NZ TRANSPORT AGENCY
WAKA KOTAHI

Basin Reserve Grade Separation
Project Feasibility Report

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Quality Assurance Statement

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Contents

Appendices

Executive Summary

This Project Feasibility Report (PFR) was prepared following completion of the Ngauranga to Airport Strategy study. The PFR documents the objectives for the Basin Reserve project and the success with which the preferred option meets them.

The PFR presents each of the options developed and describes the key attributes of the preferred option. The option recommended for inclusion within the Ngauranga to Airport Transport strategy would provide a grade separated link from the Mount Victoria Tunnel around the Basin Reserve to Buckle Street. A southbound on-ramp would be provided from SH1 (Kent Street) whilst traffic heading to Newtown and the Hospital would pass under the new viaduct. Only one exit-slip would be provided: from SH1 northbound from the tunnel down to Dufferin Street.

The PFR also documents issues identified during the Ngauranga to Airport study, which will need to be considered as a preliminary design is developed and during a scheme assessment. This report identifies potential social and environmental effects, both during and following construction. These are documented in the Transit NZ Social and Environmental Screen extracted from PSF/13. Work during the Scheme Assessment will identify the magnitude of effects and potential measures for mitigating them.

The effects expected to be most severe are noise and visual impact of a grade-separated viaduct around the Basin Reserve. Traffic Disruption during construction may also be significant. Each of these issues will need careful consideration as the design and construction programme is developed further. The scheme also brings positive community effects, by reducing the volume of traffic which would travel between the CBD and Kilbirnie along Evans Bay Parade. This provides an opportunity for the City Council to prioritise the bay road route for pedestrians, cyclists and passenger transport services.

The feasibility estimate presented within this PFR includes contingencies to allow for unknown elements and risk associated with assumptions that have been made. As further investigation is carried out and a preliminary design is developed, the project team will develop a clearer, more detailed understanding of the construction, consenting and other costs. This will be combined with further work to quantify the costs or benefits associated with crashes, walking and cycling, disruption during construction and other affects. The economic efficiency with which this solution meets its project objectives is indicated in the preliminary BCR of 2.41.

The final part of this report includes an assessment against the objectives of the New Zealand Transport Strategy and the requirements of the LTMA. The recommended option is expected to improve the efficiency with which SH1 operates and reinforce the route hierarchy within the City. It also brings significant opportunities to improve facilities for pedestrians, cyclists and passenger transport services. Tests undertaken using the Wellington Transportation Strategic Model found that grade separation of SH1 at the Basin Reserve encouraged model shift to buses even without priority measures. Grade separation also provides opportunities to improve pedestrians and cyclists journeys by removing interaction with high volume traffic flows on SH1.

This scoping stage has concluded that the project aims are valid, both in terms of the Ngauranga to Airport Transport Strategy, but also in terms of the national and regional transport objectives. The proposed improvement addresses the project objectives relatively efficiently and the project should therefore be developed further and be subject to a rigorous scheme assessment.

1 Introduction

Opus International Consultants (Opus) has been commissioned by the New Zealand Transport Agency (NZTA) to prepare a Project Feasibility Report (PFR) identifying options for improving transport operations around the Basin Reserve gyratory.

The purpose of this report is to document the expected performance of the recommended project against the strategy objectives, efficiency criteria and contribution towards the objectives of the Land Transport Management Act 2003 (LTMA).

1.1 Previous work

All the reports produced as part of the Ngauranga to Airport Transport Strategy document the technical assessment undertaken for the various projects identified. The work has included various planning and engineering assessments as well as several phases of public consultation. The recommended strategy is documented in Technical Report III. Other reports issued as part of the study include:

The Problem Framing Report: - set out the need to deliver an integrated land transport system that supports Wellington City's transport and urban development strategies (urban growth spine) and provides access to the CBD, airport, hospital and port.

Phase I Consultation Report: - identified a number of reoccurring themes, many of which were consistent with the problem framing report.

Golden Mile Capacity Assessment Report: - investigated the existing and likely maximum operating capacity for passenger transport services along the Golden Mile.

Technical Report I: - set out a wide range of individual options for improving passenger transport, addressing the needs of general motor vehicle users as well as enhancing walking and cycling opportunities throughout the Ngauranga to Airport corridor.

Technical Report II: - documenting the effectiveness of packages of improvements at addressing issues identified in the Problem Framing Report and meeting the Regional Land Transport Strategy objectives.

Phase II Consultation Report: - This report details the findings of a consultation brochure published in December 2007. The study team received over 4500 submissions gaining valuable public feedback on the elements identified in Technical Report One that looked likely to form part of the final strategy.

Technical Report III: - describes the various elements forming the transport strategy and explains how the various elements relate to each other and how they collectively create an integrated transport solution for the study area.

1.2 Structure of this Report

This report describes the objectives for the proposed improvement, the degree to which the proposed scheme meets those objectives and those prescribed by the LTMA. It also highlights issues for taking the project forward, documenting the constraints within which options have been developed and the rationale and development of planning objectives.

The report also provides transparency for future decision making and will enable The NZTA to obtain balanced and informed input that can be documented for future reference. This is crucial to the success of the project given the importance of developing improvement options that are supported by all stakeholders. The report has therefore been structured as follows:

Between them, Chapters 2, 3, and 4 give the background to the project, objectives indentified from previous studies and puts the project into context.

Chapters 5 and 6 describe the options considered and detail the preferred option. They emphasise how the preferred option has been developed and the likely impact it will have on surrounding area.

Chapters 7, 8, 9 and 10 describe the resource management issues, land requirements geotechnical considerations and any maintenance issues associated with the preferred option. This is summarised in Chapter 11 within a Social and Environmental Screen prepared in accordance with Transit NZ PSF/13 form, and populated according to the accompanying Transit NZ PSG/13 guidance notes.

Chapter 12 and 13 establish the economic efficiency of the project and assesses the project objectives against those of the LTMA. Chapters 14 and 15 summarise the proposed project and give a set of final conclusions and recommendations for the project as it moves to the next stage of development.

2 Project Objectives

2.1 Strategy Objectives

The primary objectives for the Ngauranga to Airport Strategy are to improve access from the national and regional road network to:

- CentrePort
- Wellington Airport
- National Government
- Central Business District (CBD) – regional economic driver and one of the key economic drivers for New Zealand

Work to define the scope and issues which the strategy should address identified several key challenges including:

- Accommodating an overall increase in transport demand;
- Accommodating an increasing number of commuter trips to the CBD;
- The tidal nature of the traffic flows associated with commuters travelling to and from the CBD result in congestion both southbound during the morning peak and northbound in the evening peak.
- Increasing the level of 'penetration' of passenger transport into the CBD to facilitate/encourage a change in transport mode choices;
- Providing relief to existing (and future) 'choke points'; and
- Accommodating an increasing number of trips to/from the port and airport as passenger and freight movement's increase.

2.2 Project Objectives

The Basin Reserve is an iconic site of New Zealand sporting heritage. The gyratory that passes around the Basin is a key choke point in the local and State Highway road networks. The Basin Reserve's close proximity to the Mount Victoria Tunnel as well as key local and State Highway linkages results in significant travel time delays for drivers of both private motor vehicles and for public transport users. As a consequence of this traffic congestion, high vehicle speeds and traffic volumes cyclists and pedestrians face a number of safety issues particularly in the peak periods.

The objectives of this project are to:

- increase the efficiency of through traffic between the Inner City Bypass and Mount Victoria Tunnel,
- improve the efficiency and reliability of passenger transport services between Kent / Cambridge Terrace and Adelaide Road,

- address safety and capacity concerns relating to high traffic flows, weaving and speed around the Basin Reserve,
- improve pedestrian access to the Basin Reserve, particularly addressing the need for pedestrians to cross significant traffic flows during events,

In order to provide a more efficient, less congested road network, segregating the traffic movements and hence reducing the potential for conflict is seen as a priority. In light of this proposed function, the continued operation of the Basin Reserve as an international sporting venue must also be maintained. The interaction between the physical location of the sporting facility and the road networks functionality must be improved.

3 Site Description

Motorists travelling between the CBD, the eastern suburbs and the airport on State Highway 1 (SH1) have to complete a number of 90° turns as shown in Figure 3.1. This southbound movement includes travelling through two sets of signalised pedestrian intersections and merging from two lanes of traffic into one to travel through the Mount Victoria Tunnel. This results in congestion in the peak periods.

After leaving the Mount Victoria Tunnel, northbound traffic must circulate around the Basin Reserve before making a 90° turn onto Buckle Street. From here there is a direct route to the Terrace Tunnel. Traffic has to pass though a number of intersections, the majority of which are signal controlled. Figure 3.2 shows the location of the Basin Reserve in relation to Wellington CBD and its road network.

In addition to the State Highway movements, motorists travelling from the southern suburbs to the CBD and vice versa must also use the same roads around the Basin Reserve. This contributes to congestion both around the Basin and on the surrounding road network.

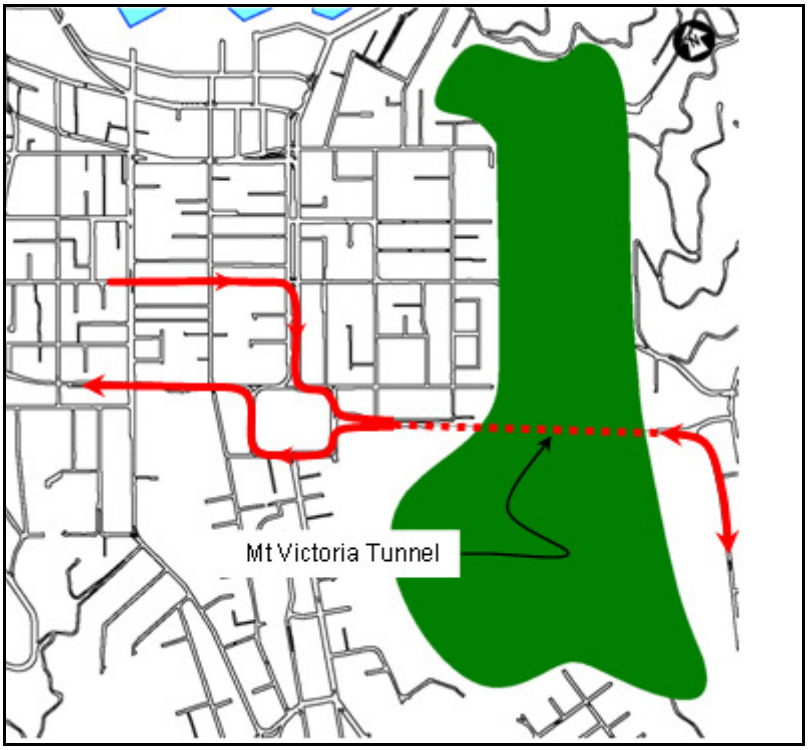

Figure 3.1: Existing SH1 Travel (Red Line) at the Basin Reserve and Mount Victoria Tunnel

Figure 3.2: Location of Basin Reserve

4 Traffic Statistics

This section outlines the current traffic situation between the Terrace Tunnel and Mount Victoria Tunnel. The speed limit between the Terrace Tunnel and Mount Victoria Tunnel (including along the Inner City Bypass) is 50km/hr. There are currently two lanes in each direction for State Highway travel.

On SH1 there are over 17,000 northbound vehicles using Buckle Street per day while 19,000 vehicles travel southbound along Vivian Street per day. Much of this traffic passes through the Basin Reserve.

Figure 4.1 shows that weekday traffic flows are tidal in nature, with peaks occurring in the morning and evening rush hours. The flows have been taken from the Paterson Street count station (ID: 01N017076), located on the western side of the Mount Victoria Tunnel. It has been averaged using the daily profile for June 2007.

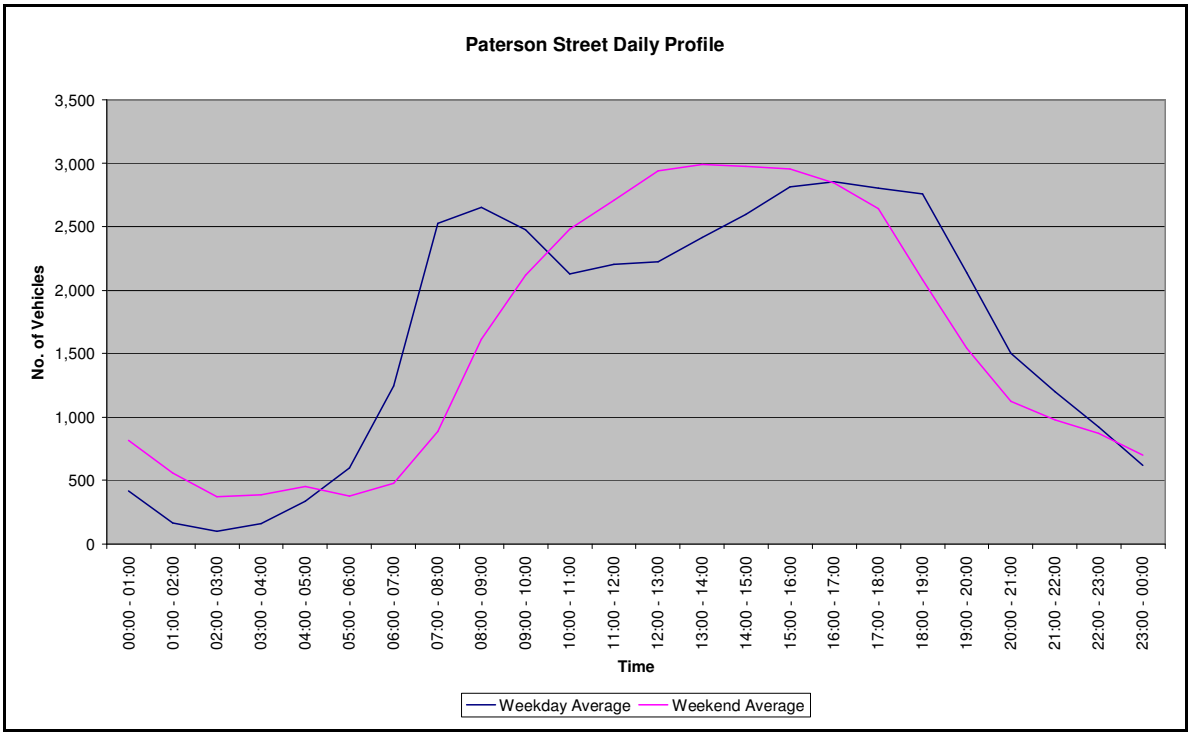

Figure 4.1: Paterson Street Daily Profile

Do Minimum (Do-min) traffic flow forecasts are presented in Table 1. These forecasts were made using the 2016 Wellington Strategic Growth Model (WTSM). The flows were extracted from the "Ngauranga to Airport Modelling Report May 2008" prepared by the Greater Wellington Regional Council (GWRC) modelling team and assume peak hour flows represent 60% of two-hour peak.

Link	Do-min Am Peak 2016	Do-min Inter Peak 2016	Do-min Pm Peak 2016
Patterson Street	2,910	2,640	2,750
Buckle Street	4,320	4,090	5,280
Kent Terrace	2,840	2,870	3,300
Cambridge Terrace	470	850	550

Table 1: Base Year Do-min Traffic Volumes

4.1 Crash History

Table 2 shows the number of crashes which have occurred on the Basin Reserve gyratory and at the intersections from which it is comprised. The table shows that there have been no fatal crashes at this location.

Severity	Year					Total
	2003	2004	2005	2006	2007	
Fatal	0	0	0	0	0	**0**
Serious	3	0	2	3	2	**10**
Minor	1	3	2	5	4	**15**
Non-Injury	15	23	23	33	45	**139**
Total	**19**	**26**	**27**	**41**	**51**	**164**

Table 2: Crash History by Year

Table 3 shows the number of crashes associated with different types of traffic movement at the gyratory. It shows that there is a high proportion of nose to tail crashes but that these are predominantly non-injury crashes. Other movements which previously have been associated with a high proportion of crashes include loss of control on a bend and changing lane. These crashes were more likely to result in injury.

Movement	Serious	Minor	Non-Injury	Total
Nose to tail	1	4	61	**66 (40%)**
Los of control on a bend	4	3	35	**42 (26%)**
Overtaking / Changing Lane	2	3	32	**37 (23%)**
Crossing / Turning	2	0	10	**12 (7%)**
Pedestrian vs Vehicle	1	5	0	**6 (4%)**
Straight-Lost control/Head on	0	0	1	**1 (1%)**
Total	**10**	**15**	**139**	**164**

Table 3: Crash History by Movement Type

2% of the injuries recorded at the Basin Reserve were pedestrians. 1% were cyclists.

5 Alternatives and Options Considered

5.1 Overview of Options

Options developed for the Basin Reserve aim to improve the connections between the Inner City Bypass and the western side of Mount Victoria Tunnel. Three options were developed. Some are mutually exclusive, stand alone projects while others need to be built in conjunction with other facilities/projects proposed as part of the Ngauranga to Airport Transport Strategy Study. Each option is described in the following sections.

5.2 Option B3: Two-way Grade separated Option at the Basin Reserve

Option B3 as illustrated in Figure 5.1 provides a new direct link for SH1 northbound vehicles travelling from the existing Mount Victoria Tunnel to the Inner City Bypass along Buckle Street. SH1 southbound vehicles travelling from the Inner City Bypass along Vivian Street and then Kent Terrace are provided with a direct link to the Mount Victoria Tunnel or alternatively the proposed duplicate tunnel if it is constructed (Paterson Tunnel - Option B2). Both of these direct links are grade separated from other traffic movements around the Basin Reserve, minimising delays at intersections and removing the significant weaving problems that exist around the Basin Reserve.

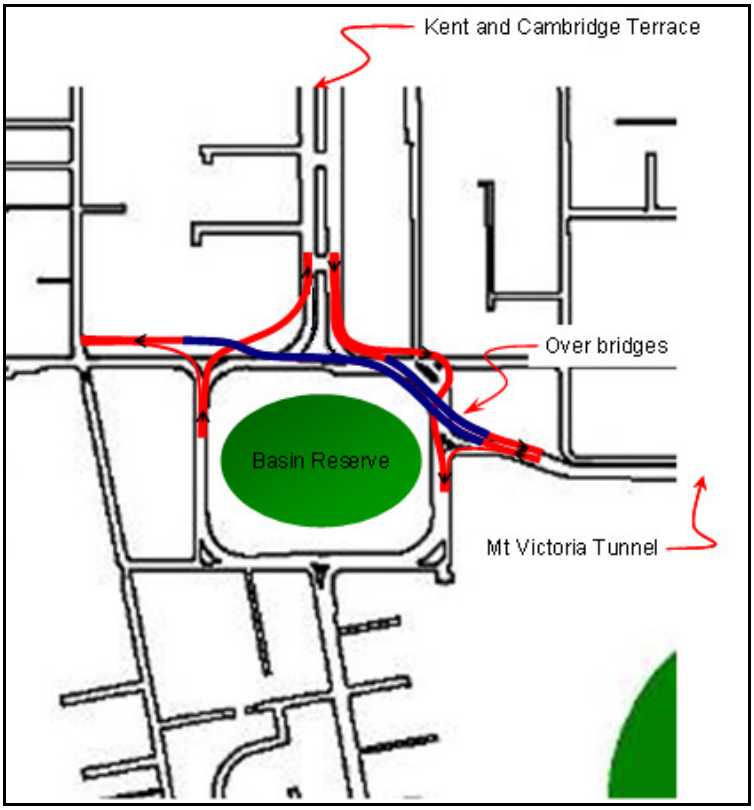

Figure 5.1: Option B3: Two-way Grade Separated Option

Initially, Option B3 included a northbound exit slip to Cambridge Terrace. As the strategy study was progressed the project was revised so that this scheme was omitted. This is the preferred option and additional details are presented in Section 6.

5.3 Option B4: One-way Grade-separated Option at the Basin Reserve

Option B4 is almost identical to Option B3, except that it does not provide the grade separated link for east-bound vehicles travelling from Vivian Street (using the Inner City Bypass) via Kent Terrace to the Mount Victoria Tunnel. Option B4 works solely in conjunction with the provision of a new tunnel on Pirie Street. The tunnel would be used by motorists travelling eastbound from the Inner City Bypass towards the airport. The tunnel emerges close to the intersection between SH1 and Taurima Street, where traffic would follow the existing alignment of SH1.

A key feature of this arrangement is that it reduces the number of lanes from four to two that must pass physical constraints at the north-east corner of the ring road around the Basin Reserve and in Paterson Street. The arrangement is shown in Figure 5.2.

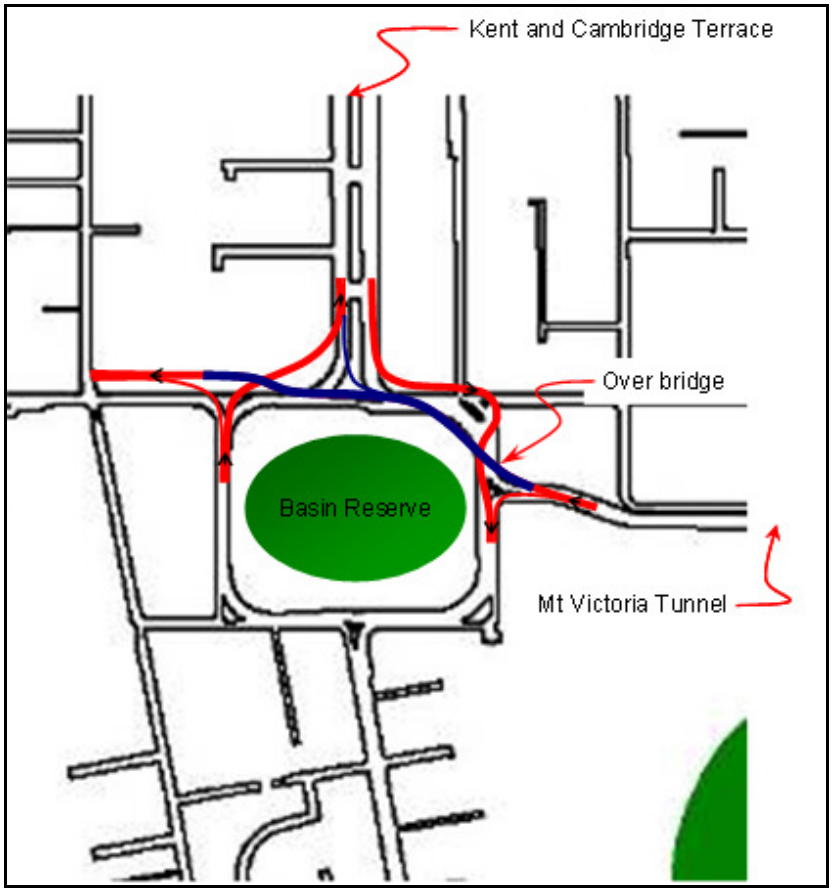

Figure 5.2: Option B4 One Way Grade Separated Option

5.4 Option B5: One-way At-grade Option for the Basin Reserve

Option B5 is similar to Option B4, except that the direct link for westbound vehicles travelling from Mount Victoria Tunnel to the Inner City bypass using Buckle Street is at grade with traffic having to pass through two signal controlled intersections (one at Dufferin Street and one at Sussex Street). The arrangement is shown in Figure 5.3.

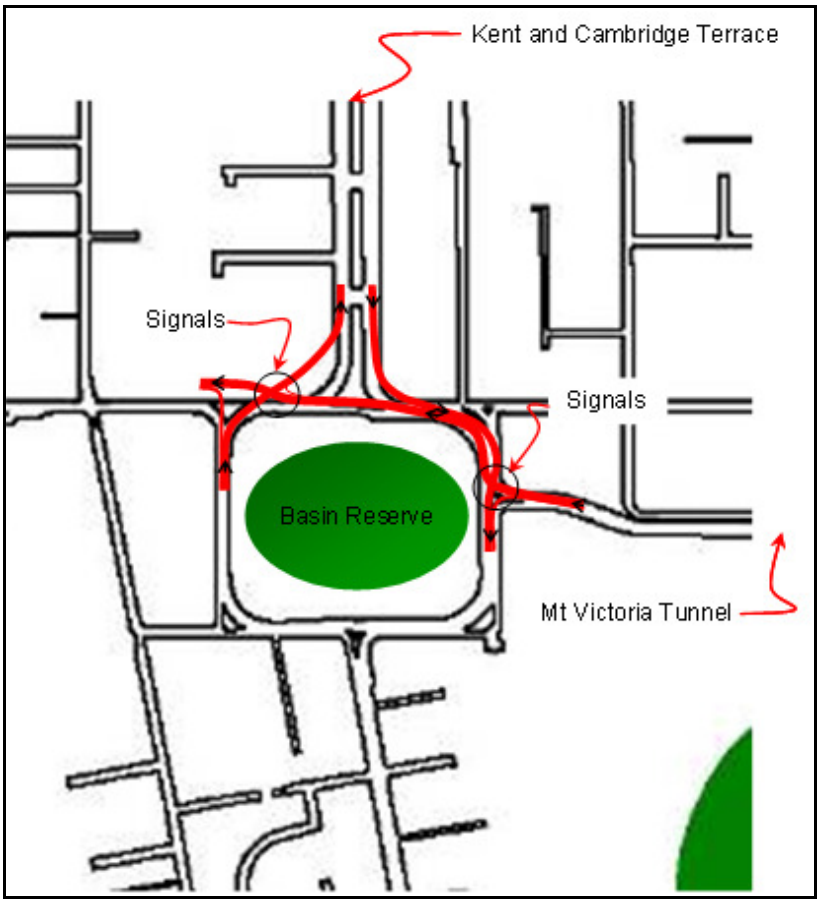

Figure 5.3: Option B5 One-Way At-Grade Option for the Basin Reserve

Option B5 can work in conjunction with a number of other options such as the Pirie Street Tunnel (mentioned above), where east-bound traffic is diverted away from the Basin Reserve Gyratory. A key feature of this arrangement is that it avoids the need for elevated structures near the Basin Reserve. While it avoids the weaving problems associated with traffic circulating around the Basin Reserve, westbound traffic will still be subject to delays at the signal controlled intersections.

It is expected that delays at these intersections could be minimised if this project were implemented in combination with the development of an Adelaide Road passenger transport corridor, with limited capacity for through traffic for general vehicles. With this arrangement, general traffic to Newtown and the suburbs south of Newtown will be encouraged to use Taranaki Street and Wallace Street. Therefore, while general vehicles

will be permitted to use the ring road around the Basin Reserve, this will be primarily to permit access to properties.

Tests undertaken using the Wellington Inner City Bypass PARAMICS model found that this option did not significantly improve traffic efficiency if implemented in isolation from Pirie Street Tunnel or depowering of Adelaide Road. The tests found that some movements suffered a worse level of service compared to when no changes were introduced. Refer to the "Basin Reserve At-grade Intersection Proposal" report completed by Opus in June 2008 for the detailed findings of the at-grade modelling results.

6 Preferred Option

Option B3 – two-way Grade Separation without a northbound exit-slip to Cambridge Terrace is the preferred option to resolve traffic congestion at the Basin Reserve. This is because it is seen to be the most efficient at reducing congestion. A full concept layout diagram is included as Appendix A.

A detailed design will be developed following a scheme assessment and as the project is progressed. One option, based on an investigation completed by Maunsells is for the two most left lanes of Kent Terrace to provide access to Adelaide Road and Buckle Street around the Basin Reserve. The two other Kent Terrace lanes rise up to pass over these two-lanes to provide access to the east through the Mt Victoria tunnel. The two-lanes providing access to Adelaide Road must loop away from the two approach lanes to the tunnel and drop below ground in a trench near the Dufferin Street and Paterson Street intersection to obtain the necessary clearance under the two-lanes above.

Westbound vehicles from the tunnel do not need to circulate around the Basin Reserve to get to Buckle Street, but are instead provided with a direct two-lane carriageway parallel to, and adjacent to, the eastbound lanes. This direct link is provided on a viaduct, which passes over the road connecting Kent Terrace with Adelaide Road, over the Basin Reserve entrance and over the road linking the Sussex Street with Cambridge Terrace at the intersection of Sussex Street and Buckle Street. In this way, there are no intersections between the tunnel portal and Buckle / Tory Streets signal controlled intersection. The road linking Sussex Street with Cambridge Terrace passes under the viaduct. Two-lanes are provided for the road linking Sussex Street with Cambridge Terrace.

It has been assumed that as part of this connection, that Buckle Street is realigned to the north, which is in keeping with the current proposals being studied to improve amenity in front of the National War Memorial in Buckle Street. This alignment also provides for better connections and more room for construction.

The elevated structure for grade separation of the Basin Reserve will be visually prominent and will affect the perception, symbolic character and context of the Basin Reserve and will impact on the overall character of the wider surroundings. The grade separation may also adversely affect the experience of those using the Basin Reserve.

There is an opportunity to enhance the entrance-way to the Basin Reserve by incorporating the viaduct structure into a grand entrance. Figure 6.1 shows an artist impression of how the viaduct could be into a gateway feature. The viaduct over the entrance to the Basin Reserve together with the relocation of other high volume roads away from the entranceway creates the opportunity to significantly improve enhanced pedestrian access to the Basin Reserve. At-grade pedestrian crossings could be modified on Kent and Cambridge Terrace to allow pedestrians to reach this area. A pedestrian route around the inside of the ring road connects the Basin Reserve entrance with other key pedestrian routes. Signal controlled crossing points for pedestrians could be provided

across Dufferin Street (opposite St Marks) and Rugby Street (opposite Adelaide Road). The drop-off and pick-up areas in front of St Mark's school in Dufferin Street will be safer given the significant reduction of traffic volumes in this area.

Before

After

Figure 6.1: Basin Reserve (looking south from Kent/Cambridge)

7 Resource Management Issues

7.1 Consultation Undertaken

All of the consultation thus far has been associated with strategic interventions for the Wellington City Area. Improvements to the Basin Reserve were one element of this. None of the consultations were focused solely on projects for the Basin Reserve.

7.1.1 Phase I Consultation (July 2006)

The purpose of the consultation was to inform people that the Ngauranga to Airport Strategic study was being undertaken and to obtain their suggestions for issues facing the corridor and any other issues the study should consider.

Phase I of consultation was carried out at the *inform* level of the IAP2 Public Participation Spectrum with the goal of providing the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions. It identified a number of reoccurring themes, many of which were consistent with the problem framing report.

Parties Consulted With

In accordance with the agreed Consultation Strategy, Phase I of the Study involved consulting directly with key stakeholders only. In this phase there were no specific activities aimed at the general public.

Brochures were sent to all key stakeholders identified in the Consultation Strategy, as well as members of the Regional Land Transport Committee, and other organisations identified by The NZTA and GWRC.

7.1.2 Phase II Consultation (Dec 2007 – Feb 2008)

The purpose of the consultation was to inform people that the strategic study was ongoing and to obtain their suggestions for improving the issues facing the corridor and to express their views on the different combinations of public transport and roading improvements which were identified in technical reports and consultation brochures. Various improvements throughout the study area were consulted upon.

The consultation brochure for Phase II was developed by GWRC, Opus, NZTA, and WCC. The document provided the background to the strategic study, described specific transportation issues and presented a range of possible transport measures which could be introduced over the next 30 years to improve Wellington's transportation systems.

Phase II of the consultation was carried out in accordance with the agreed Consultation Strategy; Phase II was carried out at the consult level of the IAP2 Public Participation Spectrum.

Parties Consulted With

Copies of the consultation brochure were sent to stakeholders identified by the Consultation Strategy, as well as members of the Regional Land Transport Committee. Copies of the consultation document/questionnaire were also available from public libraries, WCC and GWRC offices and from The NZTA. A list of contacts where the brochures were sent can be found attached in Appendix B.

Copies of technical reports were made available from the WCC, GWRC, and The NZTA websites. The websites also included the facility for electronic responses either using an on-line form or by sending an email. There were a total of 4673 responses to the consultation, with about 98% coming from individuals.

There were a number of public information days which were lead by a number of representatives from GWRC, The NZTA, and WCC. They were held between the 26th to the 30th of January 2008, open to the public at the following locations:

- Queensgate Mall, Lower Hutt (11am-3pm) Saturday 26 January 2008
- Johnsonville Mall, Johnsonville (11am-3pm) Sunday 27 January 2008
- Kilbirnie Community Centre, Kilbirnie, Wellington (3-7pm) Tuesday 29 January 2008
- Midland Park, Lambton Quay Wellington (11am-3pm) Wednesday 30 January 2008

After publication of the consultation summary report, feedback was considered by the project steering group and considered during the formulation of the recommended strategy.

7.2 Ongoing Consultation

7.2.1 Stage III Consultation

There were two broad objectives for the Stage III consultation:

- To engage stakeholders and the community in the draft Plan;
- To facilitate awareness and understanding of the Plan so interested parties have the opportunity to make submissions; and
- to obtain feedback on the recommended strategy.

Technical Report III and all preceding reports were available to the public. The consultation material outlined:

- proposed activities (projects) and groups of activities and their indicative timelines;
- other committed activities that support the network, e.g. PT real time and electronic ticketing, TDM, Urban Development Strategy, etc;

- the "adaptive approach" adopted for the strategy, including assumptions and triggers for strategy reviews;

Parties consulted with in Stage II (see Appendix B) were contacted again and given the opportunity to make submissions on the strategy. Feedback from the public and from stakeholder organisations was considered by a sub-committee of the regional Land transport committee. At the time of writing this sub-committee had not published their recommendations.

7.3 Consent Requirements

7.3.1 Overview

A preliminary planning assessment to identify the resource consents, designations and outline plans likely to be needed for the proposed improvements to SH1 along the Ngauranga to Airport corridor was completed. The assessment undertaken took into account the following territorial authority plans:

- Wellington City District Plan
- Regional Coastal Plan
- Regional Air Quality Management Plan
- Regional Soil Plan
- Regional Discharges to Land Plan
- Regional Freshwater Plan

The assessment for the consent requirements at the Basin Reserve has been based on the following assumptions:

- None of the proposed works will take place on contaminated sites. Any work on contaminated sites will likely require additional resource consents and should be subject to a further planning assessment.
- The assessment has not reviewed any Proposed District or Regional Plan Changes.
- This assessment does not include the identification of historic sites and places, protected under the Historic Planes Act 1993. Any proposal to modify or destroy protected sites and places may require an authority under the Act.

7.3.2 Existing Roadway Designations

Generally the project is contained within NZTA's roadway designation. However the modifications required on local road connections between Sussex Street to Cambridge Terrace, Ellice Street to Dufferin Street and for the northbound off-ramp on the exit of Mount Victoria Tunnel are outside the roadway designation.

It will be highly desirable to include these changes as part of an updated District Plan. The current Wellington City Council District Plan was adopted in 2000 and will soon be due for a review and amendment.

If this scheme is not recognised within the review it will be preferable to designate the land requirements. This would be a publicly notified project and designation would therefore duplicate many of the planning processes needed for adoption of an amended District Plan. Building within a designation is advantageous because:

(a) A designation, when placed on land prior to any works being undertaken, allows the land to be identified for its planned purpose and protects against interim activities that might hinder the eventual construction and operation of road improvements.

(b) Designations expressly identify the intended and eventual use of a site in the District Plan, informing the public so that they can plan accordingly. In this case, alerting future purchasers of land near State Highway 1 to the future roading plans and location of the proposed fly over facility.

(c) A designation provides a degree of certainty for the Council, as it exempts them from the rules in the District Plan. This is especially useful if rules change over time and place greater limitations on activities, which the Requiring Authority may have initially considered as acceptable.

(d) A designation provides a degree of certainty and flexibility for the Requiring Authority in long term management that other methods (such as resource consents) do not provide.

(e) Designations take interim effect immediately after a Notice of Requirement is lodged. Resource consent or plan change processes can take a long time to secure, with no guaranteed date of conclusion or approval.

A designation, in advance of construction is recommended for the reasons above. The designation would cover any new roads, alterations to the existing road where relevant and any new intersection configurations. It is noted however, that designations do not override the rules of any Regional Plan and any consent requirements under a Regional Plan would remain in force.

7.3.3 Summary of Consent Requirements

An Outline Plan is required for improvement works along Buckle Street, which are within NZTA's existing H2 designation. District Council land use consents, for works outside the H2 designation, are required for:

- Bulk earthworks
- Demolition of pre-1930's buildings on Mt Victoria

- Non residential activities
- Construction of structures
- Removal of indigenous vegetation
- Activities not provided for as permitted activities in the Open Space Area
- Demolition, removal, alteration of listed heritage sites, buildings, trees.

If NZTA designate the land needed for the proposed improvements and/or amend the boundaries of the existing H2 designation, District Council land use consents could be avoided. Note that an Outline Plan would likely be required to accompany a new or amended designation.

Regional Council consents are required under the Air Quality Management Plan; Soil Plan, Discharges to Land; and Freshwater Plan for:

- Discharge of contaminants to air from road construction/paving
- Roading and tracking activities which extend for distances greater than 200m
- Soil and vegetation disturbance on erosion prone land
- Discharge of contaminants to land not otherwise provided for
- Stormwater discharges from bulk earthworks

Refer to Appendix C for a detailed assessment of the relevant District and Regional Plans for the Basin Reserve grade separation project.

8 Land Requirements / Constraints

8.1 Land Requirements

The two-way grade separated option affects eight properties in the vicinity of Kent Terrace, Ellice Street, Dufferin Street and Paterson Street. The plan layout included in Appendix A shows the location of the properties. It should be possible to avoid the need to acquire Construction House by reducing the horizontal curve radius from Kent Terrace to Ellis Street. The realignment of Sussex Street and Cambridge Terrace affects land owned by the NZTA in Buckle Street. In addition to this, the preferred option will affect Compassion Crèche on Buckle Street which is registered as an historic building.

8.2 Constraints

Any proposed solution for the alleviation of traffic congestion is constrained by the Basin Reserve. This historic area reduces the available road space for construction and means that other properties will be required to be removed. The finished option must maintain as much as possible the character of the Basin Reserve as it is today.

In addition, the area around the proposed construction site has a number of schools and churches. These facilities must be able to function as they do currently both during and after construction.

During the construction phases the continued operation of the road network must have precedence over the speed of construction. This will constrain the types of construction activities that can be achieved during different periods of the day.

9 Geotechnical Requirements

As the project will require some form of foundation to support a two-way grade separated structure, a detailed geotechnical assessment will be required. The required geotechnical investigation should provide the basis for minimising the uncertainty in future designs.

10 Maintenance Issues

Only concept designs have been prepared to date and current and future maintenance issues have not been explicitly considered. Future development of the project and scheme assessment should consider this issue and develop preliminary designs accordingly.

11 Social and Environmental Assessment

This section documents the Opus assessment of the potential social and environmental effects. Consideration has been given to effects both during construction and on

completion of the project. The assessment subjectively identifies the magnitude of the potential effects before mitigation.

This assessment has been completed using the Transit NZ PSF/13 form, and populated according to the accompanying Transit NZ PSG/13 guidance notes.

Social and Environmental Screen			Social and Environmental Assessment		
Issue Social and environmental issues	**Effects** Describe the potential social and environmental effects of the opinion, including where the option may improve social and environmental outcomes.	**Degree of effect** H / M / L / NA**	**Requirements** list all legal requirements and relevant NZTA social and environmental objectives	**Addressing effects and meeting requirements** List actions to be taken to meet specific social and environmental requirements and objectives and address all effects identified. Include an estimated cost.	
				Specifications	Estimated cost ($)
Noise Construction noise, traffic noise, maintenance noise, presence of sensitive receivers (homes schools etc)	• There are a number of sensitive receivers in the area, which will need to be included in the assessment. • Construction noise may disturb local communities and facilities including the Basin Reserve, St Marks Church School, Wellington East Girls College, local businesses and residential areas of Mt Victoria & Mt Cook. • Maintenance noise will need to be mitigated. • Traffic noise will need to be considered in design.	H H H H			
Air Quality Dust, air pollution, greenhouse gas emissions, odour	• Dust and air pollution from construction will need to be mitigated • Will reduce congestion and CO_2 emissions	H H (+ve)			
Water Resources Sedimentation, contaminants in road run	• Sediment control will be needed during construction,	H			

Social and Environmental Screen			Social and Environmental Assessment		
Issue Social and environmental issues	**Effects** Describe the potential social and environmental effects of the opinion, including where the option may improve social and environmental outcomes.	**Degree of effect** H / M / L / NA**	**Requirements** list all legal requirements and relevant NZTA social and environmental objectives	**Addressing effects and meeting requirements** List actions to be taken to meet specific social and environmental requirements and objectives and address all effects identified. Include an estimated cost.	
				Specifications	Estimated cost ($)
off, climate change impacts (sea level rise, rainfall patterns) impacts on sensitive water bodies, changing hydrological cycles and water flow patterns					
Resource efficiency In situ pavement recycling, energy efficiency, initiatives to reduce waste to landfill, use of local materials	• Pavements could be recycled to reduce waste bitumen materials.	L (+ve)			
Culture and Heritage Wahi tapu, and identified Maori interests, archaeological sites, historic buildings, places of interest, historic trees and special features	• The project area has a number of different cultural and heritage sites which will need to be avoided. This includes the Basin Reserve Cricket ground, the historical Compassion Crèche, and a protected English Elm tree on the corner of Dufferin and Paterson Street,	H			
Visual quality Landscaping, retaining walls, views from roads and neighbouring properties, use	• Change in the visual quality, views from neighbouring properties will change considerably. Particularly for the residents on neighbouring properties of	H			

Social and Environmental Screen			Social and Environmental Assessment		
Issue Social and environmental issues	**Effects** Describe the potential social and environmental effects of the opinion, including where the option may improve social and environmental outcomes.	**Degree of effect** H / M / L / NA**	**Requirements** list all legal requirements and relevant NZTA social and environmental objectives	**Addressing effects and meeting requirements** List actions to be taken to meet specific social and environmental requirements and objectives and address all effects identified. Include an estimated cost.	
				Specifications	Estimated cost ($)
of plants to reduce maintenance costs.	the proposal and for the patrons of the Basin the Reserve.				
Vibration Construction and maintenance, pavement surface, heavy vehicle traffic, presence of sensitive features including buildings and features	• Disturbance to sensitive receivers during and after construction may cause annoyance / disturbance, particularly to local Mount Victoria residents and to schools.	M			
Land-use/transport integration Integration of land use and development with transport networks, reverse sensitivity, access management.	• The project will see a more efficient transport network for movements along the SH and local road network. This will allow better access to the southern suburbs, the hospital and the motorway. • Promotes a strong road hierarchy based upon road function	H (+ve) H (+ve)			
Urban design Context sensitive design, including aesthetics of structures, (PSG/12)	• The proposed viaduct structure will need to be aesthetically sensitive and consider other structures in the vicinity such as the Basin Reserve.	H			

Social and Environmental Screen			Social and Environmental Assessment		
Issue Social and environmental issues	**Effects** Describe the potential social and environmental effects of the opinion, including where the option may improve social and environmental outcomes.	**Degree of effect** H / M / L / NA**	**Requirements** list all legal requirements and relevant NZTA social and environmental objectives	**Addressing effects and meeting requirements** List actions to be taken to meet specific social and environmental requirements and objectives and address all effects identified. Include an estimated cost.	
				Specifications	Estimated cost ($)
Community cohesion Social severance, social interaction connectivity	• During construction the project will disrupt key movements linking areas of Wellington • On completion of the project, severance will be greatly reduced between the southern suburbs and the CBD.	H H (+ve)			
Public health Including stress to individuals and community, personal security, cycling and walking opportunities.	• By removing SH traffic from movements where local road activity is also present, safer walking and cycling movements can be promoted.	M (+ve)			
Access and mobility Multi-modal transport (walking, cycling and public transport) transport access to key services such as medical employment and recreation.	• By providing separate facilities for local and SH movements, there will be less delays and congestion, opening up the possibility of improving and encouraging multi-modal transport systems, such as busses and/or cycle lanes • This project also gives improved access to the hospital, airport and other employment and recreational services in the CBD. • Improvements to safety and access to	H (+ve) H (+ve)			

Social and Environmental Screen			Social and Environmental Assessment		
Issue Social and environmental issues	**Effects** Describe the potential social and environmental effects of the opinion, including where the option may improve social and environmental outcomes.	**Degree of effect** H / M / L / NA**	**Requirements** list all legal requirements and relevant NZTA social and environmental objectives	**Addressing effects and meeting requirements** List actions to be taken to meet specific social and environmental requirements and objectives and address all effects identified. Include an estimated cost.	
				Specifications	Estimated cost ($)
	the schools located around the Basin	M (+ve)			
Other Glare from road lighting, adjacent activities, other issues raised during consultation	• none	N/A			

12 Economic Analysis & Risk Assessment

12.1 Cost Estimation

The feasibility estimate for this project was prepared in accordance with Transit NZ guidelines (SM014). The estimate was prepared for April 2008 prices, and is attached in Appendix D. The expected estimate is for $33 million. The majority of the costs are associated with construction of the viaduct / bridge structures.

The estimate is based upon the following assumptions:

- there are no property purchase costs for buildings owned by NZTA;
- there no costs associated with compensation for loss of business;
- costs for residential properties are taken from 2006 rateable value and factored by 1.15 to account for growth in the period 1/7/07 to 1/4/08
- a bridge from SH1 northbound to Cambridge Terrace is not provided;
- 600m of acoustic fencing is provided on the bridge to shield the Basin Reserve from traffic noise;

Costs forecast for investigation and reporting are presented below. The costs include an assessed contingency of 30%.

Investigation and Reporting	Expected Cost
I & R	$912,600
Designation Application	$130,000
Hearing Costs (excluding Environmental Court)	$65,000

12.2 Risk Assessment

A contingency is applied to cost estimates for each category of the physical works, rather than at an elemental level. The resulting “expected estimate” is based upon a 30% contingency for risk associated with unknowns for each category. Different contingencies have been applied where there is a higher or lower level of uncertainty surrounding the estimate category.

Plans showing the location of services were used in developing costs estimates. It was not however, possible to obtain a good estimate of the unit cost for service relocations. A 200% contingency has therefore been applied to account for uncertainty regarding this cost category.

The 95%ile costs estimate incorporates a 70% allowance for unknowns.

12.3 Benefits and Savings

A summary of the benefits and savings forecast to result from the completion of this project (in $Millions/annum) is presented in Table 4. Benefits were forecast using the 2016 and 2026 WTSM. Only travel time benefits and vehicle operating cost benefits have been forecast. No crash costs or benefits are included.

Some elements of the Ngauranga to Airport Strategy were tested both individually and as part of packages to identify whether there were synergy benefits. The Basin Reserve project was however only tested in isolation. Therefore any additional benefits which may be realised if the project is built in conjunction with duplication of Mount Victoria Tunnel have not been identified.

Component	Basin Reserve Benefits ($M/annum)
Car Travel Time Savings	3.6
Car Congested Travel Time Savings	0.4
Car Vehicle Operating Cost Savings	0.7
Car Congested Vehicle Operating Cost Savings	0.1
HCV Travel Time Savings	0.9
HCV Congested Travel Time Savings	0
HCV Vehicle Operating Cost Savings	0.1
HCV Congested Vehicle Operating Cost Savings	0
Public Transport Travel Time Savings	0.8
2016 Total ($M/annum)	**6.5**
2026 Total ($M/annum)	**7.9**

Table 4: 2016 & 2026 Benefits by Year & Component

12.4 Benefit Cost Ratio Results

The total forecasts benefits and costs for 25 years from 2015 to 2039 associated with the Basin Reserve two-way grade separated facility are presented in Table 5 below. The travel time and vehicle operating costs have been interpolated from 2016 to 2026 and extrapolated linearly to 2041.

The estimate assumes that the project is opened in 2016. Both costs and benefits are discounted to 2008 prices and have been rounded to the nearest $500k. An annual discount rate of 8% has been assumed in accordance with NZTA guidance.

	25 Year Benefits ($M)	Capital Cost ($M)	BCR
Basin Reserve	$47.0	$19.5	2.4

Table 5: Summary of BCR Calculations (25 Year)

An indicative Benefit Cost Ratio (BCR) for this project is calculated as 2.41. Until a preliminary design is developed and scheme assessment undertaken further there remains uncertainty around some elements of the project. This BCR assessment assumes construction lasts for no longer than a year and that benefits are realised immediately on completion. This indicative analysis makes no account of crash benefits or for travel time and vehicle operating costs during construction. A copy of the BCR calculation is included as Appendix E.

13 Assessment against the LTMA

13.1 LTMA Objectives

The LTMA builds upon legislation contained within LTA which was predominantly focused upon the development of transport infrastructure rather than its use and management. The LTMA requires the preparation of land transport strategies for each of the New Zealand Regions. It specifies that they are developed with high levels of public input. It also compels locally elected bodies and organisations such as the NZTA and On-Track to work in accordance with the adopted regional strategy.

The LTMA aims to support the objectives of the NZTS by making specific requirements of Council's involved in the preparation of the Regional Land Transport Strategies. The legislation incorporates the principles of the NZTS:

- Sustainability;
- Integration;
- Responsiveness; and
- Safety.

The act also specifies that potential transport interventions are assessed:

- in relation to other development proposals within the region, rather than in isolation;
- to demonstrate the degree to which they contribute towards achieving community outcomes (defined in the Regional Land Transport Strategy);
- to demonstrate the degree to which they will contribute to managing the demand for travel; and
- to determine affordability given the likely availability of funding for the region.

One of the primary mechanisms used to assess regional transport interventions are corridor strategies. The Ngauranga to Airport Strategy Study was initiated as a corridor study.

13.1.1 New Zealand Land Transport Strategy 2008

The New Zealand Transport Strategy (NZTS) sets out the government's vision for transport to 2040 and the strategic approach to be taken. The vision is that: '*People and freight in New Zealand have access to an affordable, integrated, safe, responsive, and sustainable transport system.*'

The vision is supported by five transport objectives:

- Ensuring environmental sustainability
- Assisting economic development

- Assisting safety and personal security
- Improving access and mobility

The NZTS states that a 'business-as-usual' approach will not be adequate to achieve that vision and sets out seven key components where increased emphasis needs to be applied. These will need to guide how transport is planned and delivered. The seven key components are:

- integrated planning
- making best use of existing networks and infrastructure
- investing in critical infrastructure and the transport sector workforce
- increasing the availability and use of public transport, cycling, walking and other shared and active modes
- considering options for charging that will generate revenue for investment in transport infrastructure and services
- using new technologies and fuels
- maintaining and improving international links.

13.1.2 Regional Land Transport Strategy (2007-2016)

The Regional Land Transport Strategy (RLTS) was adopted in July 2007 and translates the objectives, themes and policies contained within the regional policy statement and the Wellington Regional Strategy into specific action programmes and other strategic interventions. The vision for the regional transport system is:

"To deliver, through significant achievements in each period[1], an integrated land transport system that supports the regions people and prosperity in a way that is economically, environmentally and socially sustainable"

It highlights that as well as providing access from the north island to the economic generators of Wellington CBD and CentrePort, the corridor also connects communities in the north island with the south island and overseas.

In presenting a vision for the region, the strategy recognises that increasing population and economic growth within the region is likely to lead to increased demand for travel. The strategy indicates that the region's population are making more trips, more often and over longer distances.

Network Management

Network management policies relevant to the Ngauranga to Airport Strategy aim to ensure that best use is made of network management techniques (such as travel information, HOV priority, variable speed limits, ramp metering) to optimise the performance of the

[1] Defined as Short Term (0-3 years), Medium Term (4-10 years), Long Term (10 years +)

transport network. The strategy also encourages the separation of arterial and local road traffic where practicable.

13.2 Assist Economic Development

The Basin Reserve two-way grade separation project will increase the connectivity between the Airport and the Wellington CBD, thus assisting in the economic development of the region. With the increasing cost of transporting freight by heavy vehicles, providing economically viable alternative means of freight movement must be provided. Transporting goods by air has the potential for economic growth and only can be encouraged by improved linkages with the CBD. Due to Wellington's relatively short distance between the airport and the CBD, Wellington is often used as a regional and national hub for commercial activity. Improving the linkages will only further attract and encourage new companies and their support services.

The primary reason connectivity is improved by the Basin Reserve project is that there significant travel time and congestion savings that can be made. The project does this by making SH1 more direct with less interaction between local and State Highway traffic. By minimising congestion for both directions of State Highway travel at this critical network node; freight will be more efficiently moved to important regional economic locations. In addition to the State Highway benefits, reduced travel time and congestion benefits will occur for local traffic movements. This will assist in the development of local economic activity within the designated sections of Wellington suburbs.

13.3 Assist Safety and Personal Security

Reducing the interaction and conflict between the movements of vehicles, cyclists and pedestrians around the Basin Reserve, will reduce the potential for road substantially. At present the State Highway traffic becomes integrated with road users making movements both to and from the CBD through the southern suburbs of Newtown and Mount Cook. The high number of road users, (particularly during the peak periods) result in a much increased probability of a crash occurring.

Providing grade separated facilities segregates pedestrians and cyclists from the SH1 traffic and thus makes journeys safer and more secure. Minimising the number of intersections through the provision of the viaduct will also assist in safer and more secure pedestrian and cycle movements.

13.4 Improve Access and Mobility

By limiting the number of intersections around the Basin Reserve project, SH1 traffic has much improved accessibility to the eastern suburbs, the airport, the CBD and the northbound motorway. Improving accessibility can greatly assist in more efficient journeys and allows other modes of transport such as buses or cycling to be encouraged.

As result, severance will be reduced by the project as communities such as Newtown will be more effectively linked by more direct routes and the potential for greatly improved public transport services to the CBD. It should be noted that during the construction phases of the project local residents may have severance problems due to temporary road closures. These will need to be appropriately identified and mitigated prior to construction.

13.5 Protect and Promote Public Health

By improving the linkages from the CBD to Newtown, accessibility to the Wellington Hospital will be greatly improved. This will assist in providing access to health facilities and will also secure the future of the route to Wellington's major health facility.

As described in Section 13.3, the Basin Reserve project presents an opportunity to improve the pedestrian and cycle movements from the southern suburbs to the CBD. This will also promote public health by encouraging people to exercise as it will be a safer and more pleasant journey.

On the projects completion both noise and air quality should improve. With less congestion and stop/starting vehicle movements, travel will be much more efficient and continuous.

13.6 Ensure Environmental Sustainability

The Basin Reserve project presents a great opportunity to improve passenger transport on the Wellington road network. In particular, the proposed underpass facilities will permit a much more attractive service between Wellingtons southern suburbs and the CBD. The opportunity for a public transport corridor to be developed is clearly available. Modelling has found that $0.8 Million public transport travel time savings can be made in 2016.

With a reduction in congestion and energy wasting by waiting at intersections, fuel consumption in the area can be expected to improve.

A grade separated SH1 link will have an enormous visual impact on the local area. It will be visible from large distances and will negatively impact the perception of the local area. In particular this will dramatically affect the Basin Reserve's great cricketing atmosphere and considerable public opposition can be expected. Other heritage value sites will also be required to be either relocated or altered. Such examples include the English Elm tree on the corner of Dufferin and Ellice Street and Compassion Crèche on Buckle Street.

13.7 Integration

The grade separated Basin Reserve option allows integration between regional land-use and transportation planning objectives. By segregating many of the existing conflicts between State Highway and local road traffic, local traffic can effectively be freed up to travel between the identified Newtown growth node and other parts of Wellington City. This integration between transport and land-use planning will permit the realisation of the

Wellington City Council Growth Strategy; to create a spine of growth activity from Johnsonville to Newtown along the key transport corridor.

13.8 Travel Demand Management

The project presents the opportunity for Wellington residents to reduce their need to travel by car. By providing better linkages between the southern suburbs and the CBD, cycling, public transport and walking become viable alternatives.

13.9 Contribution toward Regional Objectives

13.9.1 Links to Other Strategies

In order to develop the Ngauranga to Airport Strategy the following policies and strategies have been taken into consideration:

- New Zealand Transport Strategy (2008)
- Land Management Act (2003)
- Land Transport Act (1998)
- Wellington Regional Land Transport Strategy (1999-2004)
- Regional Policy Statement for the Wellington Region (1995)
- Draft Wellington Regional Strategy (2006)
- Wellington City District Plan (2006
- Draft Urban Development Strategy (2006)
- Wellington Retail Strategy (2003)

The Ngauranga to Airport Strategy has used these high level policy documents to determine the Strategy's primary objectives and identify future projects that will satisfy the policy criteria. These objectives predominantly improve access from the national and regional road network to CentrePort, Wellington Airport and the CBD. This in turn will promote economic growth in the region.

Projects identified in the Strategy will be prioritised and subsequently included in the following regional strategies and policies:

- Regional Land Transport Strategy (2008)
- Wellington Regional Strategy (2008)
- State Highway Strategy (10 year plan)
- Wellington City Council Walking and Cycling Policy (2008)
- Wellington City Council Public Transport Strategies
- New Zealand Transport Agency Annual Plan (2008)

The Basin Reserve two-way grade separation project supports the objectives of the Ngauranga to Airport Transport Strategy. It will significantly improve accessibility between the CBD, Wellington Airport, and the southern suburbs. The project has the economic

merit to be mutually exclusive and therefore does not rely on other projects to successfully achieve the Strategy objectives. When combined with other projects identified as part of the Strategy such as the duplicate Mount Victoria Tunnel, the benefits to the network are likely to further increase – additional modelling is required to prove this.

13.10 Seriousness and Urgency

The Basin Reserve is a major choking point on both the local and SH1 road networks. This is a serious problem that must be urgently addressed as it is already congested at peak times. The anticipated rises in Wellington's population, increasing fuel costs and the desire to make key infrastructure such as the airport more accessible, the consequences of not addressing this part of the road network are serious.

The BCR of the project is the best performing of the large scale projects identified as part of the Ngauranga to Airport Strategy. Given this fact alone the project should be urgently addressed while it is economically feasible to do so.

13.11 Effectiveness & Economic Efficiency

The proposed two-way grade separated Basin Reserve facility effectively meets the project objectives and is also economically efficient. With a healthy BCR of 2.4 the project stacks up favourably compared to other proposed projects within the region and all indications are that the project will effectively:

- Provide major relief to an existing "choke point" at the Basin Reserve, by separating local and State Highway traffic movements.
- Improve access from the national and regional road network to CentrePort, Wellington Airport and the Wellington CBD.
- Increase the efficiency of through traffic between the Inner City Bypass and Mount Victoria Tunnel, while accommodating increasing transport demand and trips to the CBD.
- Address safety and capacity concerns relating to the current high traffic flows, weaving and speed around the Basin Reserve,
- Improve pedestrian and cycle access/safety and public transport services along the Newtown growth spine

14 Summary

The two-way grade separated Basin Reserve project has a significant number of benefits for the Wellington region. Primarily it will improve accessibility between the Wellington CBD, airport and southern suburbs by reducing traffic congestion and travel times on both the local and State Highway road networks. The project is in-line with the objectives of the Ngauranga to Airport Strategy, derived from the appropriate national and regional policy and strategies. The initial BCR is 2.4 indicating that the project provides a relatively efficient solution to the problems identified for the Basin Reserve, now and in the future.

Alleviating this major choking point has other positive regional improvement that can be expected. This includes:

- Better connectivity as result of the project will assist in economic development on both a local and regional scale
- Improvements in safety for all road users due to a reduction in conflicts associated with existing intersections and lane arrangements
- Limiting the number of intersections and movements will improve access and mobility for both the local and State Highway networks
- Separating local and regional traffic, permits faster and more accessible routes to public health facilities at Wellington Hospital
- Walking, cycling and public transport will be more efficient between the southern suburbs and the CBD. This may encourage a reduction in the desire to use private cars.
- Improved travel efficiency resulting in a reduction in greenhouse gas emission
- The project is one of the first steps at better integrating land-use and transportation planning objectives. By freeing up travel between the growth node at Newtown and the CBD, a spine of growth activity can be encouraged from the southern suburbs through to Johnsonville.

The project does however have the potential to create controversy. The grade separated feature will modify the existing characteristics of the Basin Reserve and the local residential area. As an iconic symbol of New Zealand sporting heritage, care will be needed to maintain the facilities functionality. Other places of interest such as the “Compassion Crèche” and the protected English Elm Tree on the corner of Dufferin and Ellice Street will need to be appropriately relocated if required. The following construction issues must also be considered:

- Maintaining the operation of the transport network while construction is occurring
- Limit the severance and noise/vibration issues for local schools in the area during construction
- Limit the damage caused by noise/dust and vibrations to local residents during construction

15 Recommendations

Given that the two-way grade separated Basin Reserve project has a healthy BCR, meets regional policies and strategies and will potentially see a major benefits for the region it is recommended that:

1. Option B3: two-way grade separation is the recommended solution at the Basin Reserve
2. Option B3: two-way grade separation is progressed to the Scheme Assessment Report (SAR) stage.

Appendix A

Overall Concept Layout

The drawings included in this appendix show the concept layout for the package of projects between the Basin Reserve and Kilbirnie including:

1. Basin Reserve Grade Separation
2. Mount Victoria Tunnel Duplication & Ruahine Street widening.

The Basin Reserve grade separation can be completed in isolation from the tunnel duplication. The primary difference from the drawings will be that the lane arrangement on the viaduct structure will have to tie into the existing arrangement at Mount Victoria Tunnel. This will mean only one lane of capacity will head eastbound towards the tunnel and only one lane will head westbound away from the tunnel.

Appendix B

Parties Consulted With

Organisations Sent Phase II Consultation Document

Accident Compensation Corporation	Masterton District Council (x3) [2]
Ara Tahi [1 2]	Ministry of Transport
Automobile Association [1 2]	New Zealand Fire Service [1]
Basin Reserve Trust [1]	New Zealand Police [1]
Bus & Coach Association [1]	New Zealand Retailers' Association
Campaign for a Better City	New Zealand Taxi Federation
Capital & Coast District Health Board [1 2]	OnTrack (x2) [1 2]
CentrePort [1]	Option 3
Cycle Aware Wellington [1]	Porirua City Council (x2) [2]
Department of Conservation	South Wairarapa District Council (x3) [2]
Employers and Manufacturers Association	Stagecoach
Energy Efficiency & Conservation Authority	Sustainable Wellington
Heartbeat Wellington	Toll NZ
Historic Places Trust [1]	Transport 2000+ [2]
Hutt City Council (x3) [2]	Upper Hutt City Council (x3) [2]
Hutt Valley District Health Board v	Victoria University of Wellington [1]
John Anderson [2]	Waterfront Watch
John Christianson [2]	Wellington Emergency Management Office
Kapiti Coast District Council (x3) [2]	Wellington Engineering Lifelines Group [1]
Land Transport New Zealand [1 2]	Wellington Free Ambulance [1]
Living Streets Aotearoa [2]	Wellington International Airport [1]
Mana Coach Services	Wellington Regional Chamber of Commerce[2]
Massey University Wellington [1]	Wellington Tenths Trust [1]

NOTE: [1] = Key Stakeholder, [2] = Regional Land Transport Committee member

Appendix C

Assessment of Relevant District and Regional Plans

Wellington City District Plan

The area subject to the proposed road improvements is identified by District Plan Map 16. The zones underlying the road improvements are Inner Residential, Central Area, and Open Space A. Notable features include heritage buildings (No's. 42, 18) and trees (No. 204). Ground shaking hazard areas are located north to south through the centre of the Basin Reserve, and north to south along Dufferin Street. An existing NZTA designation (H2) is located on the corner of Buckle Street and Cambridge Terrace.

The following is an assessment of the potential District Plan consents required for the proposed road improvement works.

Residential Area

- Rule 5.1.4 – The total or partial demolition or removal of buildings and structures are permitted activities except:
    - Those listed in the District Plan as heritage items
    - All buildings constructed before 1930 in the Thorndon Character Area
    - Any demolition of any building in Thorndon, Mt Victoria [Newtown, Berhampore, and Mt Cook] that is restricted by Rule 5.3.11
- Rule 5.1.7 – Any activity relating to the upgrade and maintenance of existing formed roads and accessways including associated earthworks, except the construction of a new legal road, is a Permitted Activity.
- Rule 5.1.9 – Earthworks are Permitted Activities subject to conditions
- Rule 5.3.9 – Earthworks that do not comply with the conditions for Permitted Activities are a Discretionary Activity (Restricted).
- Rule 5.3.11 – The demolition of any building in Mt Victoria (shown in Appendix 9), excluding accessory buildings, constructed before 1930, or for which approval for construction was granted before 1930, is a Discretionary Activity (Restricted).
- Rule 5.4.1 – Non-residential activities and structures not specifically provided for as Permitted or Controlled Activities are Discretionary Activities.
- Rule 5.5 – Activities which have not been provided for as Discretionary Activities (Restricted) or Discretionary Activities (Unrestricted) are Non-complying Activities.

Central Area

- Rule 13.1.1 – Any activity, except for those specified as Controlled Activities, Discretionary Activities (Restricted) or Discretionary Activities (Unrestricted) are a Permitted Activity subject to conditions.
- Rule 13.1.2 – The construction, alteration of, and addition to structures except for those specified as Controlled Activities, Discretionary Activities (Restricted), or Discretionary Activities (Unrestricted) are Permitted Activities.
- Rule 13.2.1 – The construction, alteration of, and addition to structures with a gross floor area greater than 100m² and covering more than 20 percent of the site are Controlled Activities.
- Rule 13.3.1 – Activities that do not comply with one or more of specified conditions for Permitted Activities in Rule 13.1.1 are Discretionary Activities (Restricted)
- Rule 13.3.2 – The construction, alteration of, and addition to structures which do not meet one of more of the conditions for Permitted Activities in Rule 13.1.2 are Discretionary Activities (Restricted).
- Rule 13.4.1 – Structures, including pedestrian bridges, located above the street that exceed 25 percent of the width of the road at any point are Discretionary Activities (Unrestricted).
- Rule 13.5 – Activities that have not been provided for as Discretionary Activities (Restricted) or Discretionary Activities (Unrestricted) are Non-Complying Activities.

Open Space

- Rule 17.1.4 – Any activity relating to the upgrade and maintenance of existing formed roads and accessways, excepting the construction of a new legal road, is a Permitted Activity.
- Rule 17.1.5 – The total or partial demolition or removal of buildings and structures (except those listed in the District Plan as heritage items) are Permitted Activities
- Rule 17.1.6 – Earthworks involving the relocation of earth within the site are Permitted Activities subject to conditions.
- Rule 17.1.16 – The modification, damage, removal or destruction of indigenous vegetation is a Permitted Activity in Open Space A.
- Rule 17.3.1 – Activities or structures in Open Space A, not specifically provided for as Permitted Activities are Discretionary Activities (Unrestricted).
- Rule 17.3.3 – The removal, relocation or deposit of earth which is not a Permitted Activity is a Discretionary Activity (Unrestricted).

- Rule 17.4 – Activities which have not been provided for as Discretionary Activities (Restricted) or Discretionary Activities (Unrestricted) are Non-Complying Activities.

Heritage

- Rule 21.3.1 – The total or partial demolition, destruction or removal of any listed heritage area, building or listed facades or other listed elements of a building, object, or sites of significance to tangata whenua or other Maori, is a Discretionary Activity (Unrestricted).

- Rule 21.3.2 – The destruction, removal or partial removal of any listed tree that is not a Permitted Activity is a Discretionary Activity.

Regional Air Quality Management Plan

- Rule 22 – Miscellaneous Rule relating to the discharge of contaminants to air associated with spray painting of roads and road construction and paving (including re-construction) are Permitted Activities.

- Rule 23 – General Rule relating to discharge of contaminants to air, require consent as a Discretionary Activity. Discharges to air from the manufacture of hot-mix asphalt paving mixes, including moveable asphalt plants and the remediation of asphalt surfaces ("tar burning") are covered by this Rule. Note, this rules applies for discharge of air contaminants outside of the CMA.

Regional Soil Plan

The improvements area is located in Regional Soil Plan Area 2. Erosion Prone land (in Area 2) is defined as land with a slope greater than 28 degrees.

- Rule 1(2) - Roading and tracking that during any 12 month period, will result in a road or track having a continuous length of new upslope batter extending for greater than 200 metres, with a height of greater than 2 metres measured vertically is a Restricted Discretionary Activity.

- Rule 2(1) – Soil disturbance on erosion prone land (a slope greater than 28degrees) that involves the disturbance of greater than or equal to 1,000 m3 of soil, within any 10,000 m2 area (calculated using a minimum width of 10 m) and within any continuous 12 month period is a Restricted Discretionary Activity.

- Rule 3 – Vegetation disturbance on erosion prone land is a Permitted Activity subject to conditions.

- Rule 4 – Vegetation disturbance on erosion prone land that cannot comply with the conditions for Rule 3 is a Restricted Discretionary Activity.

Regional Discharges to Land Plan

- Rule 1 – Discharges of contaminants not entering water are a Permitted Activity. This includes stormwater discharged into a pipe which then discharges to surface water.

- Rule 2 – Discharges of contaminants not otherwise provided for is a Discretionary Activity.

- Rule 3(1) – The discharge of contaminants into or onto land as stormwater collected from any motorway, road, street, roof, yard, paved surface, grassed surface or other structure is a Permitted Activity subject to conditions.

- Rule 18 – The discharge of any contaminants into or onto land in association with the construction, maintenance and repair of roads, pathways, yards and other sealed areas or accessways, is a Permitted Activity.

Regional Freshwater Plan

It is assumed that the proposed improvements will not result in any activity in relation to the beds of lakes and rivers.

- Rule 2 – The discharge of stormwater into surface water, from an area of bulk earthworks less than 0.3ha is a Permitted Activity subject to conditions.

- Rule 5 – All remaining discharges to freshwater (i.e. bulk earthworks greater than 0.3ha) is a Discretionary Activity.

- Rule 9 - Minor diversion of water from an intermittently flowing stream is a Permitted Activity subject to conditions.

- Rule 9A – Diversion of water from an artificial watercourse or drain is a Permitted Activity subject to conditions.

- Rule 9B – Diversion of groundwater is a Permitted Activity subject to conditions.

- Rule 16 - Taking, use, damming or diversion of water, or the transfer to another site of any water permit to take or use water (i.e. diversion of water that cannot meet the conditions for a Permitted Activity) is a Discretionary Activity.

Appendix D

Feasibility Estimate

Ngauranga - Airport Strategic Study

Feasibility Estimate - Option B3 - Kent Tce to Ruahine St

FE

Item	Description	Base Estimate	Contingency	Funding Risk
A	**Project Property Cost**			
1	Property Purchase	**$1,672,000**	**$585,200**	**$1,170,400**
2	Valuation And Legal Fees	**$0**	**$0**	**$0**
3	Business Loss	**$0**	**$0**	**$0**
B	**Investigation and Reporting**			
1	I & R	**$702,000**	**$210,600**	**$491,400**
2	Designation Application	**$100,000**	**$30,000**	**$70,000**
3	Hearing Costs (exclude Env. Court)	**$50,000**	**$15,000**	**$35,000**
C	**Design and Project Documentation**			
1	D & P	**$1,504,000**	**$451,200**	**$1,052,800**
2	Resource Consent Application	**$10,000**	**$3,000**	**$7,000**
3	Hearing Cost	**$20,000**	**$6,000**	**$14,000**
4	Building Consents	**$15,000**	**$4,500**	**$10,500**
	Construction			
1	**MSQA, Transit Managed Costs and Consent monitoring fees**	$1,804,960	**$541,500**	**$1,263,500**
	Physical Works		**$0**	**$0**
2	Environmental Compliance	$150,000	**$45,000**	**$105,000**
3	Earthworks	$220,798	**$66,200**	**$154,600**
4	Drainage	$276,085	**$82,800**	**$193,300**
5	Pavement and Surfacing	$1,788,900	**$536,700**	**$1,252,200**
6	Tunnels	$0	**$0**	**$0**
7	Bridges	$10,850,000	**$3,255,000**	**$7,595,000**
8	Retaining Walls	$241,680	**$72,500**	**$169,200**
9	Traffic Services	$355,690	**$106,700**	**$249,000**
10	Service Relocations	$397,150	**$794,300**	**$1,985,800**
11	Buildings	$0	**$0**	**$0**
12	Landscaping	$523,600	**$157,100**	**$366,500**
13	Traffic Management and Temporary Works	$1,107,700	**$332,300**	**$775,400**
14	Preliminary and General	$3,182,400	**$477,400**	**$2,227,700**
15	Extraordinary Construction Costs)	$0	**$0**	**$0**
16	Allowance for Missing Items	$954,800	**$286,400**	**$668,400**
D	**Total Construction**	**$21,853,763**	**$6,753,900**	**$17,005,600**
Total Base Estimate		**$25,927,000**		

E	Assessed / Analysed Contingency	**$8,059,000**	
Expected Estimate		**$33,986,000**	
F	Assessed / Analysed Funding Risk		**$19,857,000**
95th percentile Estimate			**$53,843,000**

Date of Estimate	**JULY 2008**	**Cost Index**
Estimate prepared by	**B. CRAIG**	**Signed**
Estimate internal peer review by		**Signed**
Estimate external peer review by		**Signed**

Note: These estimates are exclusive of escalation and GST.

Appendix E

BCR Calculation Worksheet

Option	Basin Reserve Grade Separation
Time Zero	1/07/2016
Annual Discount Rate	8%
Feasibility Estimate	$33,000,000
Year of Estimate	2008
Construction Period (Years)	1
Benefit period	Year 8 to 32
Construction Start	n/a
Construction payment	n/a

Year	Time Stream Year	SPPWF	Feasibility Estimate	Forecast VOC & TT Benefit	Interpolated Annual Amount	Discounted Annual Amount
2008	0	1.0000			$5,380,000	$5,380,000
2009	1	0.9259			$5,520,000	$5,111,111
2010	2	0.8573			$5,660,000	$4,852,538
2011	3	0.7938			$5,800,000	$4,604,227
2012	4	0.7350			$5,940,000	$4,366,077
2013	5	0.6806			$6,080,000	$4,137,946
2014	6	0.6302			$6,220,000	$3,919,655
2015	7	0.5835	$19,255,183		$6,360,000	$3,710,999
2016	8	0.5403		$6,500,000	$6,500,000	$3,511,748
2017	9	0.5002			$6,640,000	$3,321,653
2018	10	0.4632			$6,780,000	$3,140,452
2019	11	0.4289			$6,920,000	$2,967,869
2020	12	0.3971			$7,060,000	$2,803,623
2021	13	0.3677			$7,200,000	$2,647,425
2022	14	0.3405			$7,340,000	$2,498,984
2023	15	0.3152			$7,480,000	$2,358,008
2024	16	0.2919			$7,620,000	$2,224,205
2025	17	0.2703			$7,760,000	$2,097,287
2026	18	0.2502		$7,900,000	$7,900,000	$1,976,967
2027	19	0.2317			$8,040,000	$1,862,965
2028	20	0.2145			$8,180,000	$1,755,004
2029	21	0.1987			$8,320,000	$1,652,816
2030	22	0.1839			$8,460,000	$1,556,137
2031	23	0.1703			$8,600,000	$1,464,711
2032	24	0.1577			$8,740,000	$1,378,292
2033	25	0.1460			$8,880,000	$1,296,639
2034	26	0.1352			$9,020,000	$1,219,520
2035	27	0.1252			$9,160,000	$1,146,711
2036	28	0.1159			$9,300,000	$1,077,998
2037	29	0.1073			$9,440,000	$1,013,172
2038	30	0.0994			$9,580,000	$952,035
2039	31	0.0920			$9,720,000	$894,396
2040	32	0.0852			$9,860,000	$840,072
2041	33	0.0789			$10,000,000	$788,889
2042	34	0.0730			$10,140,000	$740,679
2043	35	0.0676			$10,280,000	$695,283
2044	36	0.0626			$10,420,000	$652,548
2045	37	0.0580			$10,560,000	$612,329
2046	38	0.0537			$10,700,000	$574,488
2047	39	0.0497			$10,840,000	$538,893
2048	40	0.0460			$10,980,000	$505,420
Included in Benefit Period (2017 - 2041)			**$19,255,183**			**$47,000,000**

Benefit to Cost Ratio
2.44