the Infrastructure Working Group in June 2008, in consultation with Infrastructure Australia following its establishment, for refinement into the next forward work program for COAG consideration in July 2008.

ISSUES

- The Terms of Reference for the COAG Infrastructure Working Group require it to develop an implementation plan which covers (inter alia) “a forward work program for Infrastructure Australia, including scope for streamlining of planning and approval processes, standardisation of project appraisal techniques and the guidelines and principles for the assessment of Public Private Partnerships”.
- The National Infrastructure Audit and the National PPP Guidelines are to be completed by the end of 2008 and the Infrastructure Priority List is due in March 2009. The delivery of these immediate priorities will require the focus of Infrastructure Australia during the remainder of 2008.
- Jurisdictions nominated an extensive list of possible work priorities (Attachment A). These could be considered by a June 2008 meeting of the Infrastructure Working Group, in consultation with Infrastructure Australia following its establishment. This would allow the development of the next forward work program for COAG consideration in July 2008 to be informed by Infrastructure Australia’s perspectives on its work priorities into the future.
- Further priorities could include:
 - (i) standardisation of project appraisal techniques;
 - (ii) streamlining of planning and approval processes;
 - (iii) urban congestion (recognising the other potential work on this issue, Attachment B);
 - (iv) competition in the construction industry (Attachment C), and
 - (v) other priorities in Attachment A.
- Jurisdictions have agreed to provide information concerning the broad condition and investment plans for infrastructure for which they are responsible in the four target areas. The aim is to provide information to assist IA with the audit.

- Attachment D includes an overview of the work done on PPP guidelines by the existing PPP Forum under the auspices of the Ministerial Forum, which should be provided, along with other contributions from the Infrastructure Working Group, to assist IA in this task.
- The immediate priorities of IA's annual forward work program will be set out in the first Statement of Expectations from the Minister for Infrastructure to IA. IA will respond with a Statement of Intent. The contributions of Working Group members towards the shaping of this governance and accountability letter will be taken into account in its drafting following the passage of the legislation setting up IA and the appointment of its members.

COAG INFRASTRUCTURE WORKING GROUP

6 MARCH 2008

Implementation Plan For the Infrastructure Working Group

Objectives

The Infrastructure Working Group will support better coordination of infrastructure planning and investment across the nation, across governments and the private sector and identify and remove blockages to productive investment in infrastructure.

The Infrastructure Working Group will develop an implementation plan by March 2008 covering:

- mechanisms for Infrastructure Australia to report to COAG;
- scope of the National Infrastructure Audit, which is to examine the future capacity of transport, energy, communications and water infrastructure which is required materially to improve national productivity; and
- a forward work program for Infrastructure Australia, including scope for streamlining of planning and approval processes, standardisation of project appraisal techniques and the guidelines and principles for the assessment of Public Private Partnerships.

Possible Further Stage 2 Reforms:

Following completion of the Audit, the Working Group will develop strategies to address any identified bottlenecks and deficiencies and develop options for better coordination of infrastructure planning and investment across jurisdictions and the private sector, including possible improvements to Commonwealth, State and local planning mechanisms (including AusLink).

This implementation plan will be updated in October 2008 to detail how these later objectives will be implemented.

Key Risks

The principal objectives of the Working Group as defined by COAG have been achieved, and the legislation setting up Infrastructure Australia has been passed.

The ongoing objectives of the Infrastructure working group are to support better coordination of infrastructure planning and investment across the nation, across governments and the private sector and identify and remove blockages to productive investment in infrastructure. The ongoing role of the Infrastructure Working Group includes recommending future work priorities for Infrastructure Australia to COAG and advising COAG on recommendations made by Infrastructure Australia in relation to COAG commissioned work.

The key risk for the forward work of the Infrastructure Working Group is the capacity of Infrastructure Australia to deliver its forward work program within the agreed schedule. This risk is being managed by:

- jurisdictions providing information concerning the broad condition and investment plans for infrastructure in the four target areas that will assist Infrastructure Australia with the audit, and
- the Infrastructure Working Group assisting Infrastructure Australia with coordination in relation to the Audit.

Deliverables of the Infrastructure Working Group

Deliverable	Jurisdiction	Timeframe	Status
<i>Mechanisms for Infrastructure Australia (IA) Reporting to COAG</i>	All	March 2008	Completed
<i>Scope of the National Infrastructure Audit</i>	All	March 2008	Completed
<i>Forward Work Program For Infrastructure Australia.</i>	All	March 2008	Completed
<i>Referral of issues to Infrastructure Australia and advice to COAG</i>	All	Ongoing	Ongoing
<i>Jurisdictions to provide input to IA for the National Infrastructure Audit</i>	All	June 2008	Commenced
<i>Development of options for contributing to Indigenous Initiatives</i>	All	June 2008	Commenced

Mechanisms for Infrastructure Australia (IA) Reporting to COAG

IA will report to COAG on its activities annually and as requested by COAG or the Commonwealth Minister for Infrastructure, including regular reports to COAG on:

- progress on the infrastructure audit program and implementation of the Infrastructure Priority List;
- recommendations regarding policy and regulatory reforms to improve infrastructure utilisation and national coordination of infrastructure planning and investment;
- proposals to remove barriers to productive investment in infrastructure; and
- any other reports or research commissioned by COAG.

IA's reports to COAG will be conveyed through the Commonwealth Minister for Infrastructure, as Chair of COAG's Infrastructure Working Group.

Advice and reports by IA to COAG will be accompanied by appropriate advice and contextual material agreed by the COAG Infrastructure Working Group.

IA's reports to COAG will be made public if agreed by COAG.

The COAG Infrastructure Working Group will ensure that advice to COAG is coordinated, where relevant, across COAG Working Groups, in particular between the Infrastructure and the Business Regulation and Competition working groups.

Scope of the National Infrastructure Audit

The Infrastructure Working Group has agreed the following Terms of Reference.

Effective functioning of Australia's nationally significant infrastructure is essential to underpin Australia's future economic growth. Continuing investment by both the public and private sectors must be based on a sound understanding of strategic national priorities.

"Nationally significant infrastructure" includes (but is not limited to) infrastructure and infrastructure networks in the water, energy, transport and communications sectors the operations of which materially impact on productivity growth.

Infrastructure Australia is to undertake a national Infrastructure Audit to determine the adequacy, capacity and condition of nationally significant infrastructure, taking account of forecast growth.

The Audit is to identify gaps, deficiencies, impediments and bottlenecks in the identified sectors as measured against expected future demand.

The audit is to be completed in such a timeframe [December 2008] as to allow Infrastructure Australia to present to the Council of Australian Governments for its consideration a first Infrastructure Priority List by March 2009.

Forward Work Program for Infrastructure Australia.

The first priorities for the Infrastructure Australia forward work program are:

1. National Infrastructure Audit

To conduct a National Infrastructure Audit by 31 December 2008 in accordance with the Terms of Reference agreed by COAG.

2. Infrastructure Priority List

To provide a list of nationally significant infrastructure priorities, to COAG for consideration and potential resolution by individual jurisdictions or jointly where appropriate.

3. National PPP Guidelines

To publish best practice national guidelines for PPPs by 31 December 2008.

Indigenous Linkages

In fulfilling its functions the infrastructure working group will consider ways in which its activities can lead to a reduction in indigenous disadvantage.

Forward Work Program of the Infrastructure Working Group

The possible second stage reforms to be undertaken following the National Infrastructure Audit in December 2008 will be detailed in an update of this implementation plan in October 2008.

The ongoing functions of the Infrastructure Working Group prior to the second stage reforms include:

- a. providing ongoing guidance, national coordination and support to Infrastructure Australia;
- b. providing appropriate advice and contextual material to accompany reports by Infrastructure Australia to COAG; and
- c. developing future work items for Infrastructure Australia's program.

By 30 June 2008 the Commonwealth Government and each State and Territory Government will provide advice to Infrastructure Australia concerning its:

- water infrastructure;
- energy infrastructure;
- transport infrastructure; and
- communications infrastructure.

Infrastructure Australia will analyse this information and consult, including with industry owners and operators, in the preparation of the National Infrastructure Audit for COAG consideration early in 2009.

COUNCIL OF AUSTRALIAN GOVERNMENTS
MEETING
ADELAIDE
Wednesday 26 March 2008

Agenda Item Number: [insert item number]

Title of Item: Infrastructure Working Group

RECOMMENDED ACT POSITION

That the ACT Government agree:

1. to the implementation plan proposed by the Infrastructure Working Group attached including:
 - a. the mechanism for Infrastructure Australia reporting to COAG,
 - b. the terms of reference for the National Infrastructure Audit, and
 - c. Infrastructure Australia's initial forward work program;
2. that the ongoing functions of the Infrastructure Working Group during 2008 should include:-
 - a. providing ongoing guidance, national coordination and support to Infrastructure Australia,
 - b. providing appropriate advice and contextual material to accompany reports by Infrastructure Australia to COAG,
 - c. developing future work items for Infrastructure Australia's program, and
 - d. working in collaboration with other COAG Working Groups where relevant: and
3. to the proposed macroeconomic strategic role to be performed by the Loan Council

TALKING POINTS

- The ACT supports the role of Infrastructure Australia and the Infrastructure Working Group, more broadly, in order to better coordinate infrastructure planning and investment.
- The ACT recognises the strong focus of Infrastructure Australia on "nationally significant infrastructure that supports economic growth. The ACT also recognises that the delivery of social infrastructure is a significant component of jurisdictional expenditure, and that it contributes to important policy and economic outcomes.

- The ACT notes the role of Loan Council in considering future infrastructure projects and associated financing arrangements, and the range of issues that are to be progressed through the Heads of Treasury.

KEY ISSUES

Progress-to-date

- An Audit Sub Group has been established and has developed a template to guide jurisdictions in providing advice to IA.
- The Infrastructure Australia Bill was introduced into Commonwealth Parliament on 21 February 2008, and the legislation setting up IA has been passed.
- States and Territories have provided Government and Industry nominees to IA Board. The Commonwealth has also announced Sir Rod Eddington as the inaugural chair of Infrastructure Australia.
- The ACT Working Group representatives (CMD, Treasury and TAMS) have begun the process of compiling the ACT's infrastructure priorities for the IA audit.
 - Treasury will be seeking appropriate input from all Chief Executives to compile a list of priorities for consideration.
 - A meeting will also be held with NSW Government officials to consider regional and cross-border infrastructure priorities, particularly in relation to regional transport networks (road and rail) and their links to the ACT.

Mechanisms for IA to Report to COAG

- IA will report to COAG on its activities annually and as requested by COAG or the Commonwealth Minister for Infrastructure, including regular reports to COAG on:
 - progress on the infrastructure audit program and implementation of the Infrastructure Priority List;
 - recommendations regarding policy and regulatory reforms to improve infrastructure utilisation and national coordination of infrastructure planning and investment;
 - proposals to remove barriers to productive investment in infrastructure; and
 - any other reports or research commissioned by COAG.
- IA's advice and reports to COAG will be conveyed through the Commonwealth Minister for Infrastructure, and will be accompanied by appropriate advice and contextual material agreed by the COAG Infrastructure Working Group. IA's reports to COAG will be made public if agreed by COAG.
- In addition, to the above reporting mechanisms, at its meeting of 14 March 2008, the Australian Loan Council (Commonwealth, State and Territory Treasurers) agreed in principle to a process for the provision of macroeconomic strategic advice to COAG such that:

- the Loan Council will advise COAG on the principles for assessing the relative merits of significant economic infrastructure programs;
 - the aggregate macroeconomic consequences of infrastructure spending, including cost pressures and borrowing requirements are well understood; and
 - the financing of infrastructure best utilises the available sources of finding, including Commonwealth, State and Territory, and private sector.
- This Loan Council advice will form the basis for establishing the Commonwealth contribution to significant economic infrastructure projects.

Scope of the National Infrastructure Audit

- Effective functioning of Australia's nationally significant infrastructure is essential to underpin Australia's future economic growth. Continuing investment by both the public and private sectors must be based on a sound understanding of strategic national priorities.
- Infrastructure Australia is to undertake a national Infrastructure Audit to determine the adequacy, capacity and condition of nationally significant infrastructure, taking account of forecast growth.
 - In this context, "nationally significant infrastructure" includes (but is not limited to) infrastructure and infrastructure networks in the water, energy, transport and communications sectors the operations of which materially impact on productivity growth.
- The Audit is to identify gaps, deficiencies, impediments and bottlenecks in the identified sectors as measured against expected future demand.
- The audit is to be completed in such a timeframe [December 2008] as to allow Infrastructure Australia to present to the Council of Australian Governments for its consideration a first Infrastructure Priority List by March 2009.

Forward Work Program for Infrastructure Australia

- The first priorities for the Infrastructure Australia forward work program are:
 - National Infrastructure Audit - to conduct a National Infrastructure Audit by 31 December 2008 in accordance with the Terms of Reference agreed by COAG.
 - Infrastructure Priority List - to provide a list of nationally significant infrastructure priorities to COAG for consideration and potential resolution by individual jurisdictions or jointly where appropriate.
 - National PPP Guidelines - to publish best practice national guidelines for Public Private Partnerships by 31 December 2008.
- The possible second stage reforms to be undertaken following the National Infrastructure Audit in December 2008 will be detailed in an update of the implementation plan in October 2008.
- The ongoing functions of the Infrastructure Working Group prior to the second stage reforms include:

- providing ongoing guidance, national coordination and support to Infrastructure Australia;
- providing appropriate advice and contextual material to accompany reports by Infrastructure Australia to COAG, and
- developing future work items for Infrastructure Australia's program.

ACT Issues

- The key risk for the forward work of the Infrastructure Working Group is the capacity of Infrastructure Australia to deliver its forward work program within the agreed schedule. This risk is being managed by:
 - jurisdictions providing information concerning the broad condition and investment plans for infrastructure in the four target areas that will assist Infrastructure Australia with the audit; and
 - the Infrastructure Working Group assisting Infrastructure Australia with coordination in relation to the Audit.
- With respect to the ACT, it will be important to ensure that the infrastructure priorities for the ACT and region are given fair and adequate consideration against the other nationally significant infrastructure priorities that will be identified through the audit process.
- In terms of the future role of Loan Council, jurisdictions have already conveyed strong views about retaining control over their own infrastructure programs, albeit with some Commonwealth involvement, mainly at the macroeconomic level and contribution of funding.

BUDGET IMPLICATIONS

Nil implications at this stage.

POSITION OF OTHER STATES

- The other jurisdictions are expected to support the recommendations.

BACKGROUND

- COAG established the Working Group on Infrastructure at its meeting of 20 December 2007.
- The Infrastructure Working Group was established to support better coordination of infrastructure planning and investment across Australia, and to identify and remove blockages to productive investment in infrastructure.
- For the March 2008 COAG Meeting, it was agreed that the Working Group would develop an implementation plan covering:
 - mechanisms for Infrastructure Australia to report to COAG;
 - scope of the National Infrastructure Audit (which is to examine the future capacity of transport, energy, communications and water infrastructure which is required materially to improve national productivity); and

- a forward work program for Infrastructure Australia, including scope for streamlining of planning and approval processes, standardisation of project appraisal techniques and the guidelines and principles for the assessment of Public Private Partnerships.
- The Working Group first met on 23 January 2008 and established an audit sub group. A second meeting was held on 6 March 2008.

(Note: Please attach any relevant correspondence received on this agenda item.)

Contact Officer: [officer's name] **Phone:** [Type phone here]
Cleared By: [officer's name] **Phone:** [Type phone here]
[title]

TEMPLATE FOR JURISDICTIONS' INPUT TO THE NATIONAL INFRASTRUCTURE AUDIT

EXPLANATORY NOTES

An immediate role for Infrastructure Australia is to undertake an audit of the nation's infrastructure and produce an Infrastructure Priority List within 12 months.

As part of the agreed scope for the audit (see Terms of Reference at **Attachment A**):

- Infrastructure Australia is to undertake a National Infrastructure Audit to determine the adequacy, capacity and condition of nationally significant infrastructure, taking account of forecast growth.
- The Audit is to identify gaps, deficiencies, impediments and bottlenecks in the identified sectors as measured against expected future demand.
- 'Nationally significant infrastructure' includes (but is not limited to) infrastructure and infrastructure networks in the water, energy, transport and communications sectors the operations of which materially impact on productivity growth.
- The Commonwealth and each State and Territory Government will provide advice to Infrastructure Australia on infrastructure in key sectors by 30 June 2008.

The purpose of jurisdictional advice to Infrastructure Australia is to provide an analytical overview of the infrastructure needs and requirements in each jurisdiction, taking account of major future challenges. To support this process, the COAG Infrastructure Working Group has agreed to develop a template to assist jurisdictions prepare their advice to Infrastructure Australia.

This template is intended to be a guide only and help provide a consistent basis on which Australian governments can report their respective infrastructure capacities and priorities. It is intended that there should be sufficient flexibility for jurisdictions to identify their own strategic infrastructure priorities and risks, as well as their approaches to developing productive capacity in key sectors. Jurisdictions will not necessarily have relevant contributions to make for all of the identified sectors.

The reports are to focus strongly on nationally significant infrastructure. The Terms of Reference for the audit provide a level of guidance on the types of infrastructure that are to be included in this exercise. Consistent with adopting a flexible approach for jurisdictions to prepare their advice, the template does not prescribe more detailed criteria on what forms or types of infrastructure are to be included. However, some matters that could be considered by jurisdictions in this regard include:

- the economic impact from operation of the infrastructure and its strategic role for the productive capacity of a major region;
- whether the infrastructure provides an essential service or vital input into an essential production process;
- whether the infrastructure is critical in linking other infrastructure sectors;
- does the infrastructure form a key part of an export or trade related process; and

- whether the infrastructure will play an important role in addressing future economic challenges.

It is recognised that the timeframe for jurisdictions to prepare their advice to Infrastructure Australia is short. It is therefore intended that jurisdictional reports concentrate on identifying core strategic priorities and issues without a requirement to provide extensive amounts of technical details. (An indicative length for the reports would be around 50 pages.)

SUMMARY OF KEY INFRASTRUCTURE ISSUES

Highlight key findings on current and/or emerging infrastructure gaps or bottlenecks.

Outline government policy plans, regulatory approaches and strategic infrastructure plans, including major committed projects and developments.

The summary should also outline:

- Significant linkages or 'crossover issues' between infrastructure sectors. The economic and development implications of these interaction effects should be emphasised.
- Any impediments to efficient and responsive infrastructure investment — for example those of a regulatory, taxation or planning nature.
- Current and emerging infrastructure challenges and risks, and their economic implications.
- Any key regional issues.
- Any significant infrastructure linkages between jurisdictions.

In light of the above, jurisdictions should identify their general approach to developing productive capacity and their major (say five) infrastructure priorities.

SECTORAL ANALYSIS

The outline below provides an indication of the types of information that could be provided for key infrastructure sectors. Suggestions of more specific information that could be provided for certain sectors are provided at **Attachment B**.

Key findings

- Key findings regarding current and/or emerging infrastructure gaps or bottlenecks including:
 - the impacts of any infrastructure gaps or bottlenecks on broader economic development over the short and medium term; and
 - any inhibitors to efficient infrastructure investment in the sector.
- Detail the major infrastructure priorities in the sector.

Market environment

- Describe the market environment. For example:
 - industry structure (eg number of infrastructure providers and market shares);
 - ownership structures; and
 - commercial and market risks affecting investment.
- Detail any particular barriers to entry or market constraints.

Regulatory environment

- Describe the regulatory and planning environment for the various parts of the sector.
- Describe pricing policies in the sector.
- Outline planned future changes to the regulatory environment, including changes to pricing arrangements.

Existing infrastructure

- Detail the major strategic infrastructure across the sector, including:
 - strategic role (eg services provided, network implications and linkages);
 - ownership;
 - estimated value/cost;
 - technical capacity and expected economic life; and
 - any expected upgrades or expansions over the medium term.

Future projects

- Detail major committed and planned infrastructure projects across the sector, including:
 - strategic role (eg services provided, network implications and linkages);
 - ownership;
 - estimated value/cost;
 - technical capacity and expected economic life; and
 - any expected upgrades or expansions over the medium term.

Infrastructure adequacy

- Identify any immediate infrastructure supply gaps or excess capacity.
- Detail any relevant industry performance indicators.
- In terms of future infrastructure requirements, provide the following information:
 - forecast growth in demand and supply over the medium to long term (15 year horizon);
 - : this should be disaggregated across relevant supply sectors where possible;
 - : assumptions underpinning these forecasts should be detailed;
 - the change in capacity adequacy over this time period; and
 - significant risks and challenges affecting projected demand and supply (eg economic, planning and regulatory, demographic, land supply, climatic, environmental, social factors etc).

INFRASTRUCTURE IN MAJOR REGIONS

Jurisdictions may find it useful to provide a brief analysis of relevant infrastructure capacities and future requirements for their key regions and cities.

Such analysis would allow jurisdictions to highlight particular infrastructure challenges, impediments and risks on a spatial basis.

It would also allow jurisdictions to report on the operation and adequacy of strategic logistics chains in particular regions — for example, those centred on the market delivery of coal, iron ore, natural gas, agricultural commodities etc, where various forms of infrastructure strongly interact.

In providing this assessment, jurisdictions could also outline their major infrastructure priorities and their general approach to developing productive capacity in these areas.

A suggested outline of the information that could be provided for key regions is set out below.

- Regional economic overview and key findings.
- Outline of regional infrastructure capacity and strategic logistics chains.
- Regional/population growth projections.
- Approach to infrastructure planning, coordination and funding.
- Strategic development opportunities and major infrastructure priorities.
- Development challenges and risks.

ATTACHMENT A

NATIONAL INFRASTRUCTURE AUDIT — TERMS OF REFERENCE

- Effective functioning of Australia's nationally significant infrastructure is essential to underpin Australia's future economic growth. Continuing investment by both the public and private sectors must be based on a sound understanding of strategic national priorities.
- 'Nationally significant infrastructure' includes (but is not limited to) infrastructure and infrastructure networks in the water, energy, transport and communications sectors the operations of which materially impact on productivity growth.
- Infrastructure Australia is to undertake a national Infrastructure Audit to determine the adequacy, capacity and condition of nationally significant infrastructure, taking account of forecast growth.
- The Audit is to identify gaps, deficiencies, impediments and bottlenecks in the identified sectors as measured against expected future demand.
- The audit is to be completed in such a timeframe [December 2008] as to allow Infrastructure Australia to present to the Council of Australian Governments for its consideration a first Infrastructure Priority List by March 2009.

Mechanism

- By 30 June 2008 the Commonwealth Government and each State and Territory Government will provide advice, as set out above, to Infrastructure Australia concerning its:
 - water infrastructure;
 - energy infrastructure;
 - transport infrastructure; and
 - communications infrastructure.

Infrastructure Australia will analyse this information and consult, including with industry owners and operators, in the preparation of the National Infrastructure Audit for COAG consideration, early in 2009.

ATTACHMENT B**POSSIBLE ISSUES FOR SECTORAL ANALYSIS**

Suggestions of specific issues that could be covered in key infrastructure sectors are provided below. It should be noted that these are not necessarily exhaustive and should be read in conjunction with the generic sectoral analysis criteria provided above.

WATER SECTOR**Market environment**

Outline the development of effective water networks and tradeable water markets.

Regulatory environment

Describe the regulatory and planning environment.

Existing (and future) infrastructure

Detail the major strategic water infrastructure across the sector, including:

- water capture and storage facilities;
- water treatment facilities;
- distribution and reticulated water networks; and
- wastewater and sewerage.

Infrastructure adequacy

Forecast growth in demand and supply over the medium to long term (15 year horizon) should be disaggregated across major sectors:

- water storage;
- reticulation;
- wastewater; and
- sewerage etc.

LAND TRANSPORT

Market environment

Outline the development of effective land transport networks and modal linkages. Urban congestion issues should also be highlighted.

Regulatory environment

Describe the regulatory and planning environment.

Existing (and future) infrastructure

Detail the major strategic land transport infrastructure across the sector, including:

- key urban and interregional corridors;
- strategic regional road links;
- toll roads;
- intra and interstate highways;
- passenger and rail freight networks; and
- intermodal facilities.

Infrastructure adequacy

Forecast growth in demand and supply over the medium to long term (15 year horizon) should be disaggregated across major sectors:

- local and major road network capacity;
- freight corridors, passenger and freight rail networks;
- intermodal requirements; and
- car parking space.

SEA PORTS

Market environment

Outline the development of effective port infrastructure, including export supply networks, and linkages with road and rail networks.

Regulatory environment

Describe the regulatory and planning environment.

Existing (and future) infrastructure

Detail the major strategic port infrastructure across the sector, including:

- key bulk commodity and container ports;
- integrated export networks; and
- passenger terminals.

Infrastructure adequacy

Forecast growth in demand and supply over the medium to long term (15 year horizon) should be disaggregated across major sectors:

- coal;
- iron ore;
- wheat and other agricultural commodities;
- other key bulk commodities; and
- containers etc.

Outline the adequacy of existing port infrastructure, including export supply networks.

AIRPORTS

Market environment

Outline the linkages with road and rail networks.

Regulatory environment

Describe the regulatory and planning environment.

Existing (and future) infrastructure

Detail the major strategic airport infrastructure across the sector, including:

- international and major domestic airports;
- key regional airports; and
- significant supporting facilities (air field services, storage, freight, car parking etc).

Infrastructure adequacy

Forecast growth in demand and supply over the medium to long term (15 year horizon) should be disaggregated across major sectors:

- domestic (including major regional) airport capacity;
- international airport capacity; and
- air freight capacity.

ENERGY

Market environment

Outline the development of effective and competitive electricity and gas markets. Particular issues that should be covered include:

- consolidation and vertical integration of energy utilities; and
- generator market power issues.

Regulatory environment

In describing the regulatory and planning environment across the energy sector, include the impact of policy and regulatory reforms such as establishing of the Australian Energy Market Operator (by June 2009) and implementation of greater demand-side management.

Existing (and future) infrastructure

Detail the major strategic energy infrastructure, including:

- electricity generation facilities;
- electricity transmission and distribution assets (including interstate interconnectors);
- gas production, treatment and storage facilities;
- gas transmission and distribution assets; and
- relevant retail assets.

Infrastructure adequacy

Forecast growth in demand and supply over the medium to long term (15 year horizon) should be disaggregated across major sectors:

- generation;
- transmission;
- distribution; and
- gas treatment and storage etc.

TELECOMMUNICATIONS

Market environment

Outline the development of competitive and innovative telecommunications markets. Particular issues that should be covered include:

- access to communications services, including in regional and rural areas; and
- technological change and innovation trends.

Regulatory environment

Describe the regulatory and planning environment.

Existing (and future) infrastructure

Detail the major strategic telecommunications infrastructure across the sector, including:

- fixed line telephony and broadband infrastructure (eg backhaul networks, exchange facilities, last-mile copper connections to premises);
- mobile telephony and wireless networks (including 3G and WiMAX networks); and
- undersea fibre-optic cables.

Infrastructure adequacy

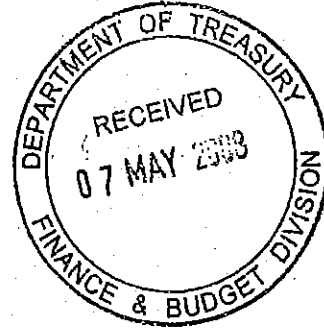
Forecast growth in demand and supply over the medium to long term (15 year horizon) should be disaggregated across major sectors:

- fixed and mobile telephony;
- undersea cables; and
- backhaul etc.



The Hon Anthony Albanese MP

Minister for Infrastructure,
Transport, Regional Development
and Local Government
Leader of the House



Reference: 04292-2008

Mr Neil Bulless
A/g Executive Director
Department of Treasury
GPO Box 158
CANBERRA ACT 2601

Handwritten signature/initials

29 APR 2008

Dear Mr Bulless

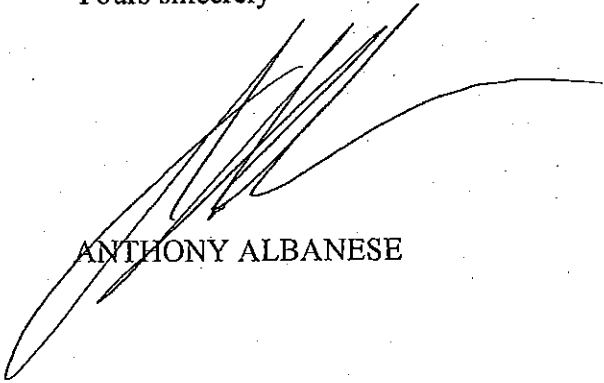
I am writing to you in my capacity as Chair of the Council of Australian Government's Infrastructure Working Group (IWG). At the inaugural meeting of the IWG on 23 January 2008, it was agreed under the proposed terms of reference for a National Infrastructure Audit (listed in agenda item 5) that the Australian Government and each state and territory government will provide advice, as defined elsewhere in the terms of reference, to Infrastructure Australia, concerning water, energy, transport and communications infrastructure by 30 June 2008.

The next meeting of the IWG is set for 22 May 2008 which will be the last meeting we have before the 30 June 2008 deadline. While the content of individual audit contributions is a matter for jurisdictions and will not be reviewed by the IWG, I am keen to ensure that we have all completed our work for transmittal to Infrastructure Australia by 30 June 2008. I would be grateful if you could submit a copy of your jurisdiction's contribution to me by 16 May 2008. The material will not be circulated further. While I note that you may need to seek ministerial or Cabinet clearance, I would nevertheless appreciate a copy of your material in draft form, suitably marked.

On a related issue, the Government is moving to finalise the appointments to the Infrastructure Australia Council and to finalise establishment of an office in Sydney. As you may appreciate, the establishment of an office and recruitment of staff takes time. As an interim arrangement, given Infrastructure Australia's comprehensive workload, I am canvassing the availability of appropriately skilled economic analysts from jurisdictions who may be willing to work on secondment for a period of up to three months and who would work directly to the Chair of Infrastructure Australia, Sir Rod Eddington.

While Infrastructure Australia will be located in Sydney, it is not anticipated that the officers would need to take up residence in Sydney but could continue to work from within their current office as part of a virtual team. There would be a requirement for staff to travel to attend meetings as necessary. Salary and associated costs for the period of the secondment would be able to be met from the Infrastructure Australia allocation of funding. I would appreciate your advice as soon as possible about whether you have any officers at a relatively senior level who could be seconded to Infrastructure Australia.

Yours sincerely

A handwritten signature in black ink, appearing to read 'ANTHONY ALBANESE', written over a horizontal line.

ANTHONY ALBANESE

National Infrastructure Audit

ACT

TRANSPORT INFRASTRUCTURE

TERRITORY and MUNICIPAL SERVICES

MAY 2008

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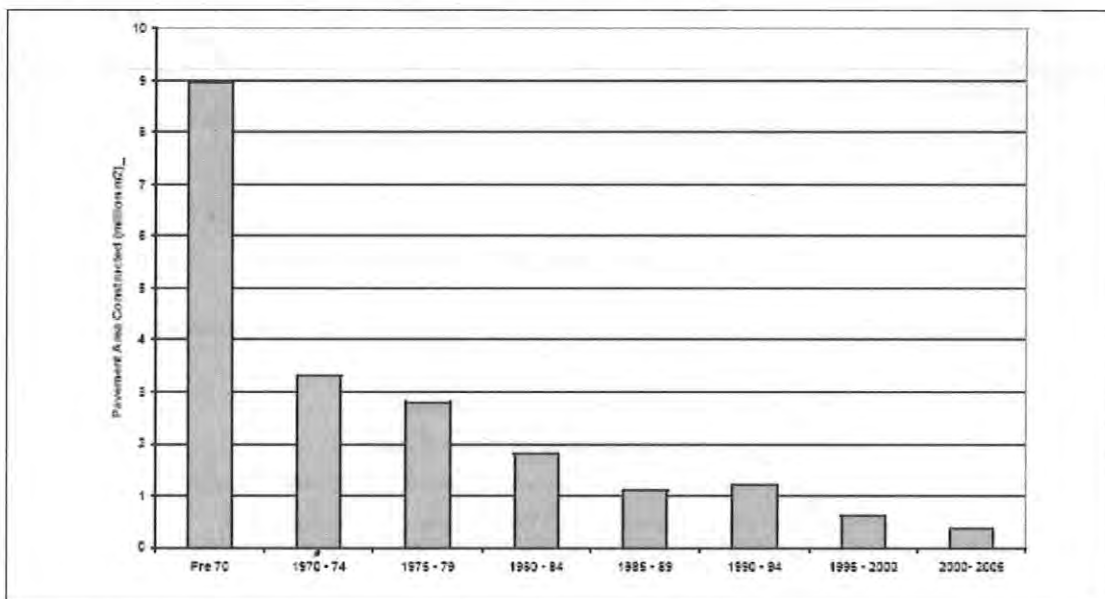
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1. REGIONAL TRANSPORT INFRASTRUCTURE SUMMARY

The Territory and Municipal Services (TAMS) infrastructure responsibility is restricted to the transport network, which comprises municipal and territorial road corridors, stormwater systems, traffic signal systems, line marking networks, signs, community paths (pedestrian and cycle) and streetlights.

In 2005 the Engineers Australia Infrastructure audit gave the ACT transport infrastructure a B rating, classifying it as being the best in the country. This compared to an average C rating across the country. The nearest by comparison was WA with a B- rating, the rest being either C or C-.

Significantly, as at 2003 the average age of the arterial (Territorial) road network was around 28 years. Some 70% of territorial roads in the ACT were more than 10 years old and approximately 54% older than 15 years whilst approximately 40% of the municipal road network was older than 10 years. It was estimated that more than 60% of municipal roads have surfacing older than 10 years and 33% have surfacing older than 15 years. The age distribution of the ACT road assets is shown below.



Age distribution, ACT roads network (Source: Roads Asset Management Plan 2004-2007).

This graph is also used as an indicator to the age of the ancillary asset groups such as lighting, stormwater runoff, signage etc, as in most cases this was installed at the same time that the road was constructed.

The Engineers Australia rating indicates that notwithstanding the age profile, the Territory Government has been able to keep the network in good condition, and that by comparison with other States and the Northern Territory the network is well managed.

The Roads Asset Management Plan 2004-2007 has indicated that the following conditions apply to each of the major asset groups. As can be seen an average of 24% of the assets are in the poor to very poor range, with road marking, bridge structures, street lights and some road pavements within this range.

	Asset Condition (%) (1)				
	Excellent (%)	Good (%)	Fair (%)	Poor (%)	Very Poor (%)
Road Pavements					
Territorial	6	32	31	24	7
Municipal	2	29	35	28	6
Bridges					
Structures	5	20	30	40	5
Stormwater					
Channels	30	20	10	10	10
Pipes	20	30	20	10	20
Dams & Weirs	10	90	0	0	0
Traffic Signals	23	38	28	11	0
Line marking					
Territorial	0	69	19	12	0
Municipal	0	31	19	50	0
Raised pavement	0	90	0	10	0
Painted	0	46	30	24	0
Signs					
Sign Blades	0	5.5	89.6	4.9	0
Community paths					
Paths	36	25	27	8	0
Street lights					
Luminaires	60	1	9	20	10
Cables	70	1	10	10	9
Control points	60	1	8	30	1
Luminaire	50	1	5	25	20
AVERAGE	22	31	22	19	5

(1) Based on the ARRB "ARRB "Strategic Study into Asset Management, Condition, Audit and the Development of Performance Based Standards" and comprised of:

- a sample of 5% Territorial and 5% Municipal Roads;
- a sample of 5% of 400 strategically important bridges;
- condition of 235 poles, 1700 lamps and 25 sets of signals were checked;
- a sample of 2% line marking and 235 Directional (Guide) Signs; and
- a sample of 5% community paths.

2. INFRASTRUCTURE ADEQUACY

The underlying statements describe the issues that contribute to the inadequacy of some elements of the transport network to fail.

TRANSPORT INFRASTRUCTURE

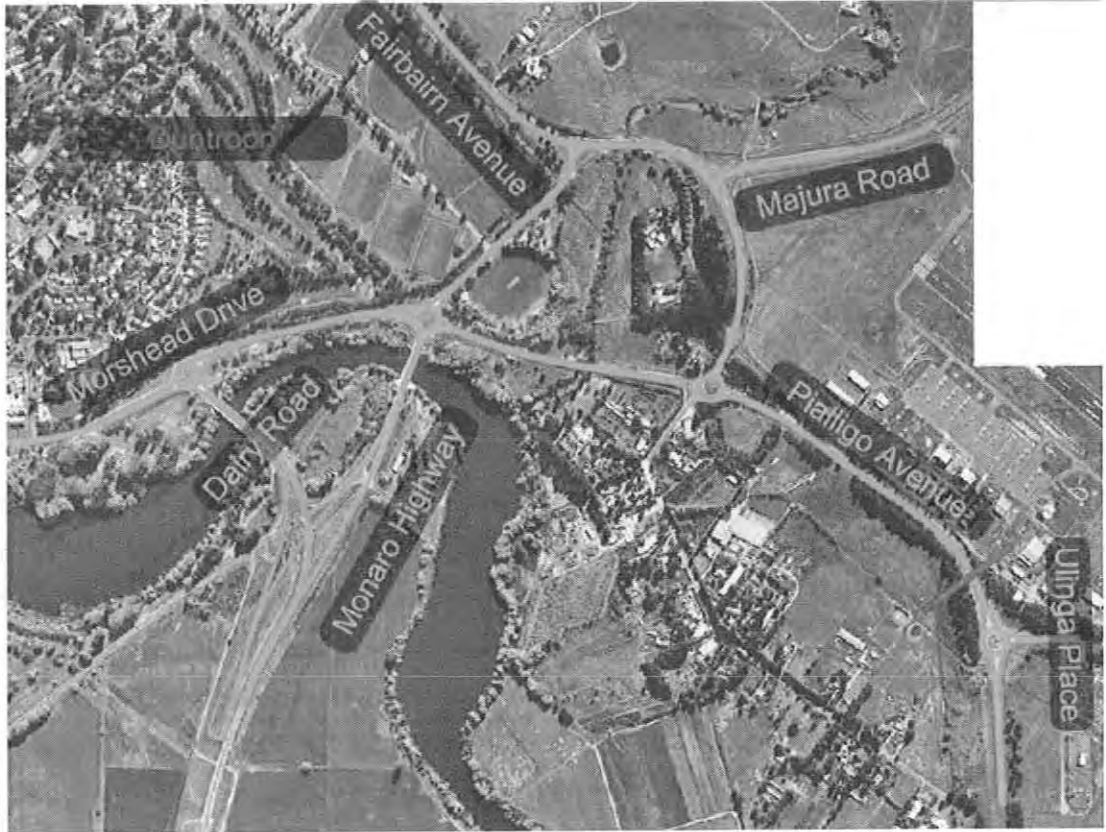
2.1. Utilisation Issues

Regional traffic from NSW is a significant user of roads in the vicinity of the airport. The traffic from Queanbeyan and the surrounding NSW regions passing the Canberra airport along Pialligo Avenue generates almost 90% of the morning peak city bound traffic. Commercial traffic on the Monaro Highway and Majura Road represent some 16% of the total traffic presently utilising the connection between the Monaro Highway, Majura Road and the Federal Highway. This is an important freight route within the ACT but also serving regional NSW.

Traffic in the vicinity of the Canberra airport has increased over the last few years with the continuing growth in Gungahlin and increased employment at the airport. The roads in the vicinity of the airport play an important role for the ACT economy, the surrounding New South Wales (NSW) region and nationally given the importance of the Monaro Highway as a freight route connection to the Federal Highway.

A report has been done by Roads ACT that looks at an improvement option for traffic flows on the road network in the area between Duntroon and the Canberra Airport. At this location five major arterials converge namely Majura Parkway, Pialligo Avenue, Monaro Highway, Fairbairn Avenue and Morshead Drive.

The plan below describes the extent of this proposed works.



Main Arterial Roads around Airport

The results of a benefit cost analysis show that the considered option is economically feasible. This is based on the two obtained key performance indicators, namely the Net Present Value (NPV) and the Benefit Cost Ratio (BCR). The considered option produces a NPV equating to ~ \$125 million over the 25 years span life of the project at a 7% discount rate. The estimated BCR for this option is ~3.9 using a 7% discount rate.

This project is offered for consideration for the National Infrastructure committee.

2.2. Other peripheral transport elements

The other transport infrastructure elements include bridges, stormwater systems, traffic signals, line marking networks, signage, community paths and street lights.

None of these elements are of national significance and will not be considered for this study.

3. SUMMARY

The transport infrastructure elements in the ACT that are of a national significance are very few and far between. The most significant project worthy of immediate consideration is the Federal Highway, Majura Parkway and Monaro Highway connection which would have significant financial and community benefits.

In light of the NSW bid for Commonwealth funds to plan for the duplication of the Barton highway it is considered appropriate that the ACT portion of the Highway be also included for duplication.

Department of Treasury



The Hon Anthony Albanese MP
Minister for Infrastructure,
Transport, Regional Development
and Local Government
Leader of the House
PARLIAMENT HOUSE
CANBERRA ACT 2600

Dear Mr Albanese

I am writing in response to your letter of 29 April 2008, which is seeking a draft copy of the ACT's response to the National Infrastructure Audit by 16 May 2008. Unfortunately, we will not be in a position to submit a draft return by this date.

Working to a 30 June 2008 deadline, we have requested that information from the relevant ACT Government Departments and Corporations be provided to Treasury by 23 May 2008. Following a consolidation of the returns, we will be in a position to provide a draft response to your office shortly after this date.

I would however like to take the opportunity to assure you that we are on track to meet the deadline of 30 June 2008, for submitting our contribution to the National Infrastructure Audit.

On a separate issue, you are seeking appropriately skilled economic analysts to work on secondment to the Chair of Infrastructure Australia for a period of up to three months. As you would appreciate, the ACT is a small jurisdiction with limited resources, as such, we do not currently have any resources available for secondment.

Should you have any queries regarding this matter, please contact Marsha Guthrie on 6207 3998.

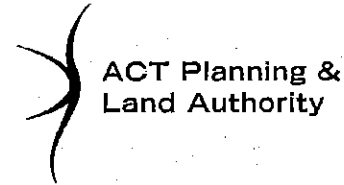
Yours sincerely

Neil Bulless
A/g Executive Director
Finance and Budget Division
14 May 2008



TSY-908/471

213



Our Reference: 08/06038 - A4005508

Ms Megan Smithies
Under Treasurer
Department of Treasury
GPO Box 158
CANBERRA ACT 2601

Richard Kingham
cc. Khalid

Megan
Dear Ms Smithies

I refer to your letter of 28 April 2008 seeking input from agencies on nationally significant infrastructure projects.

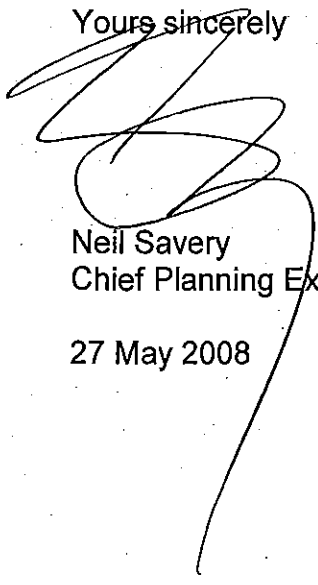
After reviewing the information provided, the ACT Planning and Land Authority (the Authority) would like to suggest the following infrastructure projects for your consideration:

- **Majura Parkway / Associated Airport Road Upgrade**
This work will improve the traffic arrangements to and from the airport and the links to Gungahlin, Federal Highway and Monaro Highway. The route became part of a National Highway Framework linking Sydney to Canberra, Canberra airport and the ski fields.
- **Very Fast Train**
Alignment provision for possible future route through the Majura Valley. A rail alignment also provides a future freight capability consistent with energy noted debates on rail freight movement.
- **Cotter Dam Upgrade**
The Dam is located within the Murrumbidgee River catchment of the Murray-Darling Basin and is to be greatly enlarged from its current 4 gigalitre capacity to 78 gigalitres. The resultant water supply is critical to regional settlement patterns.
- **Scrivener Dam and Lake Burley Griffin**
The showpiece of the National Capital; an essential component of flood control / water quality in the Murrumbidgee catchment.
- **Public Transport Infrastructure**
Completion of the planning and costing for a 21st century public transport system. The incremental implementation for which needs to commence now if it is to be in place to deal with the rising cost of petrol and climate change adaptation.

- **Canberra Central**
The City Centre continues to grow with significant development sites being released to the market, but infrastructure augmentation, quality of the public realm and accessibility continue to languish. Investment along the lines of what was recommended by the Canberra Central Taskforce is now necessary over a twenty-year time horizon.

Should you require any additional information regarding these projects please contact me and I will arrange for further briefing material to be provided.

Yours sincerely



Neil Savery
Chief Planning Executive

27 May 2008

[REDACTED]

From: [REDACTED]
Sent: Tuesday, 10 June 2008 3:02 PM
To: [REDACTED]
Cc: [REDACTED]
Subject: FW: CMD IA Submission on High Speed Rail

Below is what we have received from TAMS in response to our request for input into the National Infrastructure Audit. When compared with the work CMD have produced, I don't believe this will be adequate.

As per the below email, I have gone back to Sue and asked for some further information (Dan S has also spoken to Sue about this).

This might need to be raised with TAMS at a more senior level.

[REDACTED]



Majura Parkway
Pialligo Ave.pd...



Report.doc



Summary
Majura.doc

From: [REDACTED]
Sent: Tuesday, 10 June 2008 2:54 PM
To: [REDACTED]
Cc: [REDACTED]
Subject: FW: CMD IA Submission [REDACTED]

Having read through the attached Submission from CMD, I think we need to have another look at the work on Majura. It would be great if we could put something to IA in a consistent format, that reads like the attached.

I'm sorry to ask again, but is possible to have another look at this and get something back to me by Friday?

hanks

[REDACTED]

[REDACTED] | A/G SENIOR MANAGER | BUDGET STRATEGY AND REPORTING | FINANCE AND BUDGET DIVISION | ACT
TREASURY
PH: 02 6207 0234 | FAX: 02 6207 0298

From: [REDACTED]
Sent: Tuesday, 10 June 2008 11:24 AM
To: [REDACTED]
Cc: [REDACTED]
Subject: FW: CMD IA Submission [REDACTED]

[REDACTED]

Executive Summary, Majura Parkway Project

A key component of Canberra's major road network is the completion of the peripheral parkway system which plays an important role in the economic growth of the ACT. The recent completion of the Gungahlin Drive Extension has seen the completion of the western peripheral parkway and the Majura Parkway (an extension of the Monaro Highway to the Federal Highway) and will see the completion of the eastern peripheral parkway. The importance of these infrastructure connections to the ACT economy are identified in the Canberra Plan. A pre-design study has considered the costs, benefits and economic feasibility of providing an alternative road network improvement option to address the traffic congestion problem and its travel cost consequences on the considered Pialligo Avenue and Majura Road network.

Modelling was used to demonstrate the severity of the current peak traffic congestion problems and the expected further deterioration of the traffic conditions in this network. The modelling was also used to obtain key performance indicators including the number of vehicle kilometres travelled as well as number of vehicle hours travelled both for the existing road network as well as for the considered option in the years 2006, 2016 and 2031. These were used in accordance with RTA Economic Analysis Manual to estimate travel-related costs for each option, and included the costs of the following:

Travel related Costs

- Vehicle operation
- Travel time
- Accidents

Construction Costs

- Capital construction
- Contingencies
- Design
- Supervision
- Annual and cyclic maintenance

The travel benefits for the considered option were determined by subtracting the travel related costs of the improvement option from those travel related costs of the do nothing scenario i.e. the existing road network staying as it is with no future intervention.

The results of the subsequent cost/benefit analysis show that the improvement option is economically feasible, as the Net Present Value (NPV) over the 25 years span life of the road at a 7% discount rate equates to ~ \$125 million. Using the same 7% discount rate, the estimated cost benefit ratio for this option is ~3.9.

In addition, this option allows the ACT government to immediately fund the construction of the Majura Parkway Stage 1, and to seek a shared funding with Auslink for the grade separation to be opened by the year 2013 or before, with a 1 year design period and a 2 year construction period.

[Redacted]

From: [Redacted]
Sent: Thursday, 5 June 2008 12:18 PM
To: [Redacted]
Subject: Majura Parkway
Attachments: Summary Majura.doc

[Redacted]

Please find attached the precis version of the Majura Parkway/Monaro Highway document.

Kind Regards,

[Redacted]

Community and Infrastructure Services
Territory And Municipal Services

[Redacted]

Executive Summary, Majura Parkway Project

A key component of Canberra's major road network is the completion of the peripheral parkway system which plays an important role in the economic growth of the ACT. The recent completion of the Gungahlin Drive Extension has seen the completion of the western peripheral parkway and the Majura Parkway (an extension of the Monaro Highway to the Federal Highway) and will see the completion of the eastern peripheral parkway. The importance of these infrastructure connections to the ACT economy are identified in the Canberra Plan. A pre-design study has considered the costs, benefits and economic feasibility of providing an alternative road network improvement option to address the traffic congestion problem and its travel cost consequences on the considered Pialligo Avenue and Majura Road network.

Modelling was used to demonstrate the severity of the current peak traffic congestion problems and the expected further deterioration of the traffic conditions in this network. The modelling was also used to obtain key performance indicators including the number of vehicle kilometres travelled as well as number of vehicle hours travelled both for the existing road network as well as for the considered option in the years 2006, 2016 and 2031. These were used in accordance with RTA Economic Analysis Manual to estimate travel-related costs for each option, and included the costs of the following:

Travel related Costs

- Vehicle operation
- Travel time
- Accidents

Construction Costs

- Capital construction
- Contingencies
- Design
- Supervision
- Annual and cyclic maintenance

The travel benefits for the considered option were determined by subtracting the travel related costs of the improvement option from those travel related costs of the do nothing scenario i.e. the existing road network staying as it is with no future intervention.

The results of the subsequent cost/benefit analysis show that the improvement option is economically feasible, as the Net Present Value (NPV) over the 25 years span life of the road at a 7% discount rate equates to ~ \$125 million. Using the same 7% discount rate, the estimated cost benefit ratio for this option is ~3.9.

In addition, this option allows the ACT government to immediately fund the construction of the Majura Parkway Stage 1, and to seek a shared funding with Auslink for the grade separation to be opened by the year 2013 or before, with a 1 year design period and a 2 year construction period.

National Infrastructure Audit

ACT

TRANSPORT INFRASTRUCTURE

TERRITORY and MUNICIPAL SERVICES

MAY 2008

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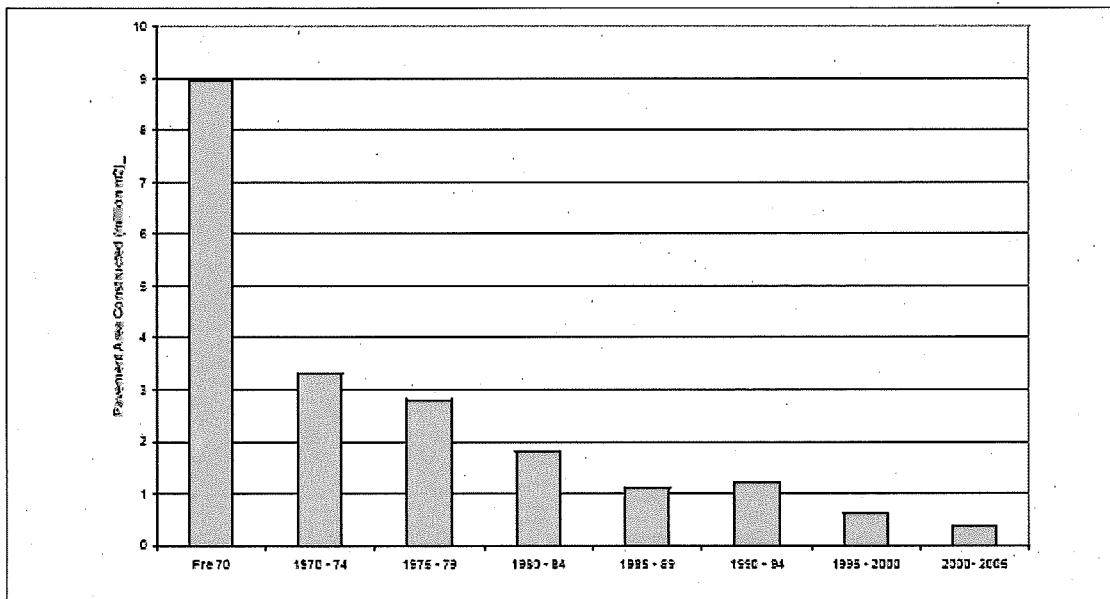
3. SUMMARY 7

1. REGIONAL TRANSPORT INFRASTRUCTURE SUMMARY

The Territory and Municipal Services (TAMS) infrastructure responsibility is restricted to the transport network, which comprises municipal and territorial road corridors, stormwater systems, traffic signal systems, line marking networks, signs, community paths (pedestrian and cycle) and streetlights.

In 2005 the Engineers Australia Infrastructure audit gave the ACT transport infrastructure a B rating, classifying it as being the best in the country. This compared to an average C rating across the country. The nearest by comparison was WA with a B- rating, the rest being either C or C-.

Significantly, as at 2003 the average age of the arterial (Territorial) road network was around 28 years. Some 70% of territorial roads in the ACT were more than 10 years old and approximately 54% older than 15 years whilst approximately 40% of the municipal road network was older than 10 years. It was estimated that more than 60% of municipal roads have surfacing older than 10 years and 33% have surfacing older than 15 years. The age distribution of the ACT road assets is shown below.



Age distribution, ACT roads network (Source: Roads Asset Management Plan 2004-2007).

This graph is also used as an indicator to the age of the ancillary asset groups such as lighting, stormwater runoff, signage etc, as in most cases this was installed at the same time that the road was constructed.

The Engineers Australia rating indicates that notwithstanding the age profile, the Territory Government has been able to keep the network in good condition, and that by comparison with other States and the Northern Territory the network is well managed.

**ACT Infrastructure Audit
Territory and Municipal Services
May 2008**

The Roads Asset Management Plan 2004-2007 has indicated that the following conditions apply to each of the major asset groups. As can be seen an average of 24% of the assets are in the poor to very poor range, with road marking, bridge structures, street lights and some road pavements within this range.

	Asset Condition (%) (1)				
	Excellent (%)	Good (%)	Fair (%)	Poor (%)	Very Poor (%)
Road Pavements					
Territorial	6	32	31	24	7
Municipal	2	29	35	28	6
Bridges					
Structures	5	20	30	40	5
Stormwater					
Channels	30	20	10	10	10
Pipes	20	30	20	10	20
Dams & Weirs	10	90	0	0	0
Traffic Signals	23	38	28	11	0
Line marking					
Territorial	0	69	19	12	0
Municipal	0	31	19	50	0
Raised pavement	0	90	0	10	0
Painted	0	46	30	24	0
Signs					
Sign Blades	0	5.5	89.6	4.9	0
Community paths					
Paths	36	25	27	8	0
Street lights					
Luminaires	60	1	9	20	10
Cables	70	1	10	10	9
Control points	60	1	8	30	1
Luminaire	50	1	5	25	20
AVERAGE	22	31	22	19	5

(1) Based on the ARRB "ARRB "Strategic Study into Asset Management, Condition, Audit and the Development of Performance Based Standards" and comprised of:

- a sample of 5% Territorial and 5% Municipal Roads;
- a sample of 5% of 400 strategically important bridges;
- condition of 235 poles, 1700 lamps and 25 sets of signals were checked;
- a sample of 2% line marking and 235 Directional (Guide) Signs; and
- a sample of 5% community paths.

2. INFRASTRUCTURE ADEQUACY

The underlying statements describe the issues that contribute to the inadequacy of some elements of the transport network to fail.

TRANSPORT INFRASTRUCTURE

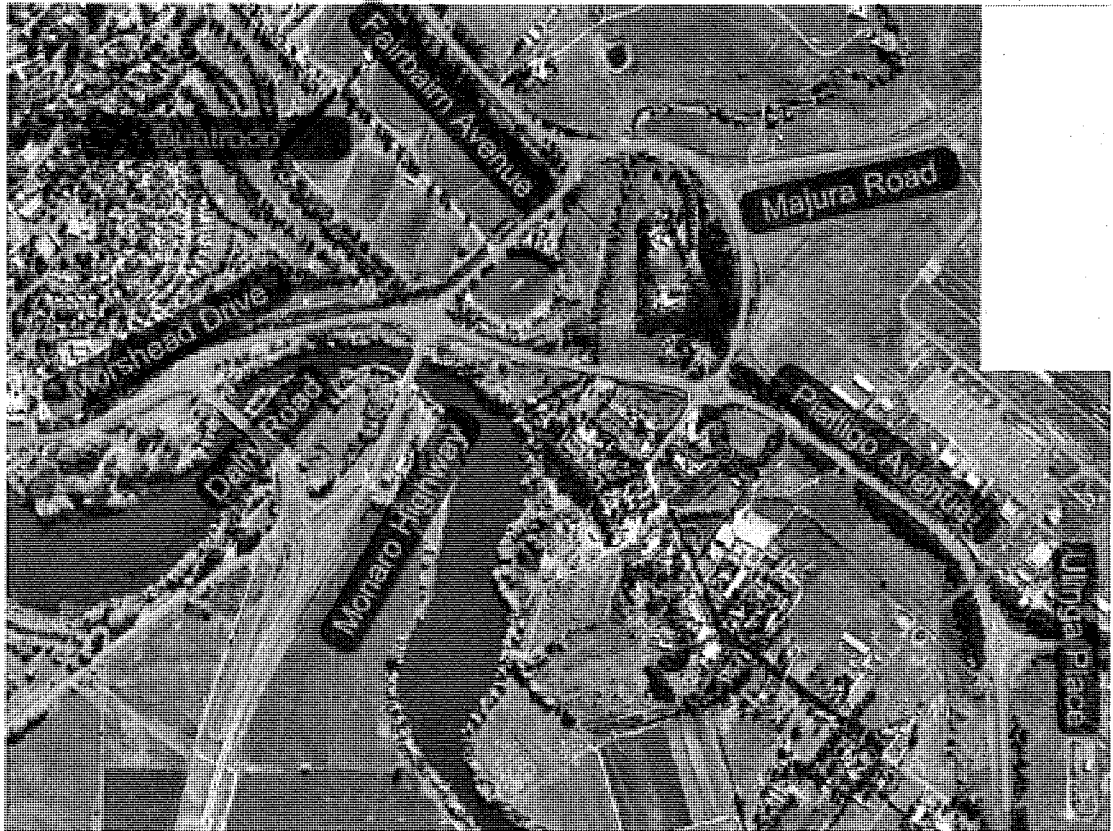
2.1. Utilisation Issues

Regional traffic from NSW is a significant user of roads in the vicinity of the airport. The traffic from Queanbeyan and the surrounding NSW regions passing the Canberra airport along Pialligo Avenue generates almost 90% of the morning peak city bound traffic. Commercial traffic on the Monaro Highway and Majura Road represent some 16% of the total traffic presently utilising the connection between the Monaro Highway, Majura Road and the Federal Highway. This is an important freight route within the ACT but also serving regional NSW.

Traffic in the vicinity of the Canberra airport has increased over the last few years with the continuing growth in Gungahlin and increased employment at the airport. The roads in the vicinity of the airport play an important role for the ACT economy, the surrounding New South Wales (NSW) region and nationally given the importance of the Monaro Highway as a freight route connection to the Federal Highway.

A report has been done by Roads ACT that looks at an improvement option for traffic flows on the road network in the area between Duntroon and the Canberra Airport. At this location five major arterials converge namely Majura Parkway, Pialligo Avenue, Monaro Highway, Fairbairn Avenue and Morshead Drive.

The plan below describes the extent of this proposed works.



Main Arterial Roads around Airport

The results of a benefit cost analysis show that the considered option is economically feasible. This is based on the two obtained key performance indicators, namely the Net Present Value (NPV) and the Benefit Cost Ratio (BCR). The considered option produces a NPV equating to ~ \$125 million over the 25 years span life of the project at a 7% discount rate. The estimated BCR for this option is ~3.9 using a 7% discount rate.

This project is offered for consideration for the National Infrastructure committee.

2.2. Other peripheral transport elements

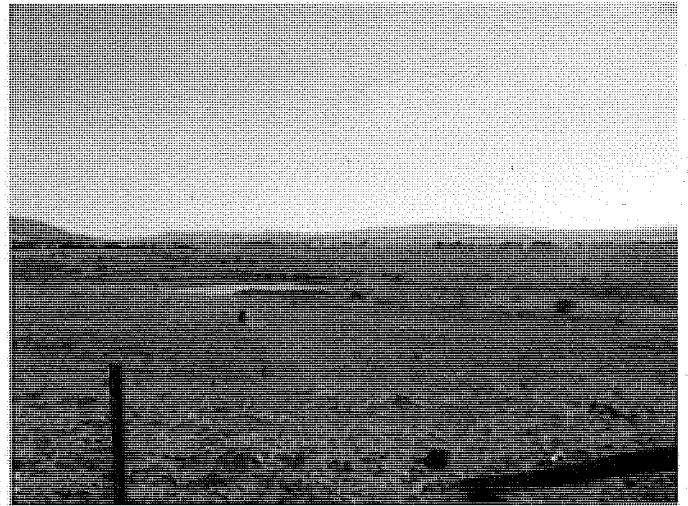
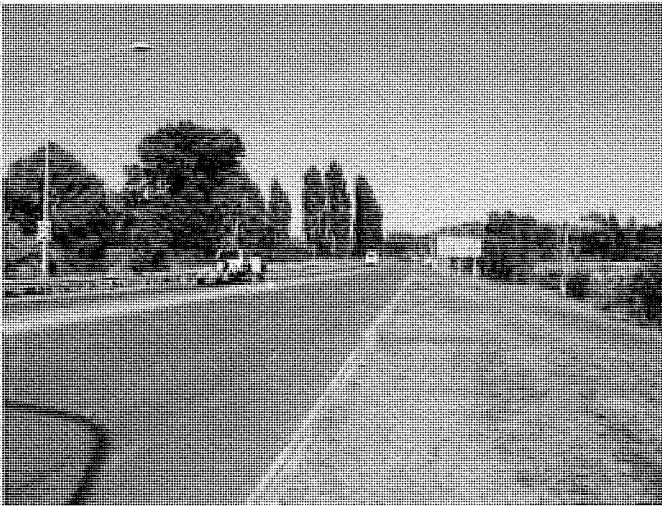
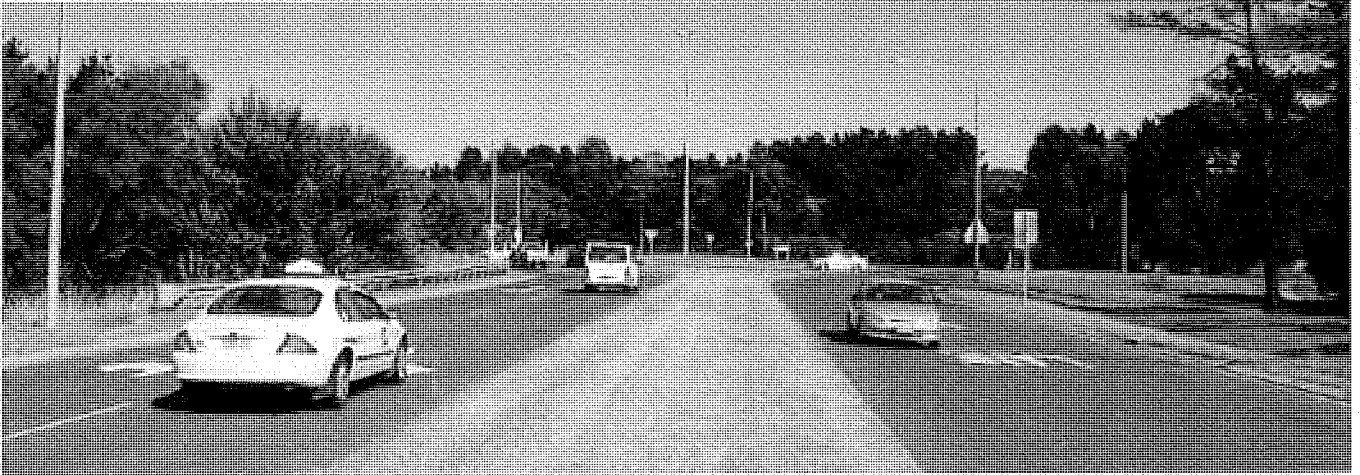
The other transport infrastructure elements include bridges, stormwater systems, traffic signals, line marking networks, signage, community paths and street lights.

None of these elements are of national significance and will not be considered for this study.

3. SUMMARY

The transport infrastructure elements in the ACT that are of a national significance are very few and far between. The most significant project worthy of immediate consideration is the Federal Highway, Majura Parkway and Monaro Highway connection which would have significant financial and community benefits.

In light of the NSW bid for Commonwealth funds to plan for the duplication of the Barton highway it is considered appropriate that the ACT portion of the Highway be also included for duplication.



Report

MAJURA PARKWAY / PIALLIGO AVENUE ECONOMIC ANALYSIS REPORT

21st November 2007

AUSTRALASIA | ASIA | MIDDLE EAST | AFRICA | PACIFIC

Document / Report Control Form

Project Name: **Majura Parkway / Pialligo Avenue Options Review**

Project number: **3002048**

Report for: **ACT Procurement Solutions**

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Executive Summary

Introduction

Traffic in the vicinity of the Canberra airport has increased over the last few years with the continuing growth in Gungahlin and increased employment at the airport. The roads in the vicinity of the airport play an important role for the ACT economy, the surrounding New South Wales (NSW) region and nationally given the importance of the Monaro Highway as a freight route connection to the Federal Highway.

This report presents the findings of assessing a considered road network improvement option to improve traffic flows on the road network in the area between Duntroon and the Canberra Airport. At this location five major arterials converge namely Majura Road, Pialligo Avenue, Monaro Highway, Fairbairn Avenue and Morshead Drive.

Objectives

The main objectives of this study are:

1. Update previous economic analysis which was undertaken as part of the Pialligo Avenue Options review (Feb. 2007) of alignment options. This study reflects up to date construction staging and construction cost estimates. Note, Paramics modelling was performed as part of the previous economic analysis and has **not** been revised based upon the modified construction staging.

Results

Microsimulation runs for the years 2006, 2016 and 2031 were conducted using the Paramics model for the existing road network as well as for the considered network improvement options (albeit with a slight modification to the construction staging). The overall network performance indicators for each of the micro-simulation runs are displayed. These include the amount of released vehicles and their percentage relative to demand volumes, vehicle hours travelled and vehicles kilometres travelled. The output results look logical with a reduced proportion of demand being released in future years.

Currently, most of the traffic demand can enter into the network without causing spill over to neighbouring roads. However, such traffic is operating within the network at low level of service i.e. F. If the current network remains without any intervention, it is expected that with increasing traffic demands, there will be queues at the entry points to the network and spill over to neighbouring roads. This will result into peak spreading and delays to a larger number of vehicles. This will be also accompanied by very low Level of Service (LoS) performance of traffic using the Pialligo network.

The proposed road network improvement is expected to avoid the occurrence of the first problem, namely the spill-over of traffic congestion into neighbouring roads as well as the prolonging of the peak traffic hour. However, still with expected future traffic increases, the traffic entering the network is expected to operate at low travelling speeds and hence low LOS performance.

SMEC identified the following stakeholders as potential beneficiaries to the project:

- Canberra Airport Group
- ACT Government
- ACT Government (Land Sales)
- Department of Defence
- RTA & Queanbeyan City Council
- Department of Transport & Regional Services (Auslink)
- National Capital Authority

In order to assess and compare the considered option, an analysis of the costs and benefits of this option compared to the existing road network (do nothing scenario) was undertaken over a 25 year period. An estimate of construction, annual and cyclic maintenance costs for the considered option was conducted. Benefits resulting as savings in Vehicle Operation Costs, Travel Time Costs and

Accident Costs were estimated for each option. The Net Present Value (NPV) and Benefit Cost Ratio (BCR) were then computed for each of the three options using three different discount rates namely 4, 7%, and 10%.

Conclusions

The results of the benefit cost analysis show that the considered option is economically feasible. This is based on the two obtained key performance indicators namely the Net Present Value (NPV) and the Benefit Cost Ratio (BCR). The considered option produces a NPV equating to ~ \$125 million over the 25 years span life of the project at a 7% discount rate. The estimated BCR for this option is ~3.9 using a 7% discount rate.

In addition, this option allows the ACT government to immediately fund the construction of the Majura Parkway Stage 1 and to seek a shared funding with Auslink for the grade separation to be opened by the year 2013 or before with a 1 year design period and a 2 year construction period.

1 Introduction

Traffic in the vicinity of the Canberra airport has increased over the last few years with the continuing growth in Gungahlin and increased employment at the airport. The roads in the vicinity of the airport play an important role for the ACT economy, the surrounding New South Wales (NSW) region and nationally given the importance of the Monaro Highway as a freight route connection to the Federal Highway.

This report presents the findings of assessing a considered road network improvement option to improve traffic flows on the road network in the area between Duntroon and the Canberra Airport. At this location five major arterials converge namely Majura Road, Pialligo Avenue, Monaro Highway, Fairbairn Avenue and Morshead Drive. The study area is shown in Figure 1. As stated, the current road network at this point of convergence experiences considerable traffic congestion during peak periods and has been highlighted by a number of previous studies as requiring upgrading. In addition, further increase in traffic volumes is expected when Gungahlin is fully established, further development has taken place in the surrounding NSW region and the employment at the airport reaches levels as outlined in its master plan. In this context, the provision of relieving measures for the increased traffic in the vicinity of the airport is an important initiative that will benefit the region. A road network option capable of accommodating the ultimate traffic generated would include a future Majura Parkway and an upgraded Pialligo Avenue.

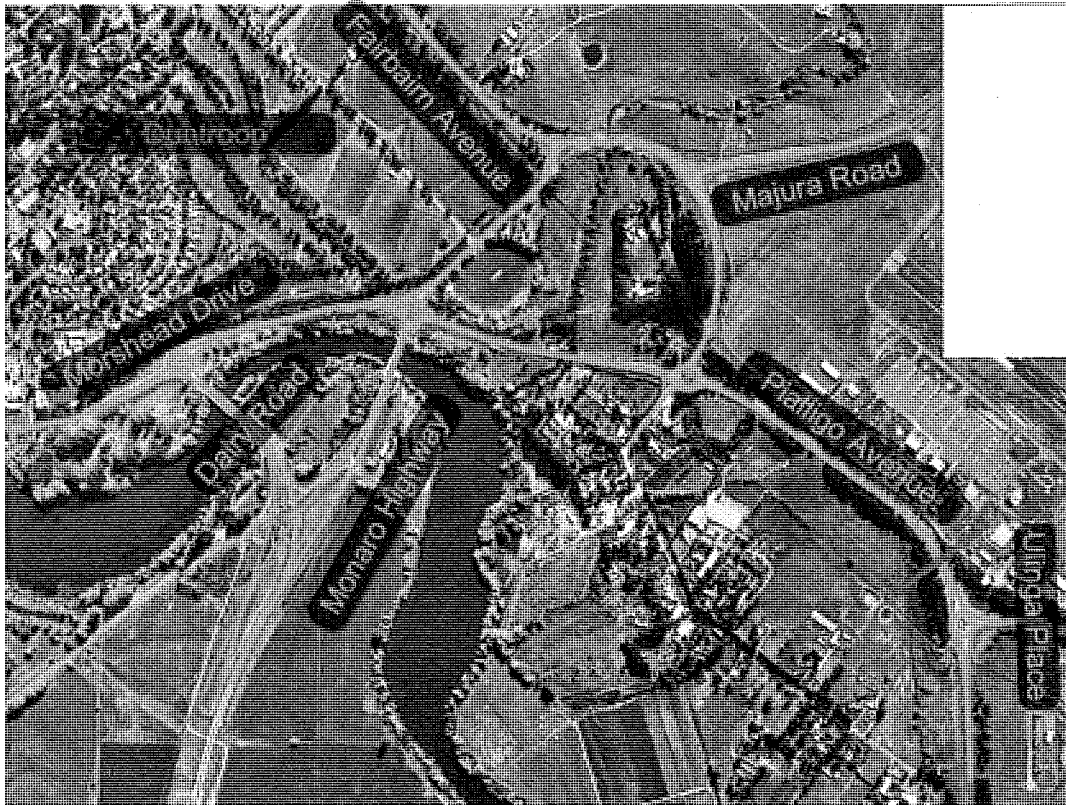


Figure 1 – Study area showing main arterial roads

1.1 Background

Prior to this option review, SMEC Australia was commissioned by the ACT Government to design the following roadworks:

- Duplication of Morshead Drive from Dairy Road to Pialligo Avenue; and
- Duplication of Pialligo Avenue from Morshead Drive to Ulinga Place.

During execution of the above works, SMEC was also commissioned to conduct an economic analysis for the considered road network improvement.

During the Preliminary Sketch Plan (PSP) phase of this project, traffic modelling suggested that an alternative scope of works would result in a greater alleviation of traffic congestion for the region. A Preliminary Sketch Plan submission was subsequently completed for this alternative scope of works which included:

- Single eastbound bypass lane at Dairy Road/Morshead Drive roundabout, thus enhancing the capacity of the roundabout. This will be accompanied (in its ultimate configuration) by part time signals at the roundabout;
- Duplication Morshead Drive between Dairy Road and Monaro Highway;
- Three phase traffic signals at Monaro Highway/Morshead Drive with banned right turns from Morshead to Monaro and from Pialligo to Morshead. This will replace the current roundabout;
- Widening of Morshead Drive between Pialligo Ave and Fairbairn Ave;
- Duplication of Fairbairn Avenue between Morshead Drive and Majura Road (including a new bridge over Woolshed Creek.

A separate project being undertaken by Hughes Trueman relates to this work and includes:

- Duplication of Pialligo Ave between Fairbairn Ave/Beltana Road intersection and a new airport access (Currently at Ulinga Place)

After completion of the PSP design, a number of events occurred that have instigated the need to re-assess the priority and scope of works to be undertaken in the study area. These events include:

- Further development of the design of the proposed Majura Parkway
- An increase in traffic due to developments occurring at the Canberra Airport and Gungahlin; and
- Working Group Meeting in September 2006

1.2 Scope

This study documents an economic analysis of the considered option for the area. In agreement with ACT Procurement Solutions one option was assessed relative to the continuation of the existing condition.

1. **Base:** The existing road network to be taken as the Base to which comparisons will be made, see Figure 2.

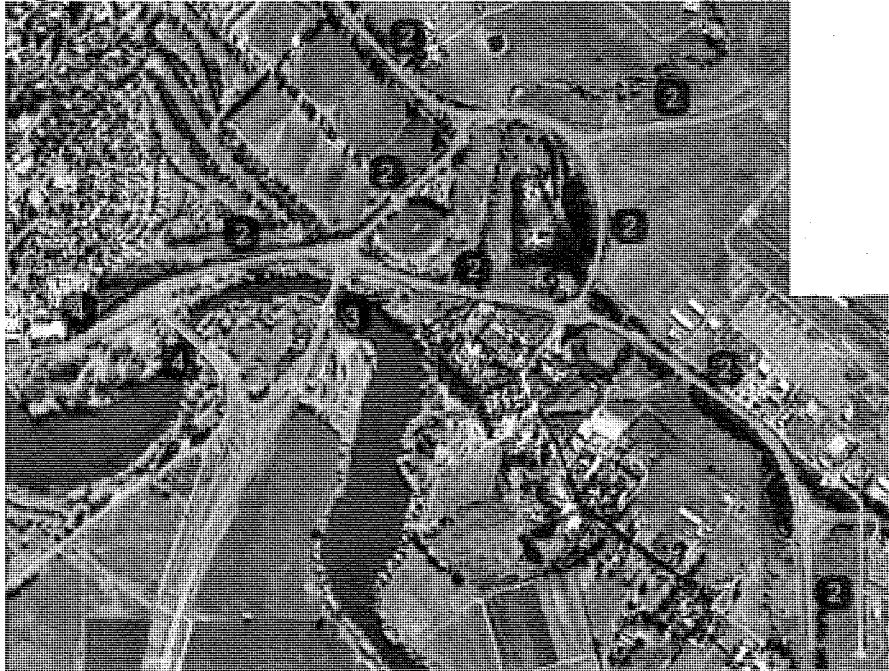


Figure 2 – Existing Road Network with lane counts indicated

2. **Considered option:** This option is a three phase option.

Phase I

Phase I incorporates the Pialligo Ave Stage 1a and 1b works and the Airport Works to be undertaken during 2008 (completed by 2009) and includes:

- Pialligo Stage 1a - Bypass lane for the Dairy Road/Morshead Drive roundabout;
- Pialligo Stage 1a - Duplication of Morshead Drive between Dairy Road and Monaro Hwy.
- Pialligo Stage 1a - Widening of Pialligo Ave between the Monaro Hwy and Woolshed Creek.
- Pialligo Stage 1a - The replacement of the Monaro Highway/Morshead Drive/Pialligo Avenue roundabout with a traffic signal;
- Pialligo Stage 1a - Widening of the Monaro Hwy on the southern side to Silvia Curley Bridge plus 5 lanes over Sylvia Curley Bridge;
- Pialligo Stage 1a - Widening of Morshead Drive between Pialligo Ave and Fairbairn Ave.
- Pialligo Stage b - Duplication of Fairbairn Avenue (including the provision of a second bridge over Woolshed Creek) between Morshead Drive and Majura Road plus intersection works at Majura Road;
- Airport Works – Duplication of Pialligo Ave between the Beltana Road Roundabout and Brindabella circuit, including a grade separated intersection for airport access.

A diagrammatic representation of these works can be seen in Figure 3 below.

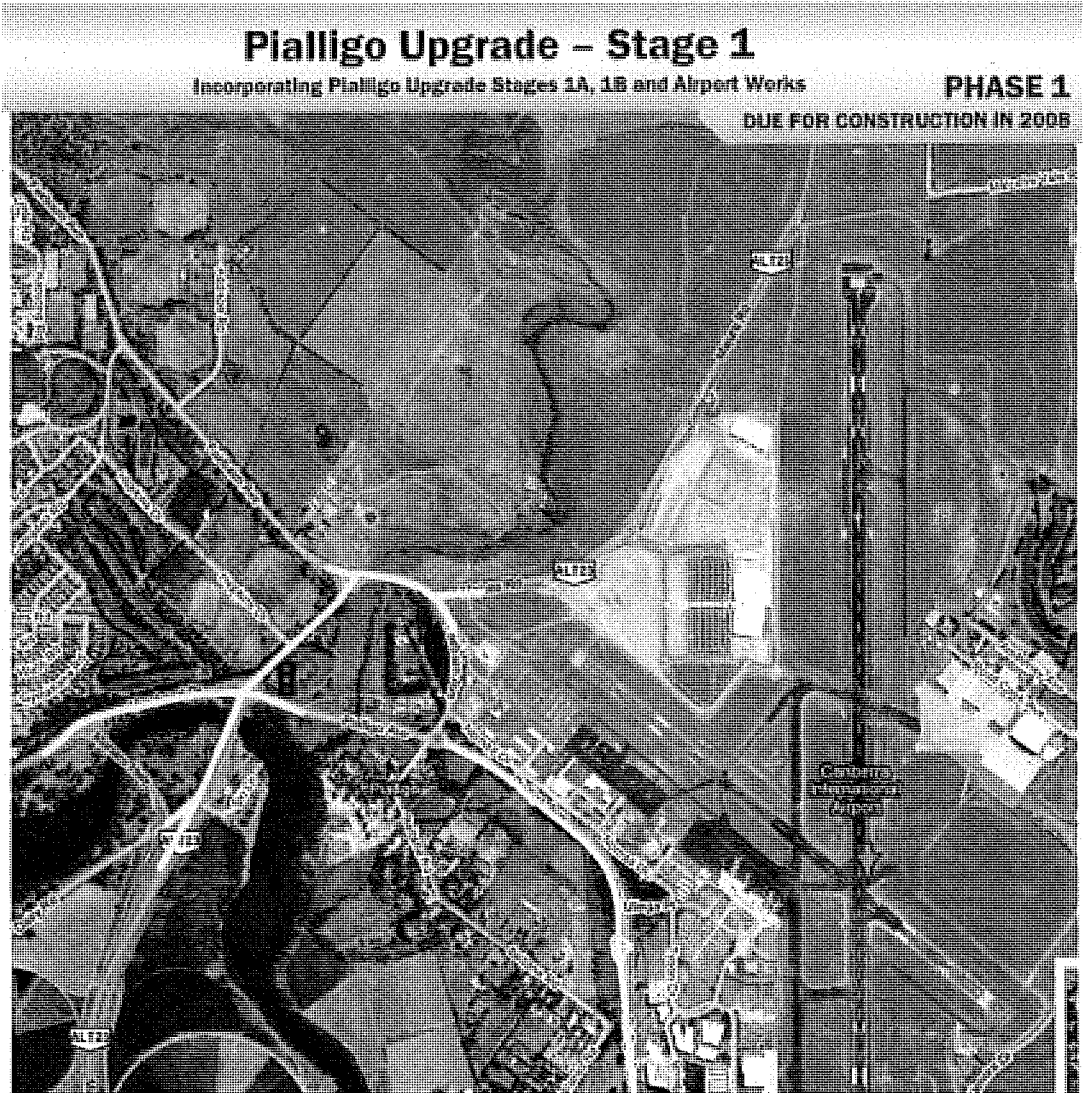
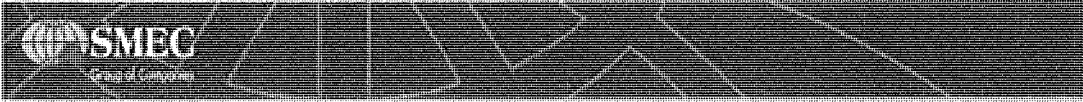


Figure 3: Phase I works – Pialligo Ave Stage 1a; 1b and Airport Works.

Phase II

Phase II incorporates Pialligo Ave Stage 1c works to be undertaken during 2009 (completed by 2010) and includes:

- Pialligo Stage 1c - duplication of Pialligo Avenue (including the provision of a second bridge over Woolshed Creek) between Stage 1a works Airport works including the signalisation of the Beltana Road intersection (currently a roundabout).

A diagrammatic representation of these works can be seen in Figure 4 below.

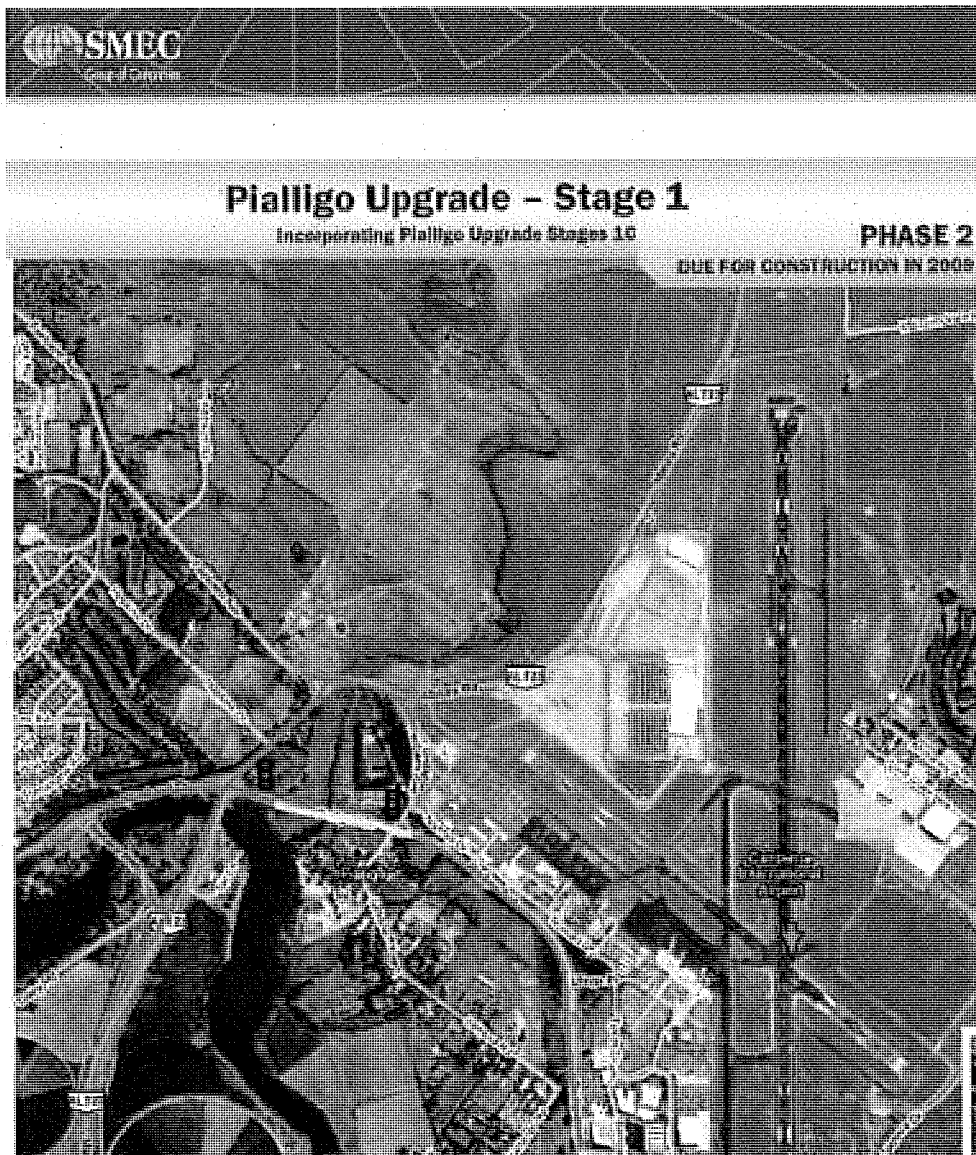


Figure 4: Phase II – Pialligo Stage 1c

Phase III

Phase III incorporates Majura Parkway Stage 1 works to be constructed during 2010 and 2011 (completed by 2012) and includes:

- The first carriageway Majura Parkway construction across the Molonglo River, through RMC land adjacent to Morshead Drive, across Fairbairn Ave, and head north until verging to the East to connect to Majura Road.
- Majura Road intersection works with Majura Parkway (configuration currently unknown).
- Exit ramp from the Majura Parkway northbound onto what is currently referred to as 'Dairy Road Bridge'.
- Exit ramp from the Majura Parkway northbound onto Fairbairn avenue

A diagrammatic representation of these works can be seen in Figure 5 below.

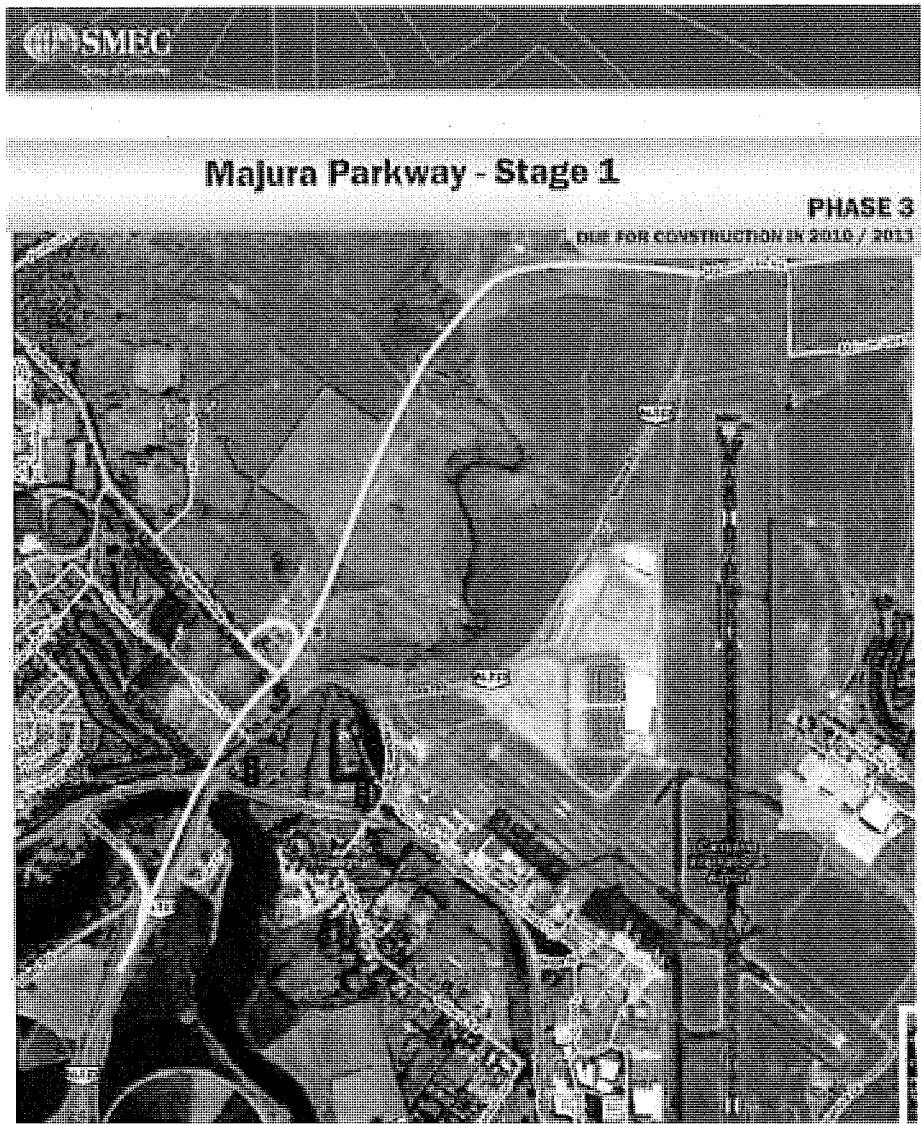


Figure 5: Phase III –Majura Parkway Stage 1.

Phase IV (excluded)

There is a Phase IV component to the ultimate Majura Parkway project, however this component has not been included as part of this revised economic assessment. The Phase IV component includes:

- Duplication of the Majura Parkway which was constructed in Phase III plus associated ramps;
- Extension of the Majura Parkway to the Federal Highway and associated ramps;
- Construction of the Northcott Drive Link Road (Kowen Link Road) and associated ramps;
- Construction of Majura Road and Local Access Road connections in the northern section of the Parkway.
- Signalisation of the Pialligo Ave / Dairy Road Roundabout plus modification to the Monaro Hwy / Pialligo Ave intersection to suit the parkway on ramp provisions.

A diagrammatic representation of these works can be seen in Figure 6 below.

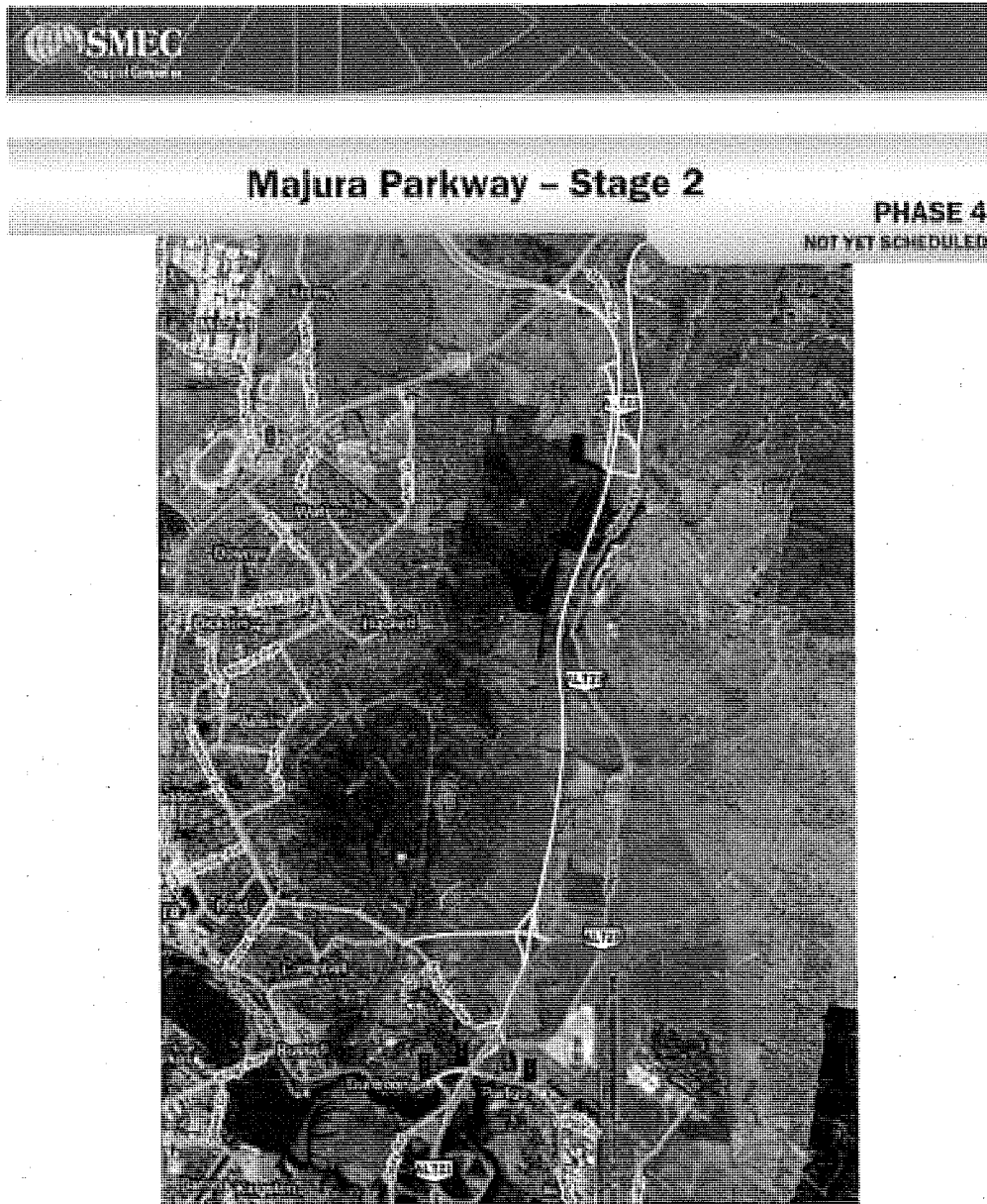
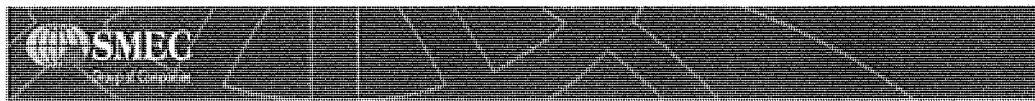


Figure 6: Phase IV - Majura Parkway Stage 2

Ultimate Configuration

All of the above construction stages form part of the ultimate configuration. A diagrammatic representation of these works can be seen in Figure 7 below.



Majura Parkway (Ultimate Configuration)



Figure 7: Ultimate Configuration

The tasks in this study are:

1. Update previous economic analysis which was undertaken as part of the Pialligo Avenue Options review (Feb. 2007) of alignment options. This study reflects up to date construction staging and construction cost estimates for Phase I, II and III as presented above. Note, Paramics modelling was performed as part of the previous economic analysis and has **not** been revised based upon the modified construction staging.

2 Traffic Modelling

2.1 Introduction

Micro-simulation modelling using Paramics was undertaken by SMEC in a previous assessment of options (Refer Pialligo Avenue Options Review - Feb. 2007). The reassessment of the economic analysis has not incorporated revised traffic modelling. The modified construction staging will have an affect on the calculated traffic modelling results and SMEC recommends that this study be extended to include a revision of the models.

The previous assessment has been used to assess the performance of the existing network and the considered network option. The results of the modelling were used as input into the economic analysis to assist in estimating the Net Present Value and Benefit Cost Ratio for the considered option compared to the existing network.

The remainder of the discussion in this chapter refers to the previous traffic modelling that was undertaken.

2.2 Model Calibration

The existing Paramics model was calibrated by adjusting the default parameters in the standard behavioural models contained in the micro-simulation software to local conditions. This relied mainly on the RTA default Paramics input files.

2.3 Matrix Estimation

In order to estimate future travel time and vehicle operating cost benefits for each of the improvement options, origin/destination matrices for traffic flows for 2016 and 2031 were taken from SMEC's TransCAD model of Canberra. These were used to factor up the 2006 Paramics matrix to produce corresponding matrices for use in Paramics runs for 2016 and 2031. Refinement of the demand matrices was done using PARAMICS Estimator to achieve a close match to the observed flows. PARAMICS Estimator is an origin/destination matrix estimation package specifically designed to operate at the microscopic level. The traffic volumes together with the OD count ("seed") matrix were entered into Paramics Estimator to derive the 2006 OD matrices for use in Paramics.

For the purposes of the analysis, it is assumed that Majura Parkway is not constructed during the evaluation period. Also Kowen link was included in the 2031 road network. The following key population figures provided/interpolated based on the ACTPLA land use and socio-economic forecasts were used in the 2016 and 2031 TransCAD Strategic Model.

Population		
Area	Year	
	2016	2031
Gungahlin	40499	62781
Kowen	0	1321

2.4 Model Validation

The resulting OD matrices produced flows that were a close fit to the traffic counts, in line with traffic engineering best practice of at least 85% of the counts having a GEH of less than 5, and 100% of the counts having a GEH of less than 10. The GEH Statistic is a formula used in traffic engineering, traffic forecasting, and traffic modelling to compare two sets of traffic volumes. The GEH Statistic gets its name from Geoffrey E. Havers, who invented it in the 1970s while working as a transport planner in London, England. Although its mathematical form is similar to a chi-

squared test, is not a true statistical test. Rather, it is an empirical formula that has proven useful for a variety of traffic analysis purposes. The formula for the "GEH Statistic" is:

$$GEH = \sqrt{\frac{(M - C)^2}{0.5 \times (M + C)}}$$

Where M is the traffic volume from the traffic model (or new count) and C is the real-world traffic count (or the old count).

The existing Paramics network was validated against 2006 AM peak traffic count and OD data and adjusted to match the observed traffic queues and network behaviour. The AM peak counts were undertaken in February 2006 for Capital Airport Group. Traffic signals were coded according to data supplied by the ACT Government Traffic Signals Unit.

2.5 Intersection Modelling

Analysis of 2006 and 2016 AM peak flows using aaSIDRA was undertaken for the intersection of Monaro Highway and Pialligo Avenue to determine the level of service for the PSP. The intersection is controlled by traffic signals with automatically calculated phase times. Detailed results of the aaSIDRA analysis are given in **Appendix A**. A summary of the results is given in Table 1.

Table 1 – Levels of Service – Monaro Highway/Pialligo Avenue Intersection

	2006		2016	
	Level of Service	Average Delay (sec)	Level of Service	Average Delay (sec)
PSP – Three lanes on Bridge (no Right Turns)	B	18	C	21

2.6 Micro-simulation in Paramics

Two assignment runs were conducted for the existing road network and the considered network option as listed in Table 2. Network layouts are shown in Figure 8 through Figure 9. Appendix B contains colour coded count plots from the Paramics simulation, the colour scale ranges linearly between 0vph (blue) and 3500vph (red). The models all extend to the North to encompass the proposed Airport Northern Access on Majura Rd, and include Brindabella Dr on Pialligo Ave to the South.

Table 2 – Paramics Runs

	2006	2016	2031
Existing Network	✓	✓	✓
Considered Option including two phase Staging	✓	✓	✓

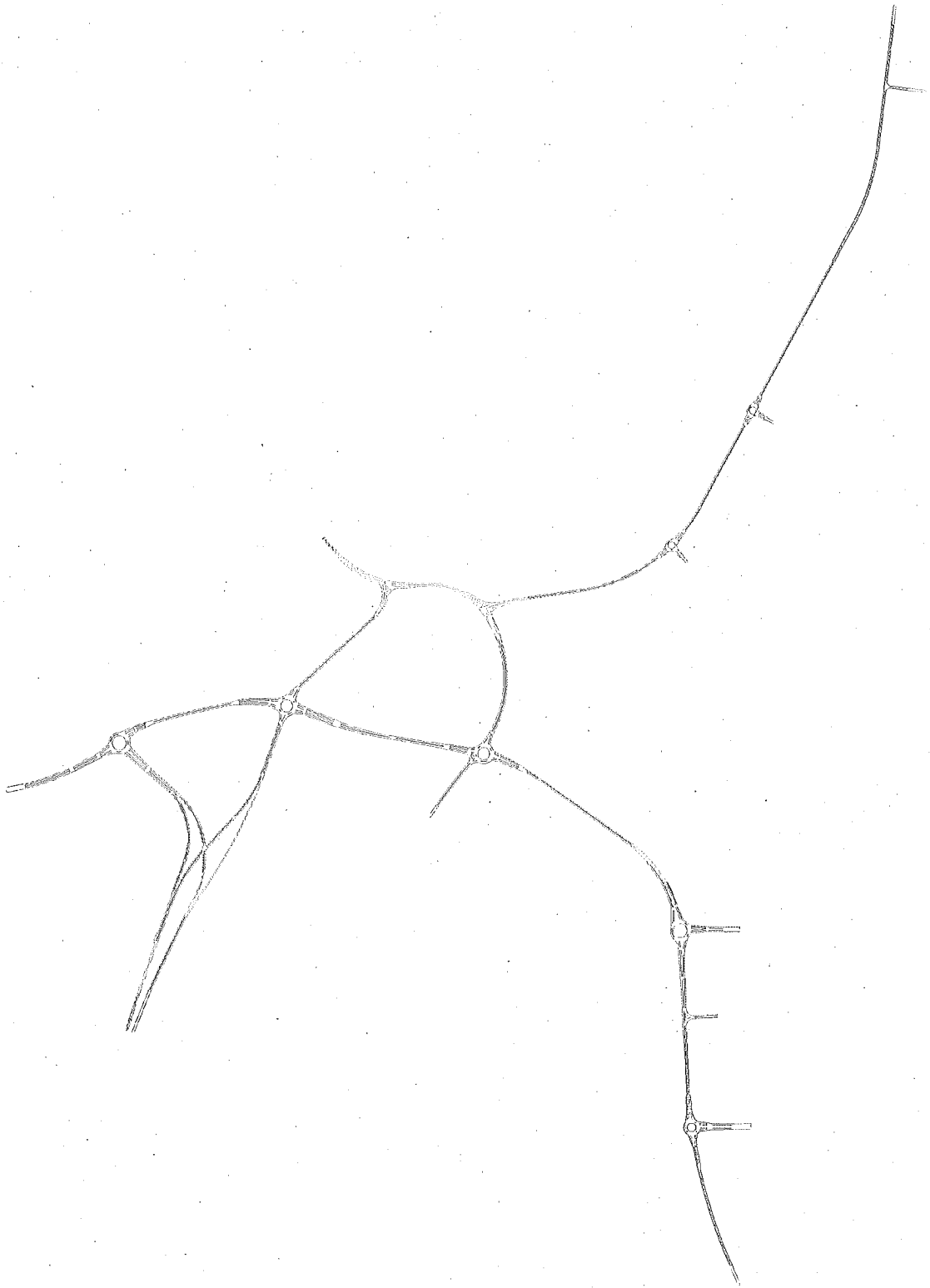


Figure 8 – Paramics network of the existing roads

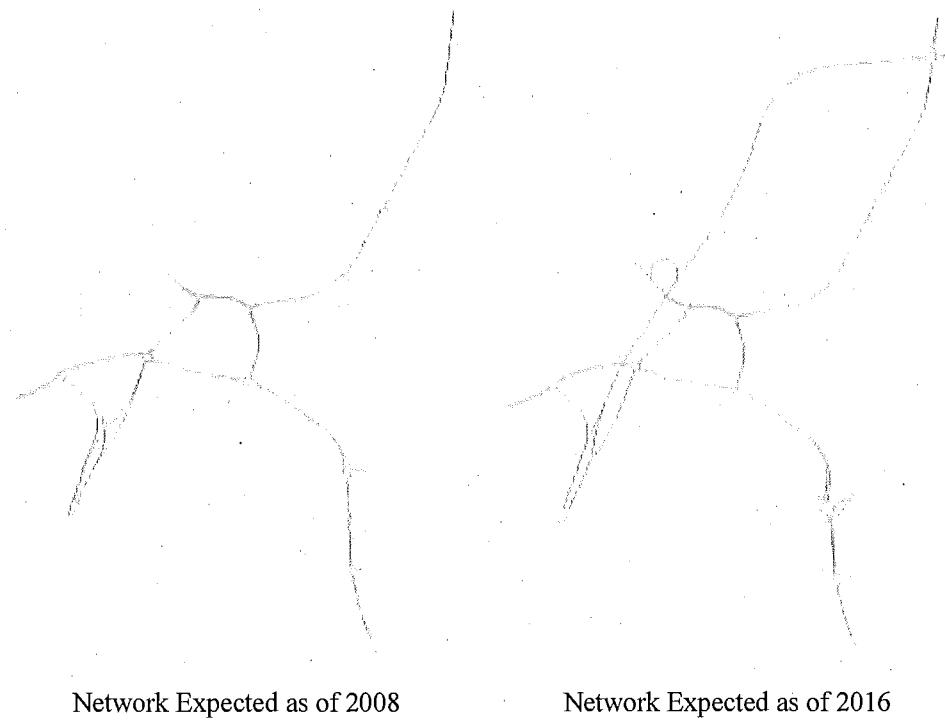


Figure 9 – Considered Option Paramics network

2.7 Paramics Modelling Results (Performance Indicators)

Microsimulation runs for the years 2006, 2016 and 2031 were conducted using the Paramics model for the existing road network as well as for the considered network improvement option. The overall network performance indicators for each of the micro-simulation runs are displayed in Table 3 and Table 4. These include the amount of released vehicles and their percentage relative to demand volumes, vehicle hours travelled and vehicles kilometres travelled. The output results look logical with a reduced proportion of demand being released in future years. It can be also noted that there are no significant changes in released demand between 2016 and 2031. This can be attributed to two reasons. The first is that the network is reaching its saturation level in 2016 and beyond. The second is that the increase in travel demand between 2016 and 2031 is minimal according to the provided ACTPLA land use data. As expected, the demand in future years increases leading to an increase in congestion, higher average travel times and hence an increase in vehicle hours travelled.

Table 3 – Micro-simulation measured performance factors (network based)

Model	Released Vehicles			Vehicle Hours Travelled			Vehicle Kilometres Travelled		
	2006	2016	2031	2006	2016	2031	2006	2016	2031
Existing Road Network	7606 (95%)*	6693 (60%)	6603 (60%)	791	1582	1558	16101	14330	13630
Considered Option including two Phase Staging	7207 (95%)	9903 (90%)	9841 (90%)	690	894	891	16875	23733	23668
Total Demand	~8000	~10800	~11100						

(*) Percentage of Demand Met Within Peak Hour = Released Vehicles/Demand Volumes
 Paramics model is constrained by capacity of modelled network. In this context, the Paramics model is not able to release demand flows that are in excess of the road network capacity during the peak modelled hour.

Table 4 – Micro-simulation calculated performance (Network Based)

Model	Average Vehicle Travel	Average Vehicle Speed
-------	------------------------	-----------------------

	Time [min]			[km/h]		
	2006	2016	2031	2006	2016	2031
Existing Road Network	6	14	14	20	9	9
Considered Option including two Phase Staging	5	5	5	24	27	27

2.7.1 Traffic Issues

In terms of traffic, two issues are considered:

1. Ability of traffic demand to enter the network without being delayed and hence causing spill over of delay to surrounding roads and entry points.
2. Once traffic entered into the network, the ability of the current network configuration to accommodate traffic with an acceptable level of service.

2.7.2 Existing Condition

Currently, most of the traffic demand can enter into the network without causing spill over to neighbouring roads. However, such traffic is operating within the network at low level of service i.e. F. If the current network remains without any intervention, it is expected that with increasing traffic demands, there will be queues at the entry points to the network and spill over to neighbouring roads. This will result into peak spreading and delays to a larger number of vehicles. This will be also accompanied by very low Level of Service (LoS) performance of traffic using the Pialligo network.

2.7.3 Expected Effect of Proposed Improvement

The proposed improvement is expected to avoid the occurrence of the first problem, namely the spill-over of traffic congestion into neighbouring roads as well as the prolonging of the peak traffic hour. However, still with expected future traffic increases, the traffic entering the network is expected to operate at low travelling speeds and hence low LOS performance. The considered option results in a substantial improvement in every year in terms of the number of vehicles being able to enter the network during the peak hour as well as in terms of the big reductions in vehicle hours travelled demonstrating significant time savings.

2.7.4 Assessment of LoS for Urban Arterials in the Study Area

SMEC identified two main urban arterial journeys within the Pialligo network. These are as follows and are shown in Figure 10:

- North-South direction starting from the intersection of Majura Road and the proposed Airport northern access road and finishing at the Water Ski Club Entrance on the Monaro Highway.
- East-West movement starting from the Ulinga Place Roundabout on Pialligo Avenue and finishing at a point on Morshead drive between Dairy Road and Plant Road

In accordance with the Highway Capacity Manual (HCM) the main two urban arterials constituting the Pialligo network, namely the North-South and the East west directions were classified as urban streets class I, where typical Free Flow Speeds (FFS) are 80 km/hr. In order to assess LOS for urban arterials it is necessary to obtain the average vehicle travel time and hence the average journey speeds during the peak periods, see Table 5 and Table 6. Based on this data, the LOS for these two urban arterial directions were determined both for the existing do nothing situation as well as for the considered ultimate option, see Table 7 and Table 8.

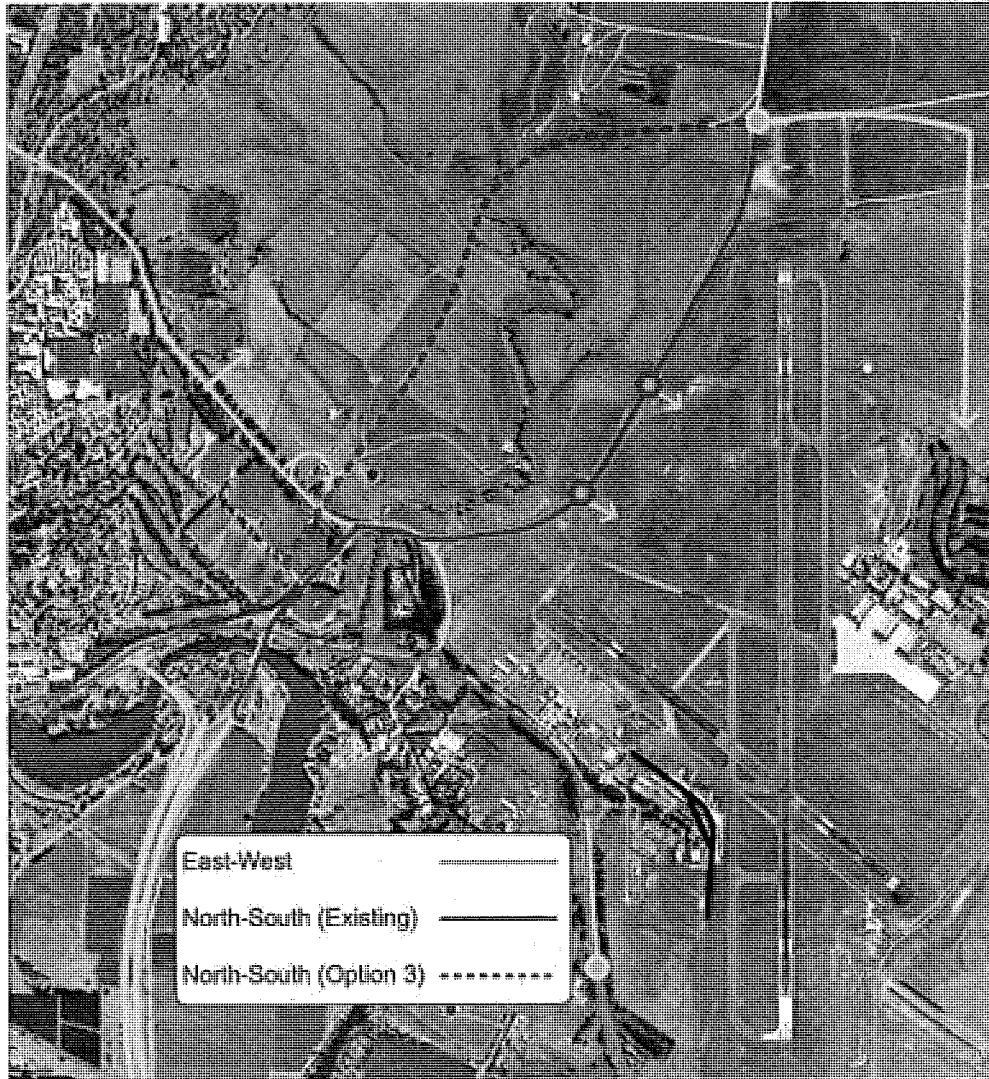


Figure 10 - Main arterial routes considered for LoS analysis

Table 5 – Micro-simulation Average Travel Time and Average Speed (North-South Direction)

Model	North to South (~3900m) Average Vehicle Travel Time [minutes]			North to South (~3900m) Average Vehicle Speed [km/hr]		
	2006	2016	2031	2006	2016	2031
Existing Road Network	8	24	24	28	10	10
Considered Option including two Phase Staging	6	3	3	34	73	75

Table 6 – Micro-simulation Average Travel Time and Average Speed (East-West direction)

Model	East to West (~3300m) Average Vehicle Travel Time [minutes]			East to West (~3300m) Average Vehicle Speed [km/hr]		
	2006	2016	2031	2006	2016	2031
Existing Road Network	8	16	16	23	12	12
Considered Option including two Phase Staging	3	7	9	56	26	22

Table 7 – LOS for North-South Direction (Do Nothing versus Considered Option including two Phase Staging)

North-South Direction						
Existing (Do Nothing)			Considered Option including two Phase Staging			
Year	Travel Time (AM Peak)	Average Speed (AM Peak)	LOS (AM Peak)	Travel Time (AM Peak)	Average Speed (AM Peak)	LOS (AM Peak)
2006	8 minutes	28 km/hr	E	6 minutes	34 km/hr.	D
2016	24 minutes	10 km/hr	F	3 minutes	73 km/hr.	A
2031	24 minutes	10 km/hr	F	3 minutes	75 km/hr.	A

Table 8 – LOS for East-West Direction (Do Nothing versus Considered Option including two Phase Staging)

East-West Direction						
Existing (Do Nothing)			Considered Option including two Phase Staging			
Year	Travel Time (AM Peak)	Average Speed (AM Peak)	LOS (AM Peak)	Travel Time (AM Peak)	Average Speed (AM Peak)	LOS (AM Peak)
2006	8 minutes	23 km/hr	F	3 minutes	56 km/hr.	B
2016	16 minutes	12 km/hr	F	7 minutes	26 km/hr.	E
2031	16 minutes	12 km/hr	F	9 minutes	22 km/hr.	F

The results demonstrates the significant expected future improvement in LOS for the North-South direction, where LOS can change from being F to A in the years 2016 and 2031. It has to be also noted that the expected LOS improvement in the east-west direction is not significant over the medium and long term.

3 Potential Beneficiaries to Road Network Improvements

Both the National Capital and Canberra Spatial Plans identify the airport as a major employment node and describe the importance of considering the Majura Parkway as a future major road. In a regional planning context the road plan provides improved access from and to Queanbeyan and the wider NSW region via the Monaro Highway. In terms of the National road network, constructing the Majura Parkway will provide better connections with the Federal Highway. In summary, the road plan presented has a strategic context and is important to support the current and the future development of Canberra and the surrounding NSW region.

The considered road network as well as being utilized by several groups of road users is of interest to several stakeholder organizations at different levels. Table 9, demonstrates the potential beneficiaries to any improvements occurring for this road network.

Table 9 – Beneficiaries from Road Network Improvements

Road Users (Beneficiaries)	Organisations ((Beneficiaries)	Level
Canberra Airport Traffic (Passengers)	Canberra Airport Group	Local
Canberra Airport Traffic (Freight)	Canberra Airport Group	Local
Canberra Airport Traffic (Employees)	Canberra Airport Group	Local
Canberra Airport Traffic (Passengers)	ACT Government	Local
Canberra Airport Traffic (Freight)	ACT Government	Local
Canberra Airport Traffic (Employees)	ACT Government	Local
Gungahlin Commuter Traffic	ACT Government (Land Sales)	Local
Traffic Related to Headquarters Joint Operational Command	Department of Defence	Local
Queanbeyan Through Traffic*	RTA & Queanbeyan City Council	Regional
Better Connections with the Federal Highway**	Department of Transport & Regional Services (Auslink)	Federal
Politicians, Parliament Members & Canberra Visitors	National Capital Authority	Federal

* Regional traffic from NSW either on Pialligo Avenue and or the Federal Highway represent a high proportion of daily travel on the roads in the vicinity of the airport particularly on the section of Pialligo Avenue past the airport where almost 90% is generated in Queanbeyan and the surrounding NSW regions.

** Commercial traffic on the Monaro Highway and Majura Road represent some 16% of the total traffic presently with the connection between the Monaro Highway, Majura Road and the Federal Highway an important freight route within the ACT but also for regional NSW.

4 Construction Cost

4.1 Phase I

The construction cost associated with Stage 1a and 1b of the project was taken from the PSP Report (SMEC August 2007). An estimated Construction cost estimate for the airport works is based upon information available through recent media releases. This estimate is summarised in Table 10.

Stage	Description	Cost (ex GST)
1a	Construction Cost Estimate (including 20% contingency plus design costs)	\$5,960,000
1b	Construction Cost Estimate (including 20% contingency plus design costs)	\$2,530,000
Airport Works	Construction Cost Estimate (including estimated design costs)	\$13,000,000
	Total	\$21,490,000

Table 10: Phase I Construction Cost

These results have been input into the economic analysis base on a 1 year construction period commencing in 2008.

4.2 Phase II

The construction cost associated with Stage 1c of the project was taken from the PSP Report (SMEC August 2007). This estimate is summarised in Table 11.

Stage	Description	Cost (ex GST)
1c	Construction Cost Estimate (including 20% contingency plus design costs)	\$2,790,000
	Total	\$2,790,000

Table 11: Phase II Construction Cost

These results have been input into the economic analysis base on a 1 year construction period commencing in 2009.

4.3 Phase III

The construction cost associated with Phase III of the project was estimated based on preliminary design performed to date by SMEC. The estimate is summarised in Table 14.

Item	Cost (ex GST)
Preliminaries	\$ 1,155,000
Earthworks for Bridge Embankments	\$ 4,800,000
Pavement South of Molonglo River	\$ 1,431,750
Pavement Between the Molonglo River and Fairbairn Av	\$ 948,750
Pavement North of Fairbairn Av	\$ 3,776,250
Concrete K&G	\$ 525,000
Road Furniture	\$ 1,225,000
Streetlighting	\$ 630,000
Landscape	\$ 1,050,000
Road Signs	\$ 105,000
Pavement Marking	\$ 175,000
Underpass	\$ 900,000
Bridge Over Fairbairn Avenue (2lane)	\$ 1,441,000
Bridge Over Morshead Drive and Molonglo River (2lane)	\$ 6,270,000
Brand Depot single bridge off ramp over Woolshed Creek	\$ 170,000
Culverts (2x1.8m and 1x1.5m)	\$ 320,000
Reinstate Oval	\$ 1,500,000
Sub Total	\$ 26,422,750
Contingencies (40%)	\$ 10,569,100
Design	\$ 300,000
Total	\$ \$37,291,850

Table 12: Phase III Construction Cost

These results have been input into the economic analysis base on a 2 year construction period commencing in 2010. The cost was split evenly between the 2 year construction period.

4.4 Phase IV – Majura Parkway Stage 2

Although not part of the economic analysis, a review has been undertaken of the Phase 3 construction cost as follows:

Item	Total
Preliminaries	\$ 3,300,000
Earthworks for Bridge Embankments	\$ 1,500,000
Pavement Duplication of Stage 1	\$ 8,715,750
Pavement Northcott Road	\$ 7,374,900
Pavement Maruja Parkway	\$ 31,521,000
Concrete K&G	\$ 1,500,000
Road Furniture	\$ 3,500,000
Streetlighting	\$ 1,800,000
Landscape	\$ 3,000,000
Road Signs	\$ 300,000
Pavement Marking	\$ 500,000
Bridge Over Fairbairn Avenue (2lane)	\$ 1,441,000
Bridge Over Morshead Drive and Molonglo River (2lane)	\$ 6,270,000
Northcott Road Bridge over Majura Parkway	\$ 3,165,000
Northcott Road twin bridge over Woolshed Creek	\$ 520,000
Majura Parkway Underpass CH6900	\$ 940,000
Majura Parkway Underpass CH8430	\$ 1,026,000
Majura Parkway Bridge CH9770	\$ 1,800,000
Culverts	\$ 1,665,000

Sub Total	\$ 79,838,650
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Contingencies (40%)	\$ 31,935,460.00
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Design	\$ 600,000
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Total	\$ 112,374,110.0
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SMEC recommends that the economic analysis and the traffic modelling be updated to include the Phase IV works.

5 Economic Analysis

5.1 Introduction

In order to assess and compare the three considered options, an analysis of the costs and benefits of each option compared the existing road network (do nothing scenario) was undertaken over a 25 year period. The Net Present Value (NPV) and Benefit Cost Ratio (BCR) were estimated for each of the three options.

5.2 Construction and Maintenance Costs

For the Base Case (do nothing) and for each of the improvement options, capital construction costs and maintenance life costs were estimated.

Table 13 below indicates an initial approximate estimate of construction costs for the various options. Although these estimates are subject to further detailed design they provide a broad order of magnitude cost which is considered appropriate for comparison purposes of the options at this stage.

Table 13 – Initial Construction Costs (ex GST)

	Existing Road Network (Do Nothing)	Phase I 2009	Phase I 2010	Phase II 2011	Phase II 2012
Construction Cost	\$0	~ 21.5 Million	~ 2.8 Million	~ 18.7 Million	~ 18.7 Million

A simplified maintenance cost was also calculated for the analysis. The cyclic maintenance was assumed to occur every 5 years from the year of work completion and opening to traffic. The cyclic maintenance cost was estimated as a 0.5% of the construction cost for the first application and then for the remaining 3 applications was estimated as a 1% of the construction cost. As for annual maintenance, its cost was estimated as 0.25% of the initial construction cost. In case cyclic maintenance is applied, no annual maintenance is applied.

5.3 Travel Related Costs

Several indicators of travel are obtained as output from the Paramics runs in the AM peak, namely the number of Vehicle Kilometres Travelled (VKT), the number of Vehicle Hours Travelled (VHT) as well as the mean speed. These are obtained for the years 2006, 2016 and 2031. The annual stream of VKT and VHT were estimated over a 25 year period with annual values interpolated between estimated values in 2006, 2016 and 2031. These are used to estimate the benefits for the existing condition continuing as well as for the considered network improvement option. For each, the following travel related costs were estimated:

- Vehicle Operating Costs (VOC): - this is dependent on the number of vehicle-kilometres travelled (VKT) as well as on the Vehicle Operating Cost per km (VOC/km) obtained from the RTA Economic Analysis Manual
- Time Costs (TC): - this is dependent on the Vehicle-Hours Travelled (VHT) as well as on the vehicle composition, average vehicle occupancy and value of travel time obtained from the RTA Economic Analysis Manual
- Accident Costs (AC): - this is dependent on the VKT as well as on the accident rate per Million Vehicle-Kilometres Travelled (MVKT) obtained from the RTA Economic Analysis Manual

The following sections detail the exact methodology used for estimating each of these costs:

5.3.1 Vehicle Operating Cost

Vehicle operating cost (VOC) is a function of kilometres travelled and VOC/Km. According to the RTA Economic Appraisal Manual, the VOC/km varies with the operating speed and the vehicle type. This study considered two types of vehicles, namely used private cars and rigid trucks. For both types of vehicles the study used different models for computing the VOC/km depending on the journey speed. This is included in Table 14. These models are based on the recently updated Appendix B: economic parameters for 2005 produced by the RTA.

Table 14 – Models for Computing VOC/Km According to Type of Vehicle and Journey Speed

Vehicle Type	Journey Operating Speed	
	= 60 Km/Hr	= 60 Km/Hr
Private Car (Used)	$C = 25.28 + 95.69/V$	$C = 28.35 - 0.068V + 0.00051 V^2$
Rigid Truck	$C = 69.3 + 476.20/V$	$C = 80.85 - 0.408V + 0.00280 V^2$

$C = VOC$ (cents/km), $V =$ journey speed (km/hr).

The VOC is a product of multiplying VKT by the appropriate C value. The formulation for this computation is as follows:

$$VOC_{option} = VKT_{(option,Used PrivateCar)} \times C_{(PrivateCar)} + VKT_{(option,RigidTruck)} \times C_{(RigidTruck)}$$

5.3.2 Travel Time Costs

The Paramics model produces the amount of VHT. This is multiplied by the value of time to produce the travel time costs for each option. According to the RTA manual, the average time cost per vehicle hour is \$22.04 in December 2005 prices. The formulation for the computation of Travel Time Costs (TTC) is as follows:

$$TTC_{option} = VHT_{(option)} \times VOT$$

5.3.3 Accident Costs

The expected number of accidents by type is a function of kilometres travelled. It is a known phenomenon that the more travelling, the more is the propensity of getting involved in an accident. In this context, average rates for accident occurrence were computed based on the 2004 accident statistics. These are included in Table 15. The table also shows the cost of accidents as reported in the RTA manual.

Table 15 – Adopted Accident Rates and Costs

Type of Accident	Rate Based on ACT 2004 Accident Statistics (/100 Million Vehicle kilometres Travelled)	Generic Costs Based on RTA Manual Update, December 2005
Fatal Injury	0.34 Fatal Person/100 MVKT	\$1,572,820
Serious Injury	4.72 Seriously Injured Person/100 MVKT	\$391,890
Other Injury	13.26 Other Injured Person/100 MVKT	\$15,930
Property Damage Only	260.1 PDO/100 MVKT	\$6,995

The Accident Costs (AC) is a summation of all the costs expected to be incurred as a result of occurrence of different types of accidents. The formulation for this computation is as follows:

$$AC_{option} = \frac{VKT_{(option)}}{100MVKT} \times (Rate_{(Fatal)} \times Cost_{(Fatal)} + Rate_{(S.Injury)} \times Cost_{(S.Injury)} + Rate_{(Injury)} \times Cost_{(Injury)} + Rate_{(PDO)} \times Cost_{(PDO)})$$

$$AC_{option} = \frac{VKT_{(option)}}{100MVKT} \times (0.34 \times \$1,572,820 + 4.72 \times \$391,890 + 13.26 \times \$15,930 + 260.1 \times \$6,995)$$

It is to be noted that with the considered option (grade separation) some intersection related accidents are also avoided. These were also taken into account.

5.3.4 Annualisation Factor

An annual expansion factor of 1825 was applied to the AM peak VOC, TTC and AC in order to estimate the annual incurred costs over the evaluation period. The expansion factor is estimated by applying the existing peak hour to daily flow ratio. Recent 24 hour traffic count data collected for Canberra Airport Group along Majura Road provides a basis for estimating the peak hour to daily traffic flow ratio.

$$AnnualCosts_{option} = (VOC_{(option)} + TTC_{(option)} + AC_{(option)}) \times 1825$$

5.4 Option Benefits

The expected benefits for the considered option are computed. This is based on obtaining the savings of the considered option as compared to the base option (existing do nothing) in terms of VOC savings, TTC savings and AC savings. Values of such savings for each option are depicted in Appendix C. The formulation for this computation is as follows:

$$Benefits_{option} = (VOC_{(option)} - VOC_{(base)}) + (TTC_{(option)} - TTC_{(base)}) + AC_{(option)} - AC_{(base)}$$

5.5 Benefit Cost Ratio

In order to compare the costs and benefits of the proposed option relative to the existing road network over the evaluation period, the change in monetary values over time needs to be accounted for. This is achieved by discounting the annual costs and benefits of the project to the present year using a range of discount rates (4%, 7%, and 10%). The normal indicators of the worth of a project, the NPV and BCR for each option are estimated for each of these discount rates. The analysis results are summarised in Table 16.

Table 16 – Results of Economic Analysis

Discount Rates	Considered Option	
	NPV (000)	BCR
4%	\$201,588	4.90
7%	\$125,236	3.86
10%	\$79,815	3.13

If the discounted present value of the benefits exceeds the discounted present value of the costs, then the project is worthwhile. This is equivalent to the condition that the net benefit must be positive. Another equivalent condition is that the ratio of the present value of the benefits to the present value of the costs must be greater than one. In this context, it is obvious from the table that all of the considered option is producing positive NPVs as well as BCRs > 1. A detailed spreadsheet of the output of the cost benefit analysis is included in Appendix C.

6 Conclusions

The pre-design study has considered the costs, benefits and the economic feasibility for providing an alternative road network improvement option. This option is meant to address the traffic congestion problem and its travel cost consequences on the considered Pialligo Avenue and Majura Road network. The considered options include:

- Construction of Pialligo Ave Stage 1a, 1b and Airport works in 2008, followed by construction of Pialligo Ave Stage 1c in 2009 and Majura Parkway Stage 1 in 2010.

Micro-simulation modelling was used to demonstrate the severity of the current peak traffic congestion problems and the expected future further deterioration of the traffic conditions in this network. The current LOS for the North-South direction starting from Majura Road Roundabout to Water Ski Club Entrance is E and expected to deteriorate to F by 2016. As for the East-West direction starting from Ulinga Place Roundabout to Staff Cadet Roundabout, the current LOS is already F. The micro-simulation results demonstrate the significant expected future improvement in LOS for the North-South direction, where LOS can change from being F to A in the years 2016 and 2031. It has to be also noted that the expected LOS improvement in the east-west direction is not significant over the medium and long term. However, it is expected that the PSP will bring a significant instant improvement to the current east-west direction changing the LOS from F to B.

The micro-simulation modelling was also used to obtain key performance indicators including number of vehicle kilometres travelled as well as number of vehicle hours travelled both for the existing road network as well as for the considered option in the years 2006, 2016 and 2031. These were used in accordance with RTA economic Analysis Manual to estimate travel-related costs for each option including Vehicle Operation Costs, Travel Time Costs and Accident Costs. Capital construction costs, contingency, design, supervision costs were also estimated for each option. Annual and cyclic maintenance costs were also considered for each option.

Travel benefits for the considered option were determined by subtracting the travel related costs of the improvement option from those travel related costs of the do nothing scenario i.e. the existing road network staying as it is with no future intervention.

The results of the benefit cost analysis show that the improvement option can be considered as economically feasible. This is based on the two obtained key performance indicators namely the Net Present Value (NPV) and the Benefit Cost Ratio (BCR). The considered option produces a NPV equating to ~ \$125 million over the 25 years span life of the project at a 7% discount rate. The estimated BCR for this option is ~3.9 using a 7% discount rate. In addition, this option allows the ACT government to immediately fund the construction of the Majura Parkway Stage 1 and to seek a shared funding with Auslink for the grade separation to be opened by the year 2013 or before with a 1 year design period and a 2 year construction period.

Appendix A aaSIDRA Results

A.1 Movement Summaries

A.1.1 Morshead Dr - Pialligo Ave Signalised with Banned Right Turns, 2006 AM

Mov No	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Monaro Highway (S)										
2	T	708	8.2	0.499	28.2	LOS C	113	0.85	0.73	33.8
Approach		709	8.2	0.499	28.2	LOS C	113	0.85	0.73	33.8
Pialligo Avenue (E)										
4	L	532	4.7	0.573	10.3	LOS B	66	0.38	0.71	46.9
5	T	1077	3.1	0.462	15.0	LOS B	122	0.66	0.59	42.5
Approach		1608	3.6	0.573	13.4	LOS B	122	0.57	0.63	43.9
Morshead Drive (N)										
6	L	1	0.0	0.003	10.4	LOS B	0	0.29	0.61	46.7
7	T	495	10.9	0.354	26.6	LOS C	82	0.80	0.67	34.7
Approach		496	10.9	0.354	26.6	LOS C	82	0.80	0.67	34.7
Morshead Drive (W)										
10	L	87	4.6	0.096	10.1	LOS B	10	0.28	0.66	47.1
11	T	1152	3.1	0.495	15.3	LOS B	132	0.68	0.60	42.2
Approach		1239	3.2	0.495	15.0	LOS B	132	0.65	0.61	42.5
All Vehicles		4052	5.2	0.573	18.1	LOS B	132	0.67	0.64	40.1

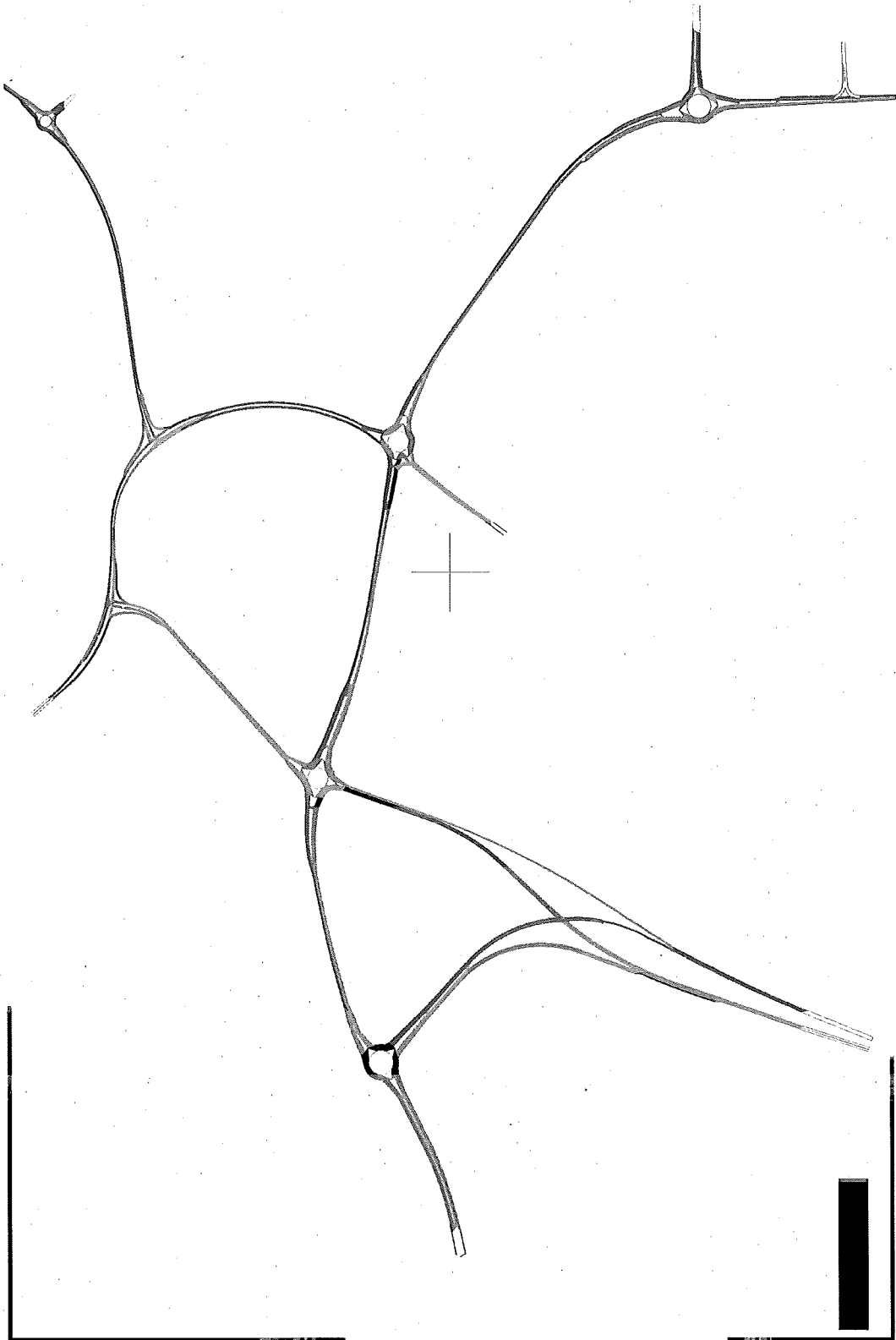
A.1.2 Morshead Dr - Pialligo Ave Signalised with Banned Right Turns, 2016 AM

Mov No	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Monaro Highway (S)										
2	T	981	8.2	0.690	30.7	LOS C	159	0.92	0.81	32.6
Approach		981	8.2	0.691	30.7	LOS C	159	0.92	0.81	32.6
Pialligo Avenue (E)										
4	L	736	4.8	0.813	16.9	LOS B	130	0.59	0.85	41.2
5	T	1492	3.0	0.640	17.2	LOS B	183	0.76	0.69	40.8
Approach		2227	3.6	0.813	17.1	LOS B	183	0.70	0.74	40.9
Morshead Drive (N)										
6	L	1	0.0	0.005	13.4	LOS B	0	0.39	0.61	43.9
7	T	685	10.9	0.491	28.1	LOS C	112	0.84	0.72	33.8
Approach		687	10.9	0.491	28.1	LOS C	112	0.84	0.72	33.8
Morshead Drive (W)										
10	L	121	5.0	0.154	12.4	LOS B	20	0.38	0.68	45.0
11	T	1595	3.1	0.684	17.8	LOS B	201	0.79	0.72	40.3
Approach		1715	3.2	0.684	17.5	LOS B	201	0.76	0.71	40.6
All Vehicles		5610	5.2	0.813	20.9	LOS C	201	0.78	0.74	38.1

Appendix B Micro-simulation Snapshots

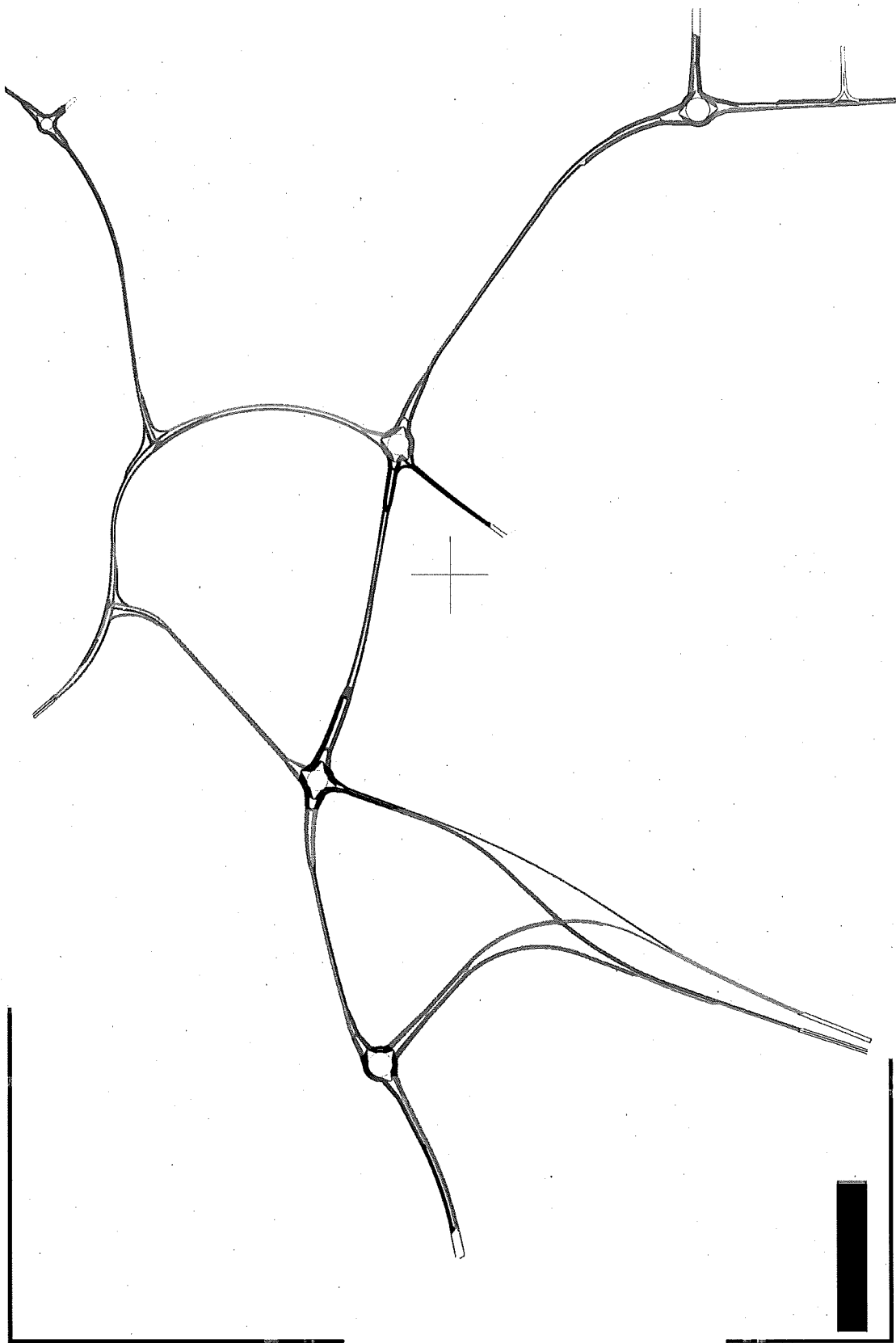
B.1 Existing Network

B.1.1 2006 AM



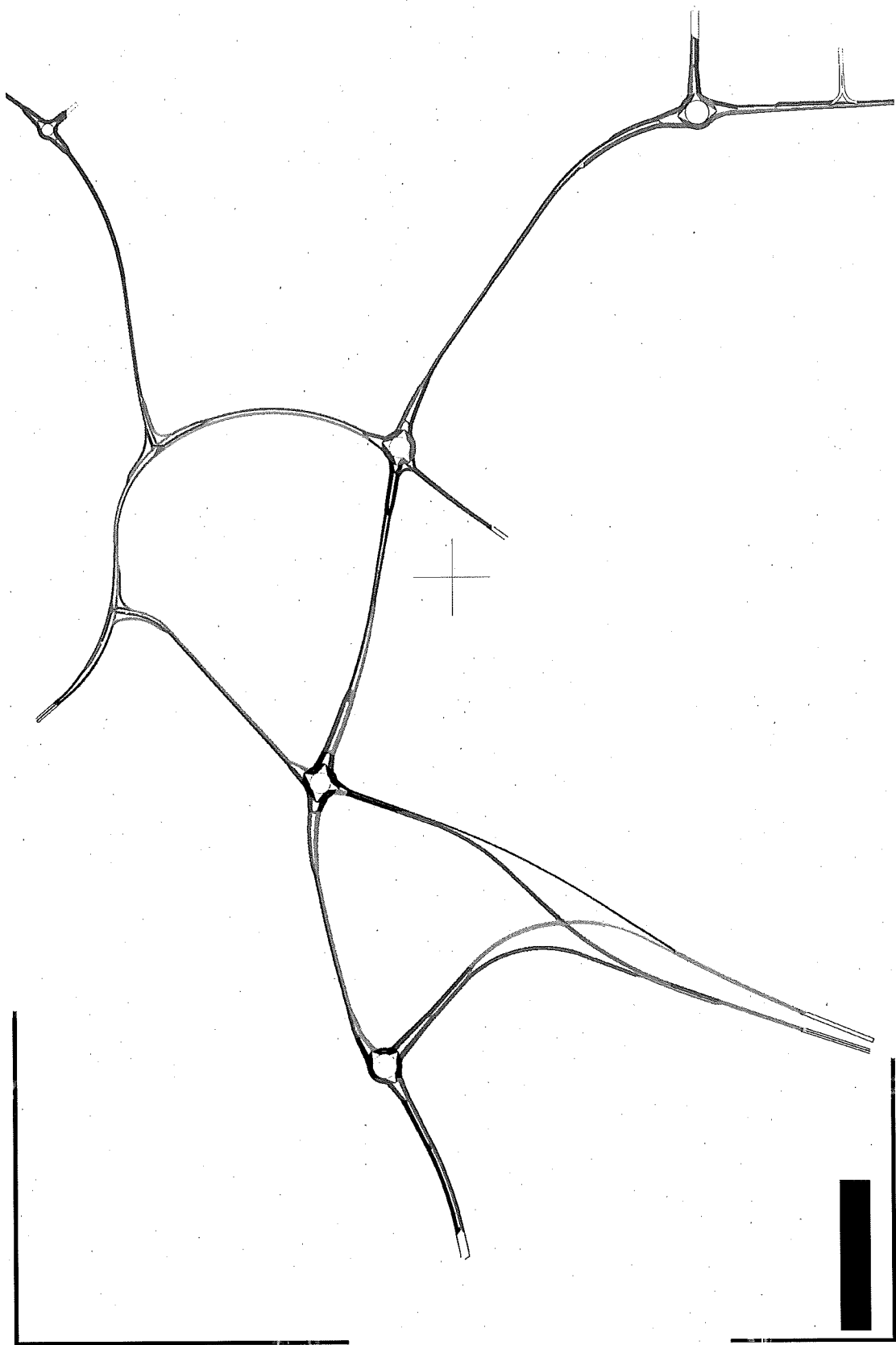
Colour scale is 0 vehicles per hour (blue) – 3500 vehicles per hour (red)

B.1.2 2016 AM



Colour scale is 0 vehicles per hour (blue) – 3500 vehicles per hour (red)

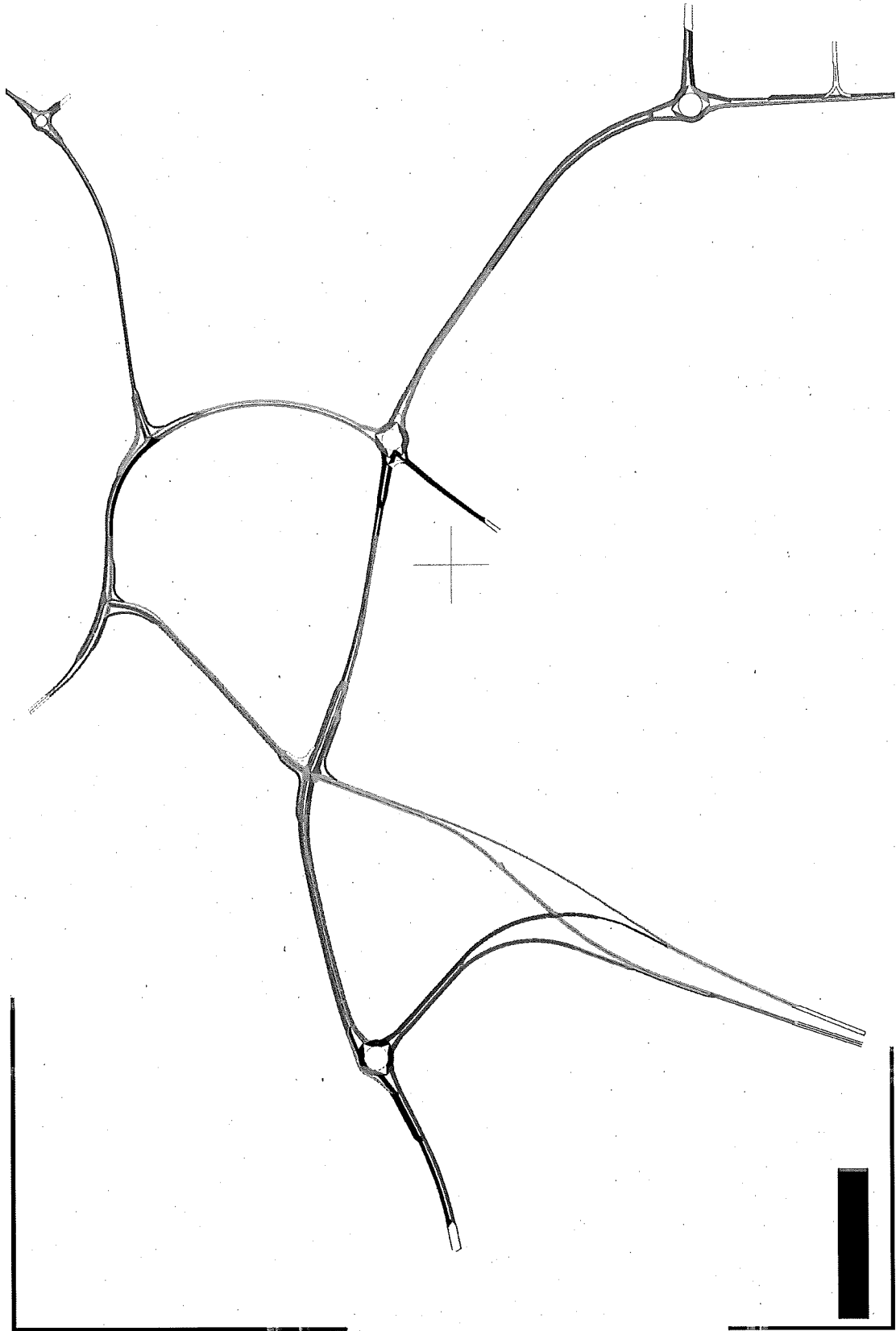
B.1.3 2031 AM



Colour scale is 0 vehicles per hour (blue) – 3500 vehicles per hour (red)

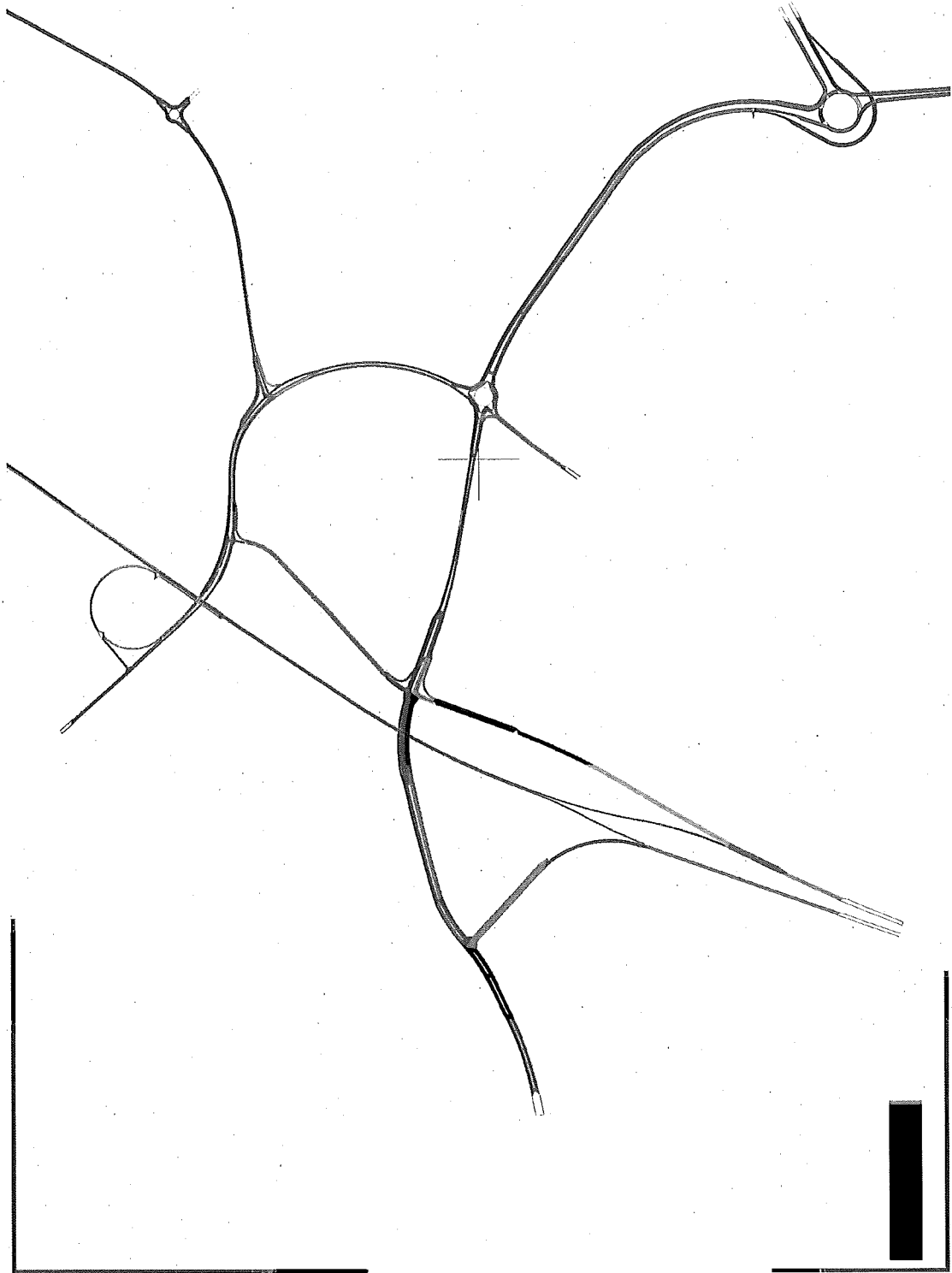
B.2 Considered Option Staging of PSP followed by Majura Bypass – Grade Separation)

B.2.1 2006 AM



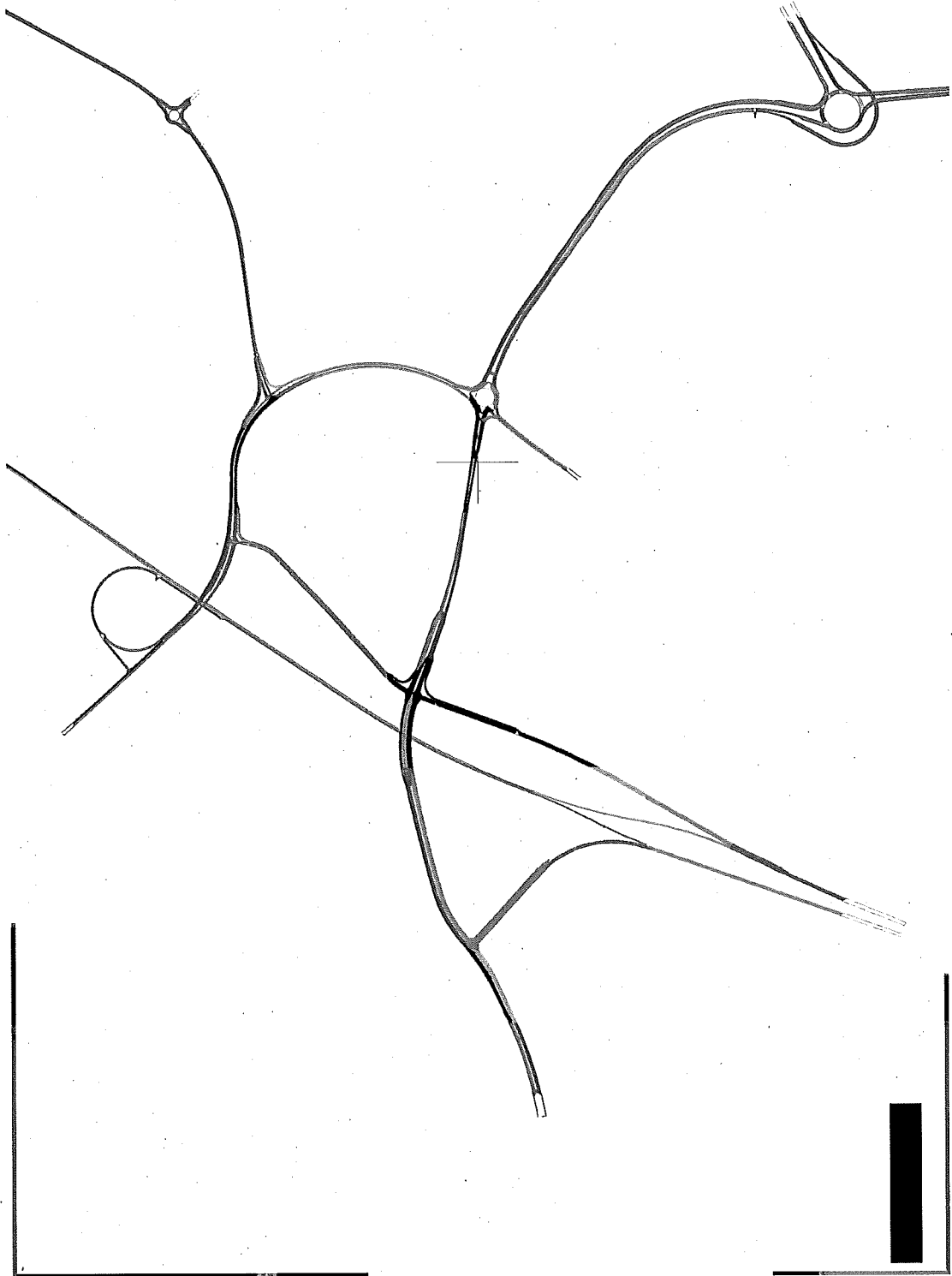
Colour scale is 0 vehicles per hour (blue) – 3500 vehicles per hour (red)

B.2.2 2016 AM



Colour scale is 0 vehicles per hour (blue) – 3500 vehicles per hour (red)

B.2.3 2031 AM



Colour scale is 0 vehicles per hour (blue) – 3500 vehicles per hour (red)

Appendix C Economic Analysis

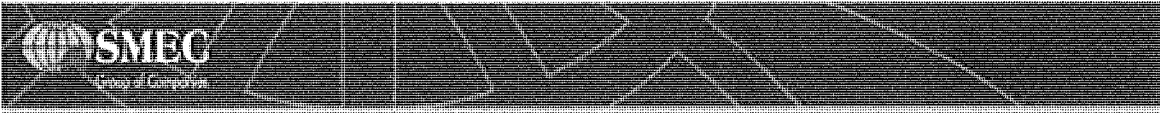
C.1 Considered Option: Staging of PSP Followed by Grade Separation vs Existing Road Network

YEAR	COSTS (shown as -ve) Current Prices			BENEFITS (shown as +ve) Current Prices			TOTALS
	CAPITAL COSTS (\$'000)	ADDITIONAL		Vehicle Operating Cost Savings (\$'000)	Travel Time Savings (\$'000)	Accident Cost Savings (\$'000)	Current Prices (\$'000)
		Annual Maintenance (\$'000)	Cyclic (\$'000)				
2006	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2007	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2008	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2009	(\$21,500)	(\$33)	\$0	(\$1,100)	\$9,182	(\$253)	(\$13,704)
2010	(\$2,800)	(\$33)	\$0	(\$1,410)	\$11,208	(\$320)	\$6,645
2011	(\$18,700)	(\$40)	\$0	(\$1,721)	\$13,415	(\$389)	(\$7,434)
2012	(\$18,700)	(\$87)	\$0	(\$2,032)	\$15,817	(\$459)	(\$5,460)
2013	\$0	(\$154)	\$42	(\$2,343)	\$18,429	(\$531)	\$15,442
2014	\$0	\$21	(\$108)	(\$2,655)	\$21,267	(\$604)	\$17,921
2015	\$0	(\$133)	\$0	(\$2,965)	\$24,347	(\$680)	\$20,568
2016	\$0	(\$133)	\$0	(\$3,275)	\$27,690	(\$758)	\$23,524
2017	\$0	(\$133)	\$0	(\$3,300)	\$27,631	(\$761)	\$23,436
2018	\$0	(\$154)	\$83	(\$3,324)	\$27,572	(\$765)	\$23,412
2019	\$0	\$21	(\$589)	(\$3,349)	\$27,513	(\$768)	\$22,828
2020	\$0	(\$133)	\$0	(\$3,374)	\$27,454	(\$772)	\$23,176
2021	\$0	(\$133)	\$0	(\$3,398)	\$27,396	(\$775)	\$23,089
2022	\$0	(\$133)	\$0	(\$3,423)	\$27,337	(\$779)	\$23,002
2023	\$0	(\$154)	\$83	(\$3,447)	\$27,278	(\$782)	\$22,979
2024	\$0	\$21	(\$589)	(\$3,471)	\$27,220	(\$785)	\$22,395
2025	\$0	(\$133)	\$0	(\$3,495)	\$27,162	(\$789)	\$22,744
2026	\$0	(\$133)	\$0	(\$3,519)	\$27,103	(\$792)	\$22,658
2027	\$0	(\$133)	\$0	(\$3,543)	\$27,045	(\$796)	\$22,573
2028	\$0	(\$154)	\$83	(\$3,567)	\$26,987	(\$799)	\$22,549
2029	\$0	\$21	(\$589)	(\$3,591)	\$26,929	(\$802)	\$21,967
2030	\$0	(\$133)	\$0	(\$3,615)	\$26,871	(\$806)	\$22,316
2031	\$0	(\$133)	\$0	(\$3,639)	\$26,813	(\$809)	\$22,231
Total	(\$61,700)	(\$2,194)	(\$1,583)	(\$69,555.4)	\$549,664.2	(\$15,774.3)	\$398,857.0
PRESENT VALUES							
PV @ 7%	(\$42,505)	(\$803)	(\$465)	(\$25,013)	\$199,711	(\$5,690)	\$125,236
PV @ 4%	(\$49,669)	(\$1,200)	(\$770)	(\$37,647)	\$299,428	(\$8,554)	\$201,588
PV @ 10%	(\$36,575)	(\$558)	(\$289)	(\$17,291)	\$138,464	(\$3,937)	\$79,815
Discount Rate		4.0%	7.0%	10.0%			
NPV ('000)		\$201,588	\$125,236	\$79,815			
BCR		4.90	3.86	3.13			

APPENDIX C - ECONOMIC ANALYSIS

Appendix D Construction Phase Diagrams

APPENDIX D - CONSTRUCTION PHASE DIAGRAMS

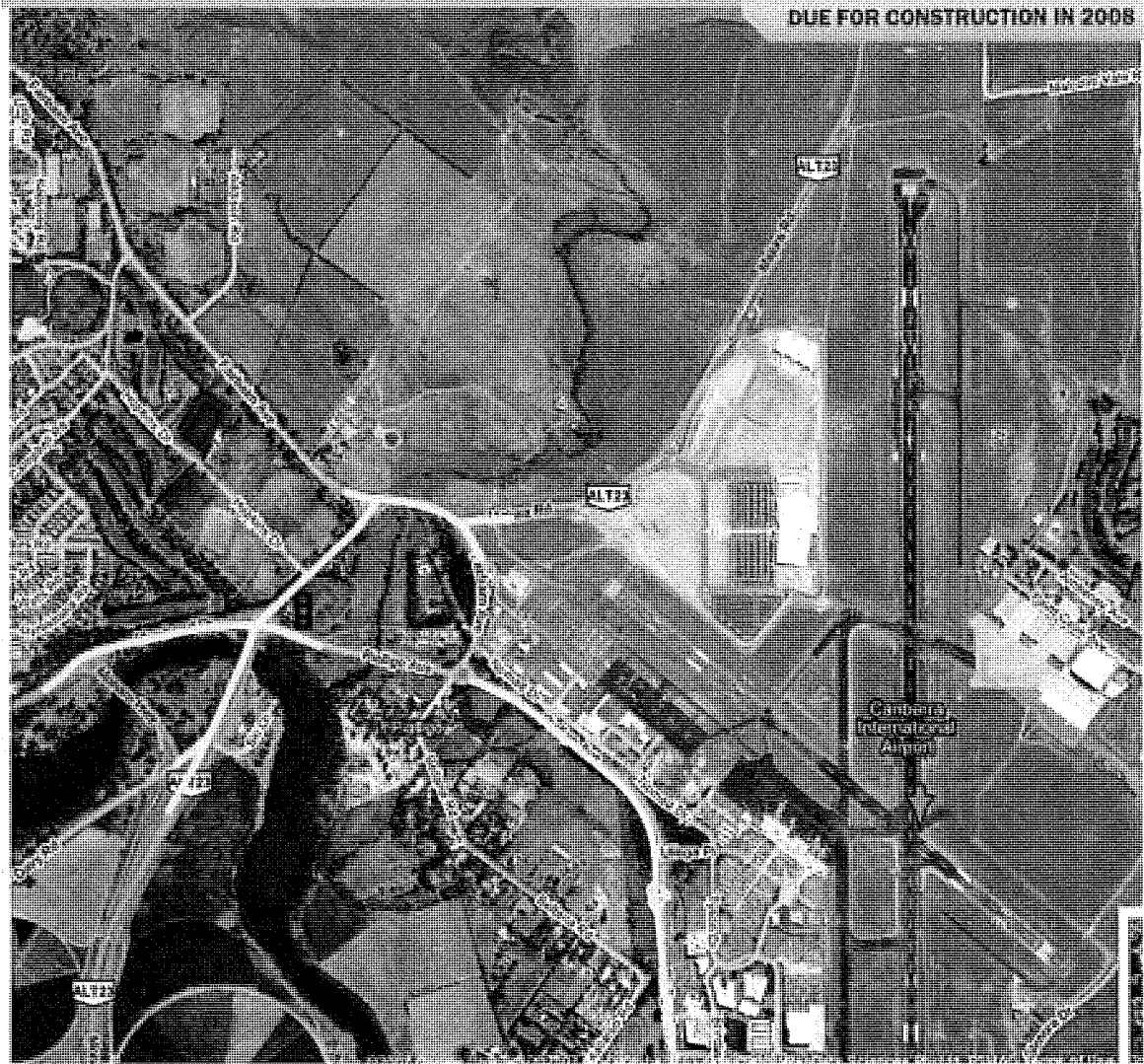


Pialligo Upgrade – Stage 1

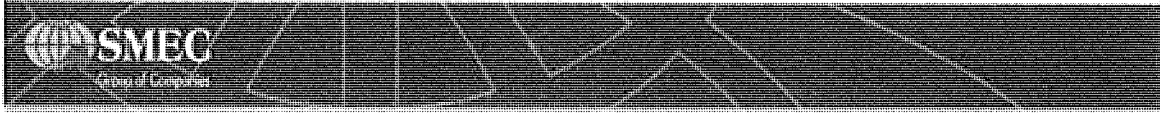
Incorporating Pialligo Upgrade Stages 1A, 1B and Airport Works

PHASE 1

DUE FOR CONSTRUCTION IN 2008



SMEC ACT
HIGHWAYS AND TRANSPORT GROUP

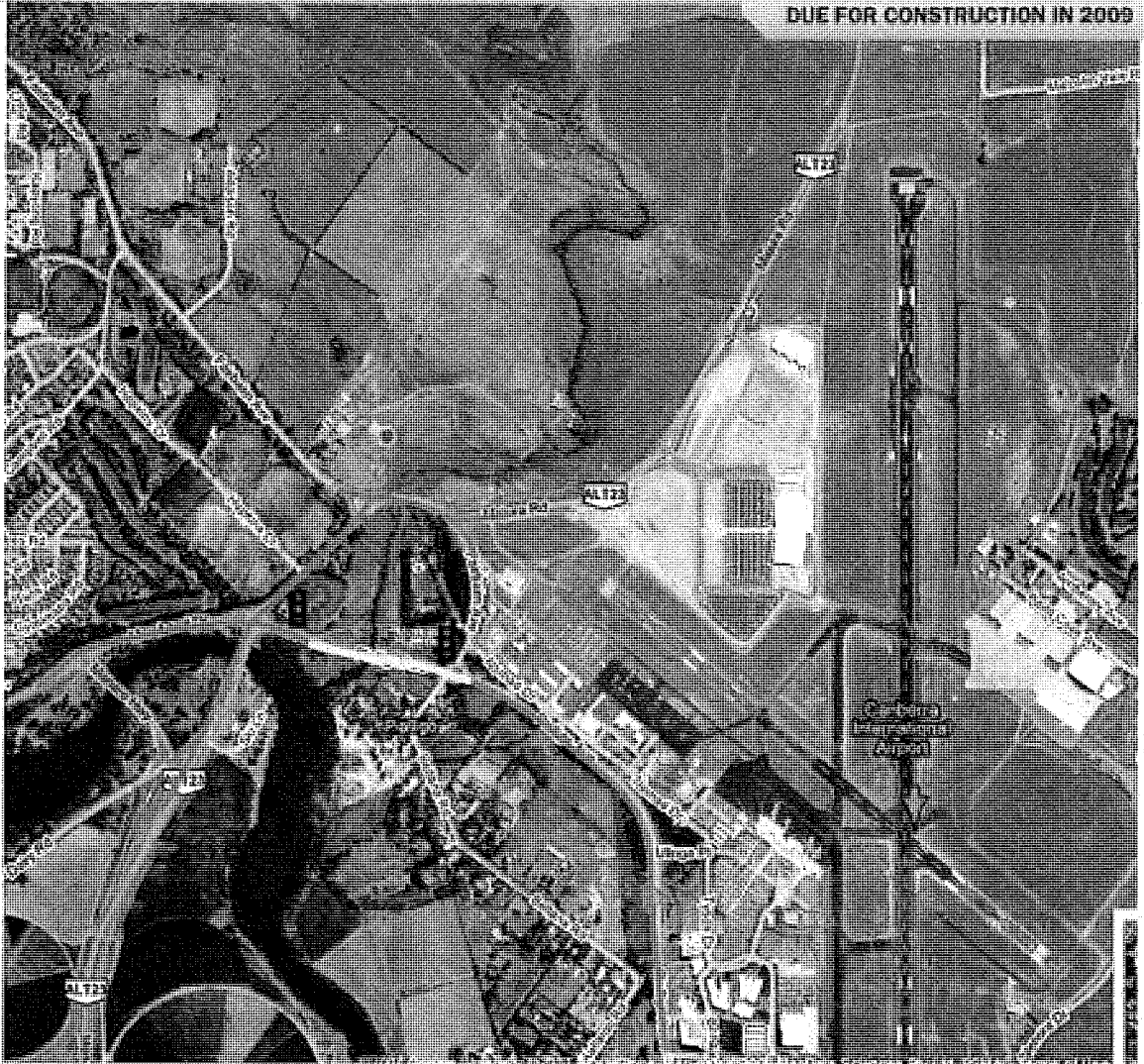


Pialligo Upgrade - Stage 1

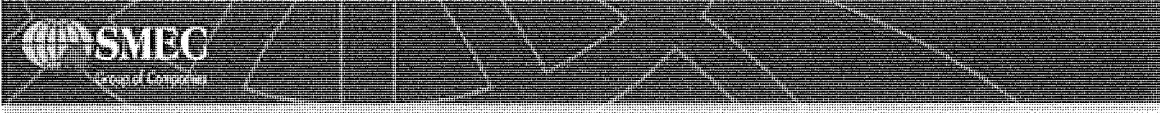
Incorporating Pialligo Upgrade Stages 1C

PHASE 2

DUE FOR CONSTRUCTION IN 2009



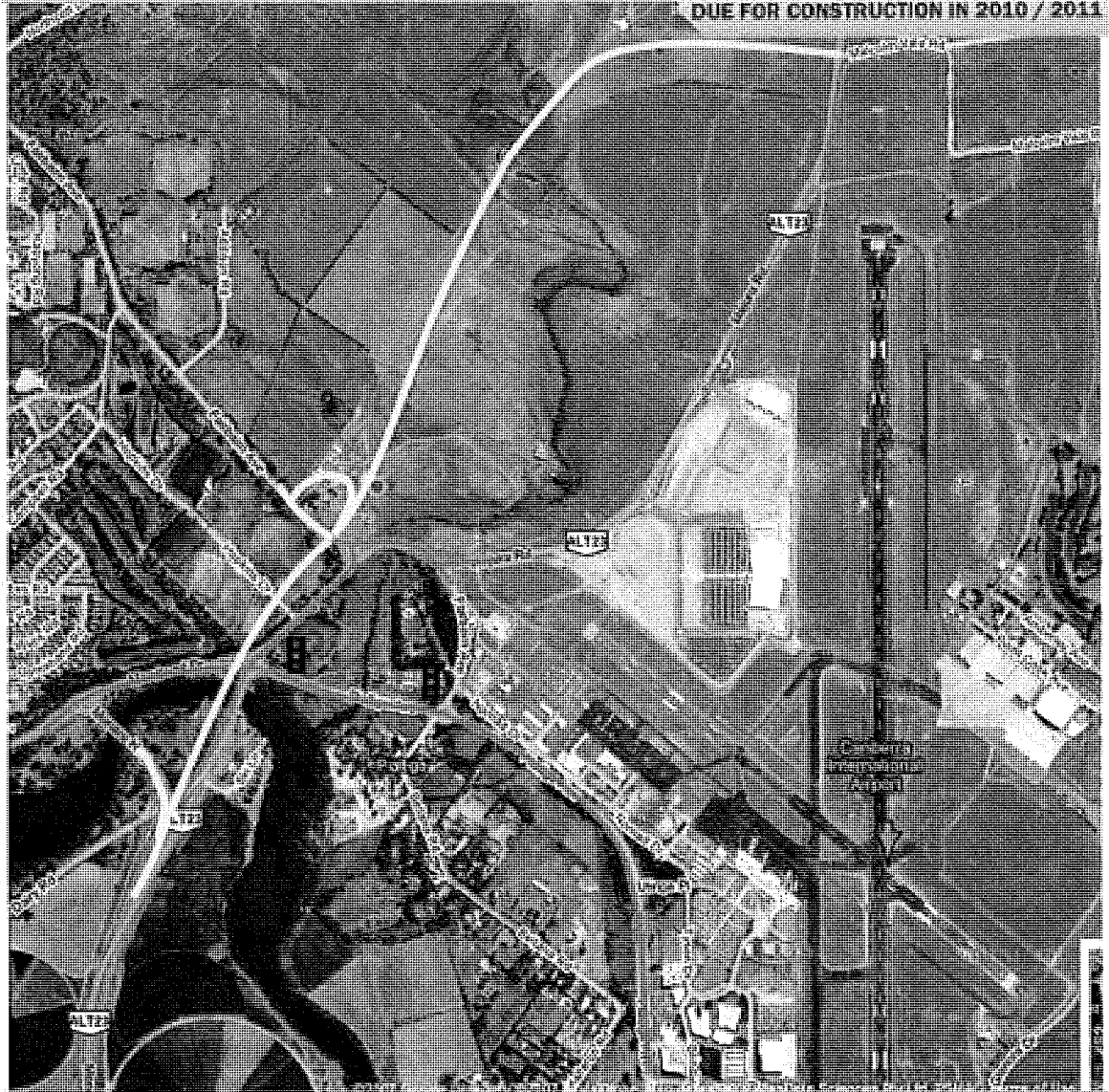
SMEC ACT
HIGHWAYS AND TRANSPORT GROUP



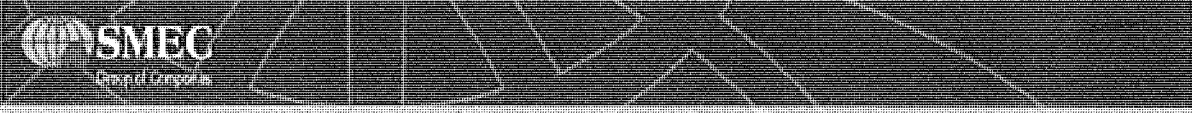
Majura Parkway - Stage 1

PHASE 3

DUE FOR CONSTRUCTION IN 2010 / 2011

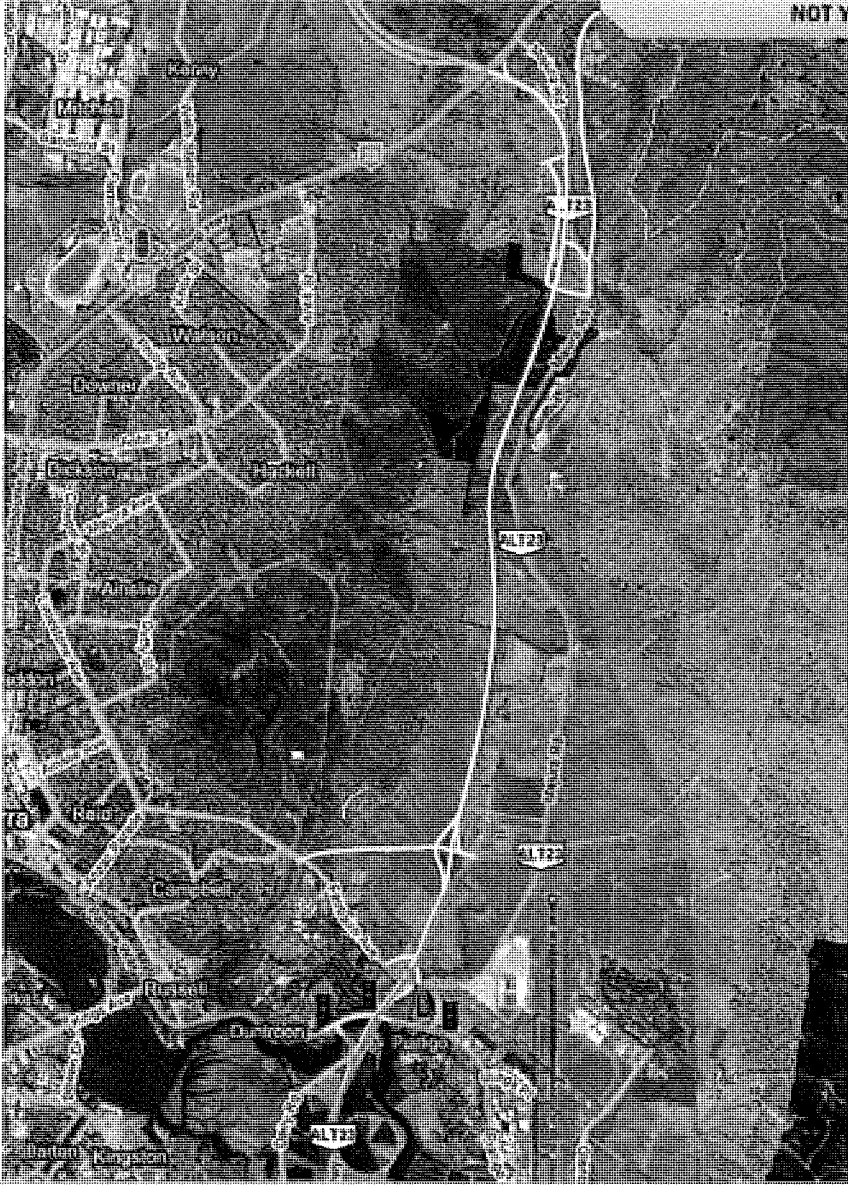


SMEC ACT
HIGHWAYS AND TRANSPORT GROUP

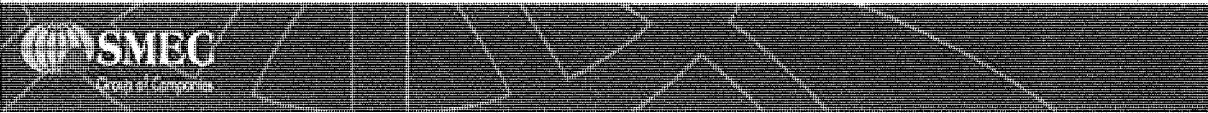


Majura Parkway - Stage 2

PHASE 4
NOT YET SCHEDULED



SMEC ACT
HIGHWAYS AND TRANSPORT GROUP



Majura Parkway (Ultimate Configuration)

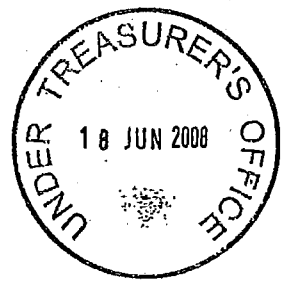


SMEC ACT
HIGHWAYS AND TRANSPORT GROUP

TSY-908/789
CMO-808/237



OFFICE OF THE CHIEF EXECUTIVE



RECEIVED
17 JUN 2008
Chief Executive
ACT Chief Minister's Department

Andrew Cappie-Wood
Chief Executive
Chief Minister's Department
GPO Box 158
Canberra ACT 2601

Dear Mr ^{Andrew}~~Cappie-Wood~~

Infrastructure Australia

→ email
BZ → Richard Kingham:
Note and file please

Further to our conversation on Wednesday 4 June 2008, please be advised that my department is prepared to assume lead agency responsibility and coordinate the ACT Government's response to requests from Infrastructure Australia.

In light of the fact that The Department of Territory and Municipal Services (TAMS) is responsible for a large proportion of the ACT Government's infrastructure and its associated service delivery, it also has staff with significant expertise and knowledge in the development and management of these assets and services.

I believe that this approach will be in the best interests of the Territory and should ensure that we are well placed to respond to the significant opportunities offered to our community through the establishment of the Infrastructure Australia Advisory Council chaired by Sir Rod Eddington.

Ms Sue Morrell, Executive Director, Community and Infrastructure Services in TAMS is currently an ACT representative on the Infrastructure Australia Working Group chaired by Minister Albanese, Minister for Infrastructure, Transport, Regional Development and Local Government. I suggest we nominate her as the ACT Government contact point for the Infrastructure Australia Advisory Council and the Infrastructure Australia Working Group. Her contact details are (02) 6205 2483 or via email sue.morrell@act.gov.au.

I would be happy to discuss this arrangement further if you require more details.

Yours sincerely

Mike Zissler
Chief Executive

12 June 2008

Kingham, Richard

From: [REDACTED]
Sent: Wednesday, 2 July 2008 5:09 PM
To: [REDACTED]@infrastructure.gov.au
Cc: [REDACTED]
Subject: In-confidence - The ACT's Draft Response to the National Infrastructure Audit

[REDACTED]

Attached is the ACT's draft response to the National Infrastructure Audit. My apologies for the delay in getting this to you, we should have a signed copy to you by early next week.



2008070216510884
5.pdf

[REDACTED] A/G SENIOR MANAGER | BUDGET STRATEGY AND REPORTING | FINANCE AND BUDGET DIVISION | ACT
REASURY
PH: 02 6207 0234 | FAX: 02 6207 0298



Jon Stanhope MLA

CHIEF MINISTER

TREASURER MINISTER FOR BUSINESS AND ECONOMIC DEVELOPMENT
MINISTER FOR INDIGENOUS AFFAIRS MINISTER FOR THE ENVIRONMENT, WATER AND CLIMATE CHANGE
MINISTER FOR THE ARTS
MEMBER FOR GINNINDERRA

The Hon Anthony Albanese MP
Minister for Infrastructure
Transport, Regional Development
and Local Government
Leader of the House
Suite MG 43
PARLIAMENT HOUSE
CANBERRA ACT 2600
Attention: Ms Anna-Maria Arabia, Adviser

Dear Mr Albanese

I am writing in relation to the request from Infrastructure Australia (IA) for the ACT's input into the National Infrastructure Audit by 30 June 2008.

I note the Audit's focus is on Nationally Significant Infrastructure which includes water, energy, transport, and communication infrastructure. I also note the approach adopted by IA is flexible, rather than prescriptive, for jurisdictions to prepare their responses, and identify current as well as prospective projects which materially impact on economic productivity growth of the region.

After a thorough review, the ACT has identified a number of projects that it considers should be included in the national audit. These projects not only have benefits for the ACT, they also have economic benefits for the wider economy of the region.

The infrastructure projects identified by the ACT relate to water security; security of energy supply to the nation's capital (including a backup power line to the ACT); transport infrastructure (linking the national highway system, a fast train link between Sydney and Melbourne, and construction of a light rail system for the ACT); and mitigation and adaptation to climate change (large scale solar farm and bulk transfer of water to Googong).

The ACT Government is also taking this opportunity to highlight a significant project relating to the reconfiguration of the Territory's health system. While not included in the IA's categories of economic infrastructure, the ACT Government considers that this will play a significant role in the economic capacity of the Territory and its region.

ACT LEGISLATIVE ASSEMBLY

London Circuit, Canberra ACT 2601 GPO Box 1020, Canberra ACT 2601
Phone (02) 6205 0104 Fax (02) 6205 0433 Email stanhope@act.gov.au

The list of projects along with a brief description and indicative costs is attached. I understand further details including feasibility studies will be required to assist with funding considerations. These will be provided directly to IA through the COAG Infrastructure Working Group.

Further information and clarification could also be sought from the ACT Treasury representative on the COAG Infrastructure Working Group.

Yours sincerely

Jon Stanhope MLA
Chief Minister

DRAFT

NATIONAL INFRASTRUCTURE AUDIT – ACT SUBMISSION Infrastructure Projects Identified for Consideration

PROJECT	DESCRIPTION	NATIONAL SIGNIFICANCE	Indicative Cost (\$ million)
TRANSPORT			
Majura Parkway	<p>The roads in the vicinity of the Canberra Airport play an important role for the ACT economy, the surrounding New South Wales region and nationally, given the importance of the Monaro Highway as a well used freight route connection to the Federal Highway.</p> <p>This project would also facilitate the potential redevelopment of the Canberra Airport into a 'freight-hub', allowing for the redirection of significant freight cargo into the airport, and for this to be transferred onto trucks for dispatch to various centres within the region.</p>	Links Majura Parkway to a National Highway	234
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]



Jon Stanhope MLA

CHIEF MINISTER

TREASURER MINISTER FOR BUSINESS AND ECONOMIC DEVELOPMENT

MINISTER FOR INDIGENOUS AFFAIRS MINISTER FOR THE ENVIRONMENT, WATER AND CLIMATE CHANGE

MINISTER FOR THE ARTS

MEMBER FOR GINNINDERRA

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ACT LEGISLATIVE ASSEMBLY

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Phone (02) 6205 0104 Fax (02) 6205 0433 Email stanhope@act.gov.au

NATIONAL INFRASTRUCTURE AUDIT – ACT SUBMISSION
Infrastructure Projects Identified for Consideration

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TRANSPORT			
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[REDACTED]

From: [REDACTED]
Sent: Tuesday, 8 July 2008 3:46 PM
To: [REDACTED]
Cc: [REDACTED]
Subject: RE: In-confidence - The ACT's Response to the National Infrastructure Audit [SEC=UNCLASSIFIED]
Attachments: 20080708153744138.pdf

[REDACTED]

Attached is the signed-off final version of the ACT's Response to the National Infrastructure Audit. The original is on it's way in the post.

Please note, there are no changes to the draft which was sent through last week.

[REDACTED]

[REDACTED] A/G SENIOR MANAGER | BUDGET STRATEGY AND REPORTING | FINANCE AND BUDGET DIVISION | ACT TREASURY
PH: 02 6207 0234 | FAX: 02 6207 0298

From: [REDACTED] [mailto:[REDACTED]@infrastructure.gov.au]
Sent: Thursday, 3 July 2008 11:28 AM
To: [REDACTED]
Subject: RE: In-confidence - The ACT's Draft Response to the National Infrastructure Audit [SEC=UNCLASSIFIED]

thanks for sending through the draft [REDACTED]
[REDACTED]

[REDACTED]
Infrastructure Adviser
Office of the Hon Anthony Albanese MP
Minister for Infrastructure, Transport, Regional Development, and Local Government
Leader of the House
Federal Member for Grayndler
Canberra: (02) 6277 7680
Sydney: (02) 9252 0966
Mobile: 0412 940 921
Fax: (02) 6273 4126
www.anthonyalbanese.com.au

From: [REDACTED]
Sent: Wednesday, 2 July 2008 5:09 PM
To: [REDACTED]
Cc: [REDACTED]
Subject: In-confidence - The ACT's Draft Response to the National Infrastructure Audit

[REDACTED]

Attached is the ACT's draft response to the National Infrastructure Audit. My apologies for the delay in getting this to you, we should have a signed copy to you by early next week.

<<20080702165108845.pdf>>

[REDACTED] | A/G SENIOR MANAGER | BUDGET STRATEGY AND REPORTING | FINANCE AND BUDGET DIVISION | ACT TREASURY
PH: 02 6207 0234 | FAX: 02 6207 0298

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Jon Stanhope MLA

CHIEF MINISTER

TREASURER MINISTER FOR BUSINESS AND ECONOMIC DEVELOPMENT

MINISTER FOR INDIGENOUS AFFAIRS MINISTER FOR THE ENVIRONMENT, WATER AND CLIMATE CHANGE

MINISTER FOR THE ARTS

MEMBER FOR GINNINDERRA

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Attention: Ms Anna-Maria Arabia, Adviser

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ACT LEGISLATIVE ASSEMBLY

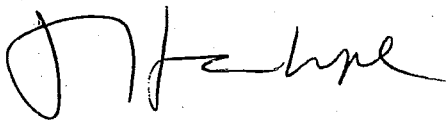
London Circuit, Canberra ACT 2601 GPO Box 1020, Canberra ACT 2601

Phone (02) 6205 0104 Fax (02) 6205 0433 Email stanhope@act.gov.au

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Yours sincerely



Jon Stanhope MLA
Chief Minister

8 JUL 2008

NATIONAL INFRASTRUCTURE AUDIT – ACT SUBMISSION
Infrastructure Projects Identified for Consideration

PROJECT	DESCRIPTION	NATIONAL SIGNIFICANCE	Indicative Cost (\$ million)
TRANSPORT			
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From: actgovmedia@act.gov.au
Sent: Wednesday, 9 July 2008 2:12 PM
To: noreply@chiefminister.act.gov.au
Subject: [ACT GOV MEDIA RELEASE] STANHOPE LISTS LIGHT RAIL AS ACT PRIORITY FOR COMMONWEALTH INFRASTRUCTURE FUNDING

STANHOPE LISTS LIGHT RAIL AS ACT PRIORITY FOR COMMONWEALTH INFRASTRUCTURE FUNDING

Published: July 9, 2008, 2:11 pm
Section: Jon Stanhope, MLA | Media Releases

The ACT Government has listed a light rail system for the ACT as one of the major infrastructure projects it believes worthy of consideration for Commonwealth funding under the \$20 billion Building Australia Fund.

In response to a request from the Rudd Federal Government for suggested major infrastructure projects, the ACT Government has proposed a light rail system linking Civic to the Airport, Parliamentary Triangle and major town centres — a project that could cost around \$1 billion to achieve.

Also on the ACT's list of worthy projects are a Very Fast Train linking three or possible four eastern capitals, including Canberra, and a major solar power station for the ACT.

It has also listed the construction of the Majura Parkway, which would play an important role in any future development of the Canberra airport as a freight hub, as well as delivering significant benefits to local road users and road freight on the Monaro and Federal Highways.

In the area of improving water security, the ACT Government has listed two possible projects for Building Australia funding — the massive enlargement of the Cotter dam from 4 gigalitres to 78 gigalitres, and the planned Murrumbidgee-to-Googong project, under which water would be pumped from the river for storage in the Googong dam.

The Government has also asked for consideration to be given to the funding of a back-up power line into the ACT, which would deliver greater security of energy supply, and the construction of a high-pressure trunk gas main.

Chief Minister Jon Stanhope said today he had written to the Minister for Infrastructure, Anthony Albanese, this week, listing the ACT's priorities for consideration.

"Each of these projects have benefits that extend beyond the borders of the ACT, delivering potential benefits in terms of climate change, regional water security and regional transport," Mr Stanhope said.

The fund was announced by the Rudd Government in this year's federal Budget. The first allocations from the fund are expected to be made in 2009-10.

"I believe the ACT's identified projects match well with the Rudd Government's stated priorities of helping Australian industry get its goods to market quickly and cheaply and improving the functioning and quality of life in cities and regional centres," Mr Stanhope said.

Media Contact:

Jess Wurf 6205 0504 0411 772 700 jess.wurf@act.gov.au
 Penelope Layland 6205 9777 0438 289 714 penelope.layland@act.gov.au

Feedback

We welcome your comments about the services provided by the ACT Government. Your comments will help us give you the service you want - the way you want it. Please use the [Feedback form](#) to send comments on the services we provide or any enquiry you may have.

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Australian Government

Infrastructure Australia

The Hon Jon Stanhope MP
Chief Minister
GPO Box 1020
CANBERRA ACT 2601



Dear Chief Minister

REQUEST FOR FURTHER INPUT TO THE NATIONAL INFRASTRUCTURE AUDIT

I am writing to request further advice in support of your submission to the National Infrastructure Audit currently being undertaken by Infrastructure Australia (IA).

As you are aware, the National Infrastructure Audit is being undertaken to determine the adequacy, capacity and condition of nationally significant infrastructure taking account of forecast growth. Based on the results of the audit, IA will develop an Infrastructure Priority List for consideration by the Council of Australian Governments (COAG) by March 2009.

As part of this process, the Commonwealth and each State and Territory has provided advice to IA concerning its water, energy, transport and communications infrastructure. In this regard, the ACT submission to IA identified a list of strategic priority projects for water, energy, transport and communications infrastructure.

IA has now assessed each of the State and Territory submissions to the National Infrastructure Audit. The framework used to undertake this assessment is attached for your information. From this assessment, IA is seeking further information from the ACT on the following matters:

- Problem assessment. An objective and quantified appraisal of the economic, environment and social costs of the infrastructure deficiencies that have been identified in your audit submission. The purpose of seeking this advice is to enable IA to better understand the costs and impacts of these deficiencies in the ACT and thus allow for the most pressing matters to be identified and prioritised.
- Solution assessment. An understanding of the economic and financial appraisal methods used to prioritise particular infrastructure projects. In particular, IA is seeking a copy of any cost-benefit analyses that have been made of those projects and on any other proposed regulatory reform options.

IA is required to complete the National Infrastructure Audit by December 2008. In light of this, please provide the ACT's supplementary information to IA by 31 August 2008.

Should you wish to discuss this matter further, please do not hesitate to contact me direct.

Yours sincerely

Michael Deegan
Infrastructure Coordinator

14 August 2008