Preface

This Value Management Workshop record presents the findings of a Value Management Workshop held in September 2003 as part of the F3 to Sydney Orbital Link Study. The Study applied strategic analysis to the assessment of corridor types and feasible route options to determine an acceptable and preferred option which best satisfies National Highway objectives.

A number of specific routes and associated engineering details such as interchange and ventilation layouts were developed and analysed during the course of the Study, for the purpose of determining feasibility and assessing the options. The specific routes and details described in this document should be seen in this context.

It may be necessary to read sections from the Main Report and Working Papers listed below to gain a more complete understanding of the information being reported in this record:

Value Management Workshop No.1 Record, June 2002
Draft Options Development Report, October 2002

Working Paper No 1: Community Consultation Report
Working Paper No 4: Traffic and Transportation Report
Working Paper No 7: Economics Report

Access to the Main Report is available via the study website at:


Details on how to gain access to the Working Papers can be found on the study website.

If Government decides to further develop the recommended option from this Study, an EIS concept proposal including a route alignment and other details will be developed for further assessment. Community consultation will continue through each stage of project development.
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Executive Summary

Project Background

In January 2001, the Federal and State Ministers of Transport announced their intention to commission a study to investigate options for a new National Highway link between the F3 and the Sydney Orbital. The purpose of the study was to identify a feasible and high standard transport link that would replace Pennant Hills Road as part of the National Highway.

Sinclair Knight Merz (SKM) was engaged to undertake the study and work commenced in early 2002. Whilst a significant amount of investigative work has been completed, and a series of possible link options has been developed, no decision regarding a preferred route has been made.

This second value management (VM) workshop was convened to enable a broad range of government stakeholders to independently review the work undertaken by the study team and to provide feedback regarding the relative merits and feasibility of the options that have emerged. It was anticipated that this information would assist the study team to identify a preferred scheme. The group comprised key agency representatives, including DOTARS and RTA, and study team members with interest in the directions ultimately adopted. The full list of participants is included in Appendix A to the record.

The session enabled the participants to articulate their concerns, to highlight the important issues that need to be considered and it provided the project team with the stakeholder input that is so vital to developing the most cost effective and widely supported option. It also facilitated the generation of ideas aimed at improving the option that would ultimately be implemented.

The VM workshop was held over two days on Wednesday and Thursday, 17 / 18 September 2003, at the Duxton Hotel, Milsons Point. At the beginning of the session, team members made brief presentations to update all participants on the current status of the study. A summary of the information presented may be found in Chapter 2.

As part of the analysis phase, the objectives for the workshop were clarified and agreed. In addition, the objectives underpinning the Sydney Orbital to F3 Link were revisited and confirmed. Participants’ assumptions were assessed. The relative merits of the available options were analysed to assist with the selection of the most appropriate option to bring forward to the next stage of the study. The results of this analysis forms Chapters 3 & 4 of this document.

Key outcomes from workshop

Having worked through the value management process there was general consensus regarding the way forward. On the basis of the information presented in the course of the workshop, the following represents the unanimous views of the group:

- It was confirmed that the Type A Corridor was superior to either Type B or Type C in meeting project objectives.

- The Yellow and Blue Options were considered to be the least attractive.

- The Red Option had merits if not tolled, however, from an overall perspective, it could not be recommended in preference to the Purple Option.

- The Purple Option was adjudged to best satisfy the project objectives, either tolled or not tolled, and was therefore recommended to be taken to the next stage of the Link Study.

- It was further agreed that a statement would be included in the Link Study Report to address community concerns regarding the need for an additional road link to Sydney from the north. The
wording of such a statement would be agreed between the parties prior to publication of the final document.

- It was recommended that demand management measures be considered in preparing the Studies’ Final Report.
- It was recommended that the knowledge gained from this Link Study would be made available to inform any future study focussed on developing an integrated planning strategy for Sydney and the Central Coast.
- It was agreed that the fact that a preferred Type A option had emerged from this value management workshop would be publicised to reduce community concern about the other options.

An important task undertaken by the group in bringing the workshop to a conclusion was the preparation of an action plan that was intended to advance the study and to realise the objectives of the workshop. The items included in the action plan resulted from issues raised, from group discussions and from the recommendations made.

The action plan generated by the group is included in Chapter 7 of the record.
1

Introduction

1.1 Value management rationale

This Value Management workshop utilised a structured process to ensure that key issues were identified, that the route option ultimately chosen would best meet project objectives and would address emerging needs and priorities to the greatest possible extent. The session was non adversarial and cooperative with a genuine focus on finding the best option to bring to the next stage of the study.

The process facilitated an open and full exchange of information by enabling all stakeholders to articulate concerns, to explore options and to appreciate the key issues associated with selecting a preferred option.

1.2 Workshop methodology

It should be noted that preparation work prior to the session forms an integral part of the process and has a major bearing on the results achieved. Detailed information regarding the various studies / investigations completed in developing the four feasible options was circulated to participants prior to the workshop. This was done to truncate the information phase by allowing participants to digest key information in advance of the session.

Tierney Page Kirkland’s (TPK) role was to facilitate and manage the workshop process. Declan Tierney was the prime facilitator with technical support provided by Lucie Hedman.

Central to the success of the workshop was the inclusion of key study team members and other stakeholders with direct interest in the directions ultimately chosen. A full list of participants is provided in Appendix A.

The session was held over two days on Wednesday and Thursday, 17/18 September 2003, at the Duxton Hotel, Milsons Point.

After presentations that provided a background to the project, the workshop methodology confirmed the

- planning, national highway and overall study objectives, and
- the VM workshop objectives

it went on to revisit and confirm the

- assumptions / givens; and
- to discuss concerns

finally the process enabled participants

- to have input to the option selection process, and
- to suggest ideas to improve the route option that the group recommended.
The session concluded with the preparation of an action plan, which is included in Chapter 7 of the record.

1.3 Value management workshop record

The information contained in this record has been distilled from the pre-workshop background papers sent to the participants and the data generated during the session itself. The record seeks to provide an overview of the workshop methodology and a record of the data generated during the session. It should be noted that much of the material was generated in the workshop and is as recorded by the minute secretary. As such this document records the views of workshop participants at that time and may not necessarily represent current views or those of their respective organisations.

It is hoped that this document will help establish the basis for decisions on study direction and will assist in bringing the Link Study to a conclusion.
2

Information Phase

2.1 Information gathering

The initial stage of the workshop was used to answer queries and to address any critical aspects raised by participants. It also provided an opportunity to update those present on current thinking and to provide an overview of the options that were considered feasible. This sharing of information helped ensure that everyone involved enjoyed a common understanding of the current status of the study. It also created the platform for decision making related to option selection that occurred later in the session.

The essence of the information presented follows.

2.2 Welcome – Wayne Trappett, DOTARS

On behalf of the Australian Government, the funders of the F3 to Sydney Orbital (SO) Link Study, Mr Trappett welcomed the participants to the workshop and thanked everyone for taking the necessary time from their busy schedules.

He explained that the study had now reached a critical stage and that this workshop provided an ideal opportunity to consult with government agencies and to obtain input to the decision-making processes. He looked forward to an open conversation between all stakeholders in an effort to understand the issues and concerns that must be addressed in finalising the study. He concluded by inviting his RTA counterpart to outline the NSW Government’s perspective.

2.3 Welcome – Hari Kishan, RTA

Dr Kishan described his role as being RTA’s representative and project development manager with responsibility of facilitating and coordinating the study on behalf of the organisation. He concurred that the study is at a crucial stage and that now is the ideal time to convene this workshop given SKM has completed much of the technical analysis upon which to base a recommendation regarding the most appropriate link corridor.

Input from the organisations represented at the workshop, DIPNR, EPA, RIC, SRA, National Parks & Wildlife Service is very important as each will be key stakeholders as the project progresses. In that sense, it is critical to obtain input and comments at this stage. Obviously, the contributions of RTA and DOTARS are equally relevant.

This project is developing into a very interesting proposal. At this stage four feasible options have been developed. These comprise 6-8 km long urban tunnels of which there are not many examples in the world, and certainly none in Australia. Therefore, if the project proceeds there will be a multitude of technical challenges to be addressed, not to mention the social challenges that would arise.

Key activities during this value management study will include, bringing the agency stakeholders up to date with the progress of the link study and outlining the options being considered. As stated earlier, perhaps the most important facet will be securing reactions, comments and suggestions for improvement.
The value management process is complementary to economic assessment activities of the project, as it examines options from a technical perspective through an assessment of the functional aspects of the project. The overarching objective is to generate improvements. The timeframe for the workshop being one and a half days should ensure that many views and ideas are discussed and shared. In addition, it is hoped that, at the conclusion of the session, agreement will have been reached regarding the ranking and relative merits of the options presented.

2.4 Feasible Options – Peter Prince, SKM

Mr Prince used this first section of the workshop to take workshop participants beyond the information provided in the background papers and to discuss some of the findings that are emerging from the technical analysis and other work completed thus far.

There are a large number of strategic issues to be addressed in completing the link study. Any one of these issues in isolation may appear uncomplicated, but when considered as a matrix of issues they become complex and challenging.

One of the driving issues is the large volume of traffic on Pennant Hills Rd, through its use as the interim National Highway. Addressing the social effects of large amounts of traffic, particularly the heavy vehicle content, is a key project imperative. Catering for demand created by population growth in the Sydney Basin as a whole and that on the Central Coast is also critical.

Assessing the impact of employment growth in a modeling sense to develop an appropriate strategic approach is important. Urban development issues, not least of which is the effect any link could have on bushland must be considered. Given the importance of freight, and public transport, a lot of effort has been expended over the last year in examining how an integrated system would work into the future and understanding the roles that rail and road should play in a comprehensive approach to transport. A stated government objective is to transfer more freight to rail as time unfolds.

Some of the key assumptions that underpin the study need to be appreciated. Looking at the F3, there are currently about 72,000 vehicles each day crossing the Hawkesbury River. Growth is likely to be between 2 & 3% per year based on historical data. This section of the F3 would be congested by 2021, even if upgraded to six lanes. The question of how this increasing volume of traffic can be accommodated beyond 2021 is of importance but beyond this study’s time horizon.

Pennant Hills Road, running south from the F3 at Pearces Corner to the M2, is the focus of the study. After completion of the Westlink M7 (previously known as the Western Sydney Orbital) in 2006, this section of Pennant Hills Road will be the only section of the National Highway route between the F3, to the north of Sydney, and the F5 Hume Highway, to the south west of Sydney, that is not to motorway standard. Many adverse effects of traffic congestion occur on this section of Pennant Hills Road. It currently carries up to 75,000 vehicles per day, including a high proportion of heavy vehicles.

At present, the Pacific Highway south of the F3 handles in the region of 66,000 vehicles a day. It links up with Ryde Rd, a significant route in its own right, which caters for a lot of the long distance traffic to and from Sydney from the north. Therefore, the study has focussed on assessing a major network in terms of its strategic importance not only to Sydney, but also its national importance in dealing with traffic in and out of Sydney to the north.

It is important to understand where this traffic comes from and where it is going. An origin and destination study was completed in July 2002, which revealed the following:

- About 35% of light vehicles coming south or going north on the F3 (that use Pacific Highway or Pennant Hills Rd) have an origin or destination in the city, North Sydney, the inner west or north shore – compared with approximately 10% to the west. Heavy vehicles exhibit different distribution patterns.
- The results for light vehicles were as follows:
− 35% City, Inner, North Sydney
− 30% North-west, Baulkham Hills, Hornsby
− 20% South and South West
− 10% West
− 5% North-east

• Of the light vehicles travelling down the F3, approximately 3 vehicles in 5 travel down the Pacific Highway and 2 vehicles in 5 travel along Pennant Hills Rd.

• About 65% of the traffic on the F3 at Wahroonga starts or ends on the Central Coast. Surprisingly, 35% of all traffic on the F3 has origins or destinations that relate to commuter trips.

• **Northern Origin / Destinations of Heavy Vehicles on the F3**
  − (source: Based on Commuting from Sydney’s Fringe TDC, June 200)
  − 25% north of Newcastle
  − 22% Newcastle/Hunter
  − 19% Central Coast
  − 26% NW Sydney (Hornsby/Baulkham Hills)
  − 8% NE Sydney (Ku-ring-gai/Warringah)

• **Southern Origin / Destinations of Heavy Vehicles on the F3**
  − 30% Sydney/Botany
  − 24% South and SW
  − 18% West
  − 15% NW Sydney
  − 13% NE Sydney (Ku-ring-gai/Warringah)

• With regard to long distance heavy vehicle movement, about 25%, on a 24-hour basis, have origins or destinations north of Newcastle & the Hunter. Over the day the percentage drops to around 10%. A very large number of heavy vehicles travel during the night. Of the heavy vehicles using the corridor about 50% are articulated, which is a significantly different (higher) proportion to any other corridor in Sydney.

• About 18% of all vehicles in and out of the region to the North, have their origins or destinations in Western Sydney – Blacktown, Parramatta and west of Blacktown.

• Approximately 20% of all heavy vehicles in the corridor are local - local delivery and local distribution.
Assumptions have been made regarding the distribution of population / employment and how it will grow in the future. These assumptions are based on the Transport Data Centre's median forecasts projected over a 20 year period to determine how corridor traffic is likely to grow.

From a transport planning point of view it has been assumed that the F3 between Kariong and Wahroonga and the length of the M2 east of Windsor Road would be widened to 6 lanes over the next 20 years. In addition, it has been assumed that there would be significant investment in rail over this period) on the Main Northern line would be achieved to hold rail (freight and passenger) mode shares at about existing levels.

While this is a road-based study, it has been recognised that public transport is important in terms of developing an integrated network. The study has addressed public transport as part of the development of this corridor.

A public transport only option was developed to assess potential impact on traffic volumes of a significant and accelerated investment in rail and bus initiatives by 2010. The initiatives included proposed long term transport initiatives such as a new northwest rail line between Epping and Castle Hill, the Parramatta to Chatswood rail link, the Hornsby to Wyong upgrade and the bus Transitway program completed. In addition, provision of two new train services were included- Wyong to Parramatta (10 car sets) and Wyong to Emu Plains (8 car sets).

The results of this analysis indicate that a significantly larger number of people would use public transport under those conditions in 2021 than today. However, the mode share on the network and in the corridor, would not change significantly.

Under the conditions outlined above, a 30% increase in rail patronage across the network would be achieved by 2021 – a large increase in any circumstances, however the mode share is unlikely to change in the corridor. This indicates that even with large investment in rail, there is unlikely to be a significant reduction in road vehicle trip numbers into the future. This is due to the large increase in forecast in freight (tonnes) moved.

In terms of freight¹ 14% of contestable freight in the corridor is moved by rail today ie 5 million net tonnes per year. However, 50% of this is through traffic - from Newcastle to Port Kembla and beyond - long distance heavy freight. About 37 million tonnes is contestable – long-distance freight that could be transported by either road or rail.

Rail freight is expected to at least increase by 2% per year (historical growth). This study has assumed rail will achieve 3.25% pa growing from 5 million to 10.5 million tonnes a year in the corridor by 2021. However, RIC and others in Government would like to achieve 6% pa increase over the next 15-20 years which would take rail freight mode share from 14% to 23% by 2021.

There are constraints to achieving the desired outcome for rail freight in the corridor. Accessing the Sydney rail network to facilitate the passage of freight through the city is constraining growth and constricting a possible increase in mode share. The continuing efficiency gains in road freight transport is another factor constraining growth of rail transport in a competitive market. Importantly, the average trip distance for general freight in the corridor is relatively short, making it uneconomical to use rail for most trips.

If the planning assumptions prove to be realistic i.e. rail freight reaches 23% mode share by 2021, then about 700 articulated trucks (equating to 20,000 tonnes of freight) would be transferred from Pennant Hills Rd to rail by 2020. A further 300 trucks would be removed from the Pacific Highway giving a total of 1,000 fewer articulated trucks on the F3 in 2020 than if rail mode share remains at 14% (existing).

In addition, a reduction of 800 cars per hour in peak period and 5,000 cars over the day (5%) mostly in the commuter peaks would be achieved. However, F3 improvement works would still be required as the overall number of vehicles would increase. The large investment in rail, would result in some deferment of F3 road

¹ This section on rail freight has been updated to more closely reflect the forecast situation from this Study and the RIC study.
investment (widening beyond dual 3 lanes) by up to 5 years. Demand for road use is likely to outstrip growth in rail, even with those optimistic assumptions for investment in rail infrastructure.

To put things in perspective, by 2021 it is expected that the F3 will carry close to 100,000 vehicles per day (today there are around 72,000). The proposed high investment in rail would result in a reduction of articulated trucks on the F3 in 2021 – from about 11,000 to 10,000 (today there are around 4,600 (AADT) articulated vehicles). Regardless, F3 improvements would still be required.

Establishing the need for the F3 to SO link is important. Government has ongoing responsibility to provide infrastructure to a growing world city. The National Highway will continue to be a major lifeline and provide transport access to the northern areas of NSW and to Queensland. Economic growth in Sydney is a key requirement for a sustainable city and this growth must be facilitated through the provision of infrastructure. Long distance intra-regional trade objectives are closely related to the National Highway objectives in terms of assisting, enhancing and enabling trade to take place in a cost effective way.

It is important to stress that the study has a 20-year horizon. The study aims to identify an affordable and economically justified solution that would be acceptable both in terms of its social and environmental impacts, and which will satisfy transport demand over this time frame.

The conditions that were articulated by the Transport Ministers at the commencement of the study included no surface routes in Lane Cove National Park and no widening of the existing interim National Highway.

The study has investigated broad strategic corridors. A Type C corridor would require a new crossing of the Hawkesbury River, and result in significant impacts on National Parks. Key features of a Type C corridor include:

- over 50 km long;
- many properties affected (400 - 1,090);
- high impact on National Parks;
- some relief to the interim National Highway;
- very expensive (> $3 billion), potential to be staged; and
- may be needed in longer term.

If a Type C option were in place in 20 years time, it would attract up to 40,000 vehicles per day at the Hawkesbury crossing – of which about 9,000 or 23% would be heavy vehicles. This would reflect the development of Western Sydney and of links into the Sydney Orbital and some redistribution of traffic to/from the Central Coast as a result of better access and reduced travel costs. Approximately half the heavy vehicles would be articulated trucks.

However, with 40,000 vehicles using the Type C corridor, there would still be in the order of 80,000 vehicles using the F3 in 2021 – 10,000 more than is carried today. Furthermore, relief to Pennant Hills Road would only be about 15,000 vehicles per day, compared with up to 40,000 vehicles per day for a Type A option. This indicates that a Type C option over the next 20 years would not meet the project’s transport objectives as well as Type A.

Both Type C and Type B would affect many properties and Type B would have an unacceptable impact on Berowra Waters Regional Park and part of Galston Gorge. There are major environmental concerns with Type B, and given the high cost at more than $2 billion, this corridor type has been assessed as being unacceptable.

The following are the key points associated with Type B Options:

- many properties affected (380 - 1,440);
- unacceptable impact on Berowra Waters Park and Galston Gorge;
some relief to the interim National Highway;

- expensive (>\$2 billion);
- difficult to stage; and
- would not provide an additional crossing of the Hawkesbury River.

Type A corridor options, which envisage a route mostly in a tunnel, are the preferred approach for a 20-year period. Some concerns apply, particularly in resolving how to connect with the M2 and the F3 and the effects of long tunnels on driver behaviour.

**Tunnel Characteristics**

- Separate one-way dual tunnels
- Separate ventilation tunnels
- Carriageway widened to suit long tunnels
- Climbing lanes where grades are greater than 4.5%
- Minimum of 2 ventilation stacks
- EPA standards adopted for internal and external air quality

Four feasible options have been developed - Purple, Blue, Yellow and Red moving from Purple in the northwest through Blue and Yellow to Red in the east. The entrance portals create the greatest challenges. The Purple and Blue routes operate very similarly in terms of transport outcomes.

The closer the route is to Pennant Hills Rd, the more traffic would be attracted from the road to the tunnel. Therefore, it is apparent that the Blue and the Purple options would relieve Pennant Hills Rd of more traffic than either Yellow or Red. In a network sense, the Red and to a lesser extent the Yellow option would also take traffic off the Pacific Highway so, in terms of overall network benefits there is little separating Purple and Blue relative to Red.

In conclusion, a major investment of this kind would change the way people behave. On a network such as Sydney’s, there would be a significant amount of re-distributed traffic. By building the new link there would be a redistribution of up to 20% of traffic in the corridor and that would provide benefits throughout the rest of the northern network.

### 2.5 Base Information

Key members of the study team outlined the base information and assumptions that were used in undertaking the F3 to SO Link Study and in developing the options presented at the VM workshop. These presentations occurred when appropriate to support the subject matter under discussion or when a workshop participant requested information.

### 2.6 Key Points from Presentations

The participants were asked to briefly outline the key points that they had taken from the information presented. The items identified were as follows (note that there was not necessarily agreement from all present on all of these items):

- With regard to the F3 widening the ‘Do nothing’ Option is not an Option
- A 20 year study period is too short for the scale of the project
- Major investment!!
- Commonwealth vs State objectives are different
- How accurate is the assessment of the growth on the Central Coast / Sydney?
- What is the likelihood of rail improvements?
- Freight vs passengers (re both, or if we need to chose, which is more important?)
- Whether the assumptions for rail (forecast of 40% shift) will be achieved
- Capital cost forecast - in general how accurate?
- There appears to be a demand for a road upgrade regardless of rail improvements
- Fit with other projects – Sydney Orbital, Lane Cove Tunnel
- Why have we structured the study to 20 years?  Should be an assessment for a longer period?
- Is it correct to assume that the Central Coast economy will stay the same?
- Limits of the capacity on the F3
- It is a National Hwy project, however there is a small % of National Hwy traffic vs regional (Sydney)
- Peak hour congestion is predicted to occur on a Type A road link in as little as 10 years after opening
- Demand management for commuters from the Central Coast
- Local traffic management issues
- Clarification of State and Commonwealth objectives
- Do both Options A & C need to be looked at in relation to:
  - Short term “Option A”
  - Long term “Option C”?
- Competing functions of roads
- Affordability
- Air quality issues
- Freight: impact on Port Botany expansion vs Hunter Port (for example)
- Significant differences in the level of relief to Pennant Hills Road and Pacific Hwy result from the different Type A Options
- Local & regional air quality will be key issues for consideration
- Project justification is essential.  Type C needs to be convincingly rejected before any of the Type A Options can be seriously addressed.  In considering the Type C scenario in comparison to Type A, the following need to be addressed:
  - What value is placed on another (strategic) crossing of the Hawkesbury River?
− Which scenario better meets the objectives of the National Hwy program?
− Is an “Albury Bypass” scenario with an initial 2-lane configuration along the Type C alignment appropriate and cost effective?
− Which Type appropriately addresses the transportation of dangerous goods?
− Does the Type C scenario more effectively allow for a rail duplication / rail tunnel to Brooklyn to be justified?

• How do the total cumulative costs, including on-going operation & maintenance (eg tunnel lighting & ventilation) and future road capacity expansions (eg future widening of the F3 with its impacts on national parks) compare between scenarios?
• What are the comparative cumulative implications for the adjoining and “downstream” road network for each Type? (eg future operation of Pennant Hills Road South of M2)
• What are the implications of:
  − growth along the M7 corridor
  − the establishment of industry hubs in western Sydney to service the interstate heavy vehicles which will be attracted to the M7 / Pacific Hwy

• The issue of induced traffic needs to be clarified. A tunnel option should not be economically justified by the need to attract commuter cars, but instead should look at reducing heavy vehicles and general congestion on Pennant Hills Road
• Integrated options need to be adequately addressed to ensure that they would not better achieve the desired outcomes. Combinations could include a range of actions:
  − congestion tolling
  − “Albury Bypass” style of sequenced implementation of Type C
  − surface works along Pennant Hills Road to expand capacity & amenity in partnership with on-going urban redevelopment
  − better integration with public transport/Transitway options
  − joint development/tunnelling for road & rail (note SRA have already proposed a tunnel from Hornsby to Brooklyn)

• Long-term considerations need to be ratified. If Type C does not proceed then decisions should still be made about the need or otherwise for a corridor reservation for future road construction.
3 Analysis Phase

The analysis phase of the process was used to gain an understanding of the underlying issues and constraints affecting possible proposals and/or options. It enabled participants to clarify objectives, to express concerns and to make suggestions regarding possible directions.

3.1 Review workshop objectives

It was important that participants reached consensus regarding the purpose of the value management workshop and the desired outcomes. Preliminary objectives were identified prior to the session and these were discussed with the group to gain endorsement.

The participants considered the reasons for conducting the workshop and the outcomes that were expected from the process. The objectives were confirmed to be as follows:

- To update participants on the current status of the study;
- To review merits (technical, planning basis) of the feasible link options;
- To assess feasible options to assist study team in identifying a preferred scheme;
- To identify and discuss potential problems that may be encountered in finalising the study;
- To identify and discuss stakeholders’ concerns;
- To generate ideas as to how the study outcomes might be enhanced; and
- To develop an action plan to ensure that key milestones are achieved and that agreed outcomes are implemented.

3.2 Overall Objectives

In this segment of the workshop, a range of objectives were discussed and agreed by the participants. It is essential that the reasons for undertaking work be clearly understood by all involved in an enterprise or a project. In view of the complexity associated with the F3 to SO Link it was viewed as being even more important that there be consensus regarding objectives.

3.2.1 National Highway Objectives

- To facilitate overseas and interstate trade and commerce;
- To allow safe and reliable access to major centres;
- To minimise the cost of the National Highway to the community;
- To support regional development; and
- To contribute to ecological sustainable development.
Note: in relation to the third objective, the group agreed that ‘cost’ refers to ‘whole of community cost’.

### 3.2.2 Planning Objectives

- To improve travel conditions on National Highway;
- To improve local amenity along Pennant Hills Road;
- To improve travel reliability and operating costs of long distance commercial and freight transport; and
- To serve the future growth needs of long distance transport.

### 3.2.3 Project Objectives

**High Order**

- To create a high standard integrated motorway link between the F3 and the Sydney Orbital;
- To alleviate the poor travelling conditions on the interim National Highway;
- To minimise adverse social and environmental impacts;
- To provide opportunities to improve public transport;
- To be economically justified; and
- To be affordable to Government.

**Desirable**

- To improve congestion on the surrounding network; and
- To achieve a better amenity for the community along the corridor.

### 3.2.4 The Purpose of This Study

**High Order**

- To identify a new high standard transport link between the F3 Freeway and the Sydney Orbital to replace Pennant Hills Road as the interim National Highway; and
- To identify a link that satisfies planning and project objectives.

**Specifics / Desirable**

- To investigate, plan, consult with community on feasible options;
- To investigate the need for a new link;
- To use robust processes;
- To select a route which minimises social and environmental costs; and
- To develop the preferred scheme.
3.3 Problems to be addressed

The participants identified some problems that will need to be addressed in developing the preferred option if overall functionality and long term success is to be assured. The following issues were raised:

- Ranking the alternatives in terms of their air quality outcomes;
- Using the rail corridor in the Purple Option;
- Length of the tunnel;
- Operational issues, eg Fire & Life Safety;
- Energy demand associated with running a large, long tunnel;
- Affordability associated with any of the options;
- Not reducing the capacity of the rail corridor for growth;
- Designing a project that sufficiently caters for future growth;
- The new link could be running at capacity at peak-hours within 10 years (if 2 lanes, un-tolled);
- How to deal with transporting dangerous goods;
- Clearance heights (current height limit 4.5m) – would this be adequate to achieve the National Highway objectives?;
- Addressing general environmental issues;
- What to do with the spoil created by tunnelling activities; and
- If a shared corridor is an option, we must provide for 4 rail tracks and platforms along the route.

3.4 What’s important to me

The workshop attendees were asked to articulate the aspects that they felt, either from an agency or individual perspective, the link study should address.

The items raised were:

- Keeping costs under control;
- Achieving improved travel times;
- Managing total traffic demand;
- Avoiding impacts on threatened species and Aboriginal heritage;
- Rebuilding rail tracks on their future alignment and capacity prior to construction of road works;
- Isolating the preferred Purple Option so we can assess the impacts;
- To have a 4 tracks with platforms capability through the corridor, with maintenance access on both sides of the corridor;
- Not to be restricted by future noise levels where we have the road/rail corridor close together;
- Reduction in road accidents;
• Achieving more sustainable transport and planning outcomes;
• Achieving broad community support; and
• Provision of a ‘missing link’ in Sydney’s strategic road network.

3.5 Assumptions

In developing any initiative it is necessary to make assumptions. The group was invited to list any assumptions held regarding the proposed study or project. Each item was discussed and assessed by the group in turn.

The assumptions were categorised as being a Fact, a Working Assumption, or Questionable. The items identified are sorted into these categories below.

**Facts**

• From an engineering perspective, all of the options presented can be built;
• M2 will remain as a toll road for the next 25/30 years;
• Modelling was based on a M2 toll of $3.20, now it is $3.80;
• The Purple Option gives the least steep grades in the tunnel which would have air quality benefits;
• Any option that contemplates a bridge/surface option through the National Park would be unacceptable in that it clearly fails to meet the high order project objective of “minimising adverse social and environmental impacts”. Also fails to meet objective of minimising cost;
• The Link Study Report will raise road network strategic issues beyond a 20 year time horizon;
• The Blue, Yellow and Red Options have a 6% grade (which is greater when compared with the Purple Option) up to Pearce’s Corner;
• The Economic Analysis assumes that tolling for the M2 remains in place;
• The network-wide impacts of increased traffic, with significant changes in the M2 tolling regime, will be assessed as part of the Study;
• There is a high level of confidence in the cost estimates;
• Affordability is very much dependent upon the assumptions;
• There are high operating and maintenance costs associated with all options (reflected in the cost to Government of private financing options);
• The Purple Rail Option could have significant impact on the rail corridor and on passenger and freight operations;
• The Purple Central Access Option allows entry and exit along the centre of the route;
• Purple Central Access Option allows improved tunnel operation (fire and life safety);
• Central Access is only available economically through the Purple Option; and
• Central access to the tunnel is desirable.
**Working assumptions**

- The Red Option would attract much the same percentage of heavy vehicles as the Blue / Purple Options.

**Questionable**

- The F3 – SO Link will be a toll road;
- If the link were to be toll free it would require 100% Federal funding; and
- The northern link of the rail option will be implemented.

### 3.6 Critical issues

The stakeholders were next invited to list any critical issues or concerns they held regarding the link study or indeed the project itself. It was hoped that this process would help flush out any remaining items not listed under previous headings. The following points were raised:

- We may be encouraging ‘car culture’;
- Off-peak heavy vehicles may continue to use Pennant Hills Road;
- Encouraging unsustainable growth on the Central Coast by providing this link;
- Addressing environmental impacts at the portals and where the surface options are located;
- Locations of the ventilation stacks;
- Future traffic congestion on the F3;
- Traffic congestion in the tunnels;
- Accidents in the tunnels;
- The amount of traffic diversion if a toll is applied;
- Justification and need for the project during approval processes (DIPNR);
- Traffic queuing in tunnels;
- Availability of break-down zones on the side of the road (allowing traffic to continue flowing);
- Potential to be required to install inappropriate air treatment measures;
- Transportation of dangerous goods in the tunnel; and
- Sheer quantum of public funds required – affordability.

### 3.7 Opportunities

The participants were invited to consider and list any opportunities that could enhance the study, the options that were being considered or that could provide assistance in achieving the required outcomes. They were as follows:

- Provide interchange facilities at Pennant Hills;
- Elimination of tunnels longer than 4 km;
• Travel demand management;
• Improvements to Pennant Hills Road;
• Straighter alignment to save cost;
• Facilitate the incorporation of stacks in buildings;
• Improve the functionality of local bus services in Pennant Hills Road;
• Tidal flow on a single tube to reduce costs;
• Public transport;
• Possible staged construction;
• Improved pedestrian and cyclist network;
• Improve the rail configuration;
• Encourage multi occupancy vehicles in the tunnel;
• Differential tolling;
• Managing truck/traffic on Pennant Hills Road;
• Investigate use of tunnels by dangerous goods vehicles;
• Access for emergency vehicles;
• Reduce visual impacts at interchanges;
• Improve the amenity of the existing retirement village;
• Reduce environmental impacts; and
• Management of the spoil.

3.8 Constraints affecting project

The following list contains the constraints that the participants confirmed as being applicable in implementing a solution to meet project objectives:

• Relocation of businesses on Pennant Hills Road;
• Acquisition of residential units on Pennant Hills Road;
• Difficult geotechnical conditions;
• Location of stacks;
• Rail operations and maintenance;
• High rise commercial buildings;
• Reluctance of local authorities to have an “opening” near Brickyard Pit;
• Responding to the community;
• Meeting environmental criteria;
• Fixed width of rail corridor (for sharing sub-option);
• Location of work sites;
• Affordability;
• Increasing size of trucks;
• Impact on rail stations;
• Impact on Thornleigh commuter car parking;
• Thornleigh Shopping Centre;
• Dust / noise issues during construction (for trench option); and
• Acquisition of a large number of commercial properties.

3.9 Available Options

The participants discussed the options presented by SKM. A brief description of the options is provided below:

3.9.1 Purple Option

Approximately 7.5 km of dual two or three lane tunnels plus 500 metres of 4 or 6 lane trench in the vicinity of Brickyard Park at Thornleigh.

The southern interchange with the M2 would directly connect the new National Highway link with the M2 to and from the west and Pennant Hills Road.

The northern interchange at Wahroonga would directly connect the new link with both F3 and the Pacific Highway / Pennant Hills Road. The tunnels would not pass under any major waterways.

3.9.2 Blue Option

Approximately 8 km of dual two or three lane tunnels.

The southern interchange with the M2 would directly connect the new National Highway link with the M2 to and from the west and Pennant Hills Road.

The northern interchange at Wahroonga would directly connect the new link with both F3 and the Pacific Highway / Pennant Hills Road. The tunnels would pass under Coups Creek.

3.9.3 Yellow Option

Approximately 6.5 km of dual two or three lane tunnels, including a 2.5 km eastern tunnelled connection with the M2 at Terrys Creek and a 2 km western tunnelled connection to the M2 near Beecroft Road.

The southern interchange with the M2 would directly connect the new National Highway link with the M2 to and from both the east and west.

The northern interchange at Wahroonga would directly connect the new link with both F3 and the Pacific Highway / Pennant Hills Road. The tunnels would pass under Devlins Creek, Lane Cove River and Coups Creek.
3.9.4 Red Option

Approximately 6.5 km of dual two or three lane tunnels.

The southern interchange with the M2 would directly connect the new National Highway link with the M2 and from both the east and west.

The northern interchange at Wahroonga would directly connect the new link with both F3 and the Pacific Highway / Pennant Hills Road.

The tunnels would pass under Lane Cove River and Coups Creek.

3.10 Assessment of Options

The workshop participants assessed each feasible tunnel route option against the objectives that the preferred link alignment should meet. The options were considered twice, once on the basis of a toll being applied and also without a toll.

It was decided to simply place a star against the options that performed best against a particular criterion. No attempt was made to measure the degree to which one option out performed another. If any options were rated equally, then a star was awarded to each of those options.

Following extensive discussion the tables below emerged. The discussions that took place as part of the process were highly informative and raised participants’ knowledge and understanding of the issues most relevant to the selection of the most appropriate option to take to the next stage of the study.

As mentioned the ○ indicates that an option performed best in respect of this criterion.

3.11 Type A options – twin two-lane tolled tunnels

<table>
<thead>
<tr>
<th>Objective / Selection Criteria</th>
<th>Purple</th>
<th>Blue</th>
<th>Yellow</th>
<th>Red</th>
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<tbody>
<tr>
<td>Meets National Hwy objectives</td>
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<td>Affordable</td>
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<tr>
<td>Minimises Social Impacts</td>
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<tr>
<td>Best for Air Quality</td>
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<td>Best for the General Environment</td>
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<tr>
<td>Minimises National Parks Impacts</td>
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<tr>
<td>Minimises legislative impacts</td>
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<tr>
<td>Best for Tunnel Operations</td>
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<td>Minimises Visual Impact</td>
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<tr>
<td>Best for Public Transport Operations</td>
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<td>Best for Pennant Hills Rd</td>
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</table>
3.12 Type A options – twin two-lane un-tolled tunnels

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<tr>
<th>Objective / Selection Criteria</th>
<th>Purple</th>
<th>Blue</th>
<th>Yellow</th>
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<tr>
<td>Meets National Hwy objectives</td>
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<td>Minimises National Parks Impacts</td>
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<td>Minimises legislative impacts</td>
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<td>Best for Tunnel Operations</td>
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<td>Best for Public Transport Operations</td>
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<td>Best for Pennant Hills Rd</td>
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Following detailed analysis and discussion of each of the options and having assessed the feasible options against the objectives determined and agreed earlier in the workshop, the group unanimously endorsed the Purple Option as the preferred route option.

3.13 Comparison of Purple Option vs Base Case

Having recommended the Purple Option be further developed as in finalising the Link Study, it was suggested that the performance of this option should be assessed against the Base Case option of “maintaining the status quo”. The results follow:
### Criteria

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<thead>
<tr>
<th>Criteria</th>
<th>Purple</th>
<th>Base Case</th>
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<tbody>
<tr>
<td>Meets National Hwy objectives</td>
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<tr>
<td>Affordable</td>
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<tr>
<td>Benefit to Cost Ratio</td>
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<tr>
<td>Minimises Social Impacts</td>
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<tr>
<td>Best for Air Quality:</td>
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<tr>
<td>• local</td>
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<tr>
<td>• regional</td>
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<tr>
<td>• stacks</td>
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<tr>
<td>Best for the General Environment:</td>
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<tr>
<td>• noise</td>
<td>☑</td>
<td>-</td>
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<tr>
<td>• flora/fauna</td>
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<td>☑</td>
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<tr>
<td>• greenhouse</td>
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<td>☑</td>
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<tr>
<td>Best for reducing accidents</td>
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<tr>
<td>Minimises National Parks Impacts</td>
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<tr>
<td>Legislation</td>
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<tr>
<td>Tunnel Operations</td>
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<tr>
<td>Visual Impact</td>
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<td>-</td>
</tr>
<tr>
<td>Public Transport Opportunities</td>
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#### 3.13.1 Regional transport needs beyond 2020

The consultant team sought guidance from its clients regarding the need to address longer-term regional transport needs on a timescale of 20 to 50 years. Clarification was sought because during the community consultation process this issue was raised time and again by community members.

The concern expressed by the community was that if planning for a regional transport solution is not commenced now, the opportunity could be lost forever.

Forecasts of population and urban development predict that some of Sydney’s future growth would occur to the north and west of the city, the very area where it may be logical to construct a second road link to Sydney from the Central Coast and beyond. The concern is that if a route corridor is not reserved in the relatively short term, issues such as land acquisition and environmental impacts could become insurmountable constraints to the provision of such a link.

Following lengthy discussion, the instruction from DOTARS was that the Australian Government felt that examination of longer term options was outside the scope of the Link Study and the issue should be addressed in another forum. Such analysis should more properly occur as part of a strategic planning study for the Sydney region, considering both land-use and transport. This is now the portfolio responsibility of
NSW Department of Infrastructure, Planning and Natural Resources (DIPNR). DIPNR advised that they are preparing a Sydney Metropolitan Strategy.

It was agreed however, that the Link Study Report should make reference to the community’s expressed concerns regarding the development of longer term transport options to the north of Sydney.
4

Creative Phase

4.1 Idea generation

Chapters 2 and 3 above summarise the outcomes of the information and analysis phases of the process. The understandings that were developed and the information shared enabled the group to recommend the Purple Option as the preferred Type A route option that would be taken forward to the next stage of the study.

It also facilitated the generation of ideas aimed at improving the option chosen, reducing overall cost and developing the optimum solution for the community.

The group was encouraged to come up with ideas as to how problematic issues could be resolved or how shortcomings in the preferred option could be addressed. They were asked to be as wide-ranging as possible in their thinking to ensure a full coverage of all relevant aspects.

The approach involved the recording of any idea, regardless of its apparent likelihood of being implementable. During this phase of the process, the aim was to collect as many ideas as possible without subjecting them to any form of screening or judgement. This occurred in the next segment of the workshop, the judgement phase.

The ideas generated together with the group’s assessment of each are included in Chapter 5.
5

Judgement Phase

5.1 Judgement of Ideas

The ideas for improving the recommended option generated in the creative phase were assessed by the group in terms of practicality, viability and cost-effectiveness. Each idea was discussed and rated using the following categories:

- Implement at the appropriate time within this project
- Investigate in this study
- Defer to post-study stage
- Outside the scope of this Study/project
- Impractical

In the interest of clarity, the ideas have been grouped according to these ratings.

5.1.1 Ideas recommended for implementation

“CAN WE….?”

<table>
<thead>
<tr>
<th>Idea</th>
</tr>
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<tbody>
<tr>
<td>Consider demand management measures</td>
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<tr>
<td>Contribute knowledge gained from this Study towards any integrated planning strategy for Sydney and the Central Coast</td>
</tr>
<tr>
<td>Publicise the selection of the preferred corridor Type A option to reduce community concern about the other corridors</td>
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</tbody>
</table>

5.1.2 Ideas recommended for investigation in this study

“CAN WE….?”

<table>
<thead>
<tr>
<th>Idea</th>
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<tbody>
<tr>
<td>Increase the number of accesses along the length of the route</td>
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<tr>
<td>Cost effectively avoid the need for an additional upper level at the interchange of Pennant Hills Road and M2</td>
</tr>
<tr>
<td>Have a single tube with reversible/one-way flow</td>
</tr>
</tbody>
</table>
### 5.1.3 Ideas recommended to be deferred to a post-study stage

"CAN WE…?"

<table>
<thead>
<tr>
<th>Idea</th>
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</thead>
<tbody>
<tr>
<td>Develop an affordable option</td>
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<tr>
<td>Bring up the ventilation stacks within the median strip of Pennant Hills Road</td>
</tr>
<tr>
<td>Bring up the ventilation stacks within the rail corridor</td>
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<tr>
<td>Implement alternative tolling arrangements to increase affordability</td>
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<tr>
<td>Have a tolling regime that encourages use by heavy vehicles</td>
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<tr>
<td>Have a tolling regime that encourages off-peak use</td>
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<tr>
<td>For the shared rail option, have a joint noise / visual barrier</td>
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<tr>
<td>Have dedicated bus and/or T2 lane on Pennant Hills Road</td>
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<tr>
<td>Encourage bus use by commuters from the Central Coast</td>
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<tr>
<td>Encourage train use by commuters from the Central Coast</td>
</tr>
<tr>
<td>Locate the stacks within identified buildings</td>
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<tr>
<td>Produce a full urban design plan for Pennant Hills Road, addressing cyclists, pedestrians, public transport, etc.</td>
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<tr>
<td>Assess how public transport interlinks with the whole system, considering Hornsby is the main interchange</td>
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<tr>
<td>Locate stockpiles of excavated materials to encourage re-use</td>
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<tr>
<td>Encourage excavated materials to be used on other projects</td>
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<tr>
<td>Remove spoil material by rail rather than road</td>
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<tr>
<td>Consider the station operations and passenger accessibility for the rail option</td>
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<tr>
<td>Limit truck access on Pennant Hills Road by load limits</td>
</tr>
<tr>
<td>Provide a higher standard of tunnel than those currently provided elsewhere in Sydney (eg width)</td>
</tr>
<tr>
<td>Use the tunnels for services, i.e. electricity, water, communications</td>
</tr>
<tr>
<td>Identify any Government owned land in the vicinity of the scheme that isn't required and can be dedicated to community use</td>
</tr>
</tbody>
</table>

### 5.1.4 Ideas considered outside the scope of this study/project

"CAN WE…?"

Achieve planning outcomes that go beyond the project, such as replanning Pennant Hills and Thornleigh stations / commercial areas
### 5.1.5 Ideas considered to be impractical

<table>
<thead>
<tr>
<th>“CAN WE....?”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Put trains in tunnels and use the rail corridor for the highway solution</td>
</tr>
<tr>
<td>Encourage the rail interchange facilities to relocate to Epping</td>
</tr>
<tr>
<td>Work up a non-tunnel alternative</td>
</tr>
<tr>
<td>Consider some underground passenger platforms at Pennant Hills rather than reserving land on the surface</td>
</tr>
</tbody>
</table>
Workshop outcomes

Having worked through the value management process there was general consensus regarding the way forward. On the basis of the information presented in the course of the workshop, the following represents the unanimous views of the group:

- The Yellow and Blue Corridor Options were considered to be the least attractive.
- The Red Corridor Option had merits if not tolled, however, from an overall perspective, it could not be recommended in preference to the Purple Option.
- The Purple Corridor Option was adjudged to best satisfy the project objectives, either tolled or not tolled, and was therefore recommended to be taken to the next and more detailed stage of the Link Study.
- It was further agreed that a statement would be included in the Link Study Report to address community concerns regarding the need for an additional road link to Sydney from the north. The wording of such a statement will be agreed between the parties prior to publication of the final document.
- It was confirmed that the Type A Corridor was superior to either Type B or Type C in meeting project objectives.
- It was recommended that demand management measures be considered in finalising the Link Study Report.
- It was recommended that the knowledge gained from this Link Study would be made available to inform any future study focussed on developing an integrated planning strategy for Sydney and the Central Coast.
- It was agreed that the fact that a preferred corridor had emerged from this value management workshop would be publicised to reduce community concern about the other corridors alignments.
Action Plan

An important task undertaken in bringing the workshop to a conclusion was the preparation of an action plan intended to advance the study and to realise the objectives of the session.

The items included were developed from issues raised, from discussions within the group and from the recommendations made. The action plan was structured to establish the activities that require finalisation in order to achieve study milestones. The Action Plan generated was as follows:

<table>
<thead>
<tr>
<th>No</th>
<th>Action</th>
<th>Who</th>
<th>By When</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Investigate opportunities for increasing the number of access points along the length of the route.</td>
<td>SKM</td>
<td>End October</td>
</tr>
<tr>
<td>2</td>
<td>Review previous work in relation to the possibility of having a “single tube” with reversible / one-way flow.</td>
<td>SKM / DOTARS</td>
<td>End October</td>
</tr>
<tr>
<td>3</td>
<td>Provide greater detail regarding each of the four Purple Route sub options.</td>
<td>SKM</td>
<td>End November</td>
</tr>
</tbody>
</table>
Appendix A

List of participants
<table>
<thead>
<tr>
<th>Organisation</th>
<th>Participant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department of Transport and Regional Services</td>
<td>Wayne Trappett</td>
</tr>
<tr>
<td></td>
<td>Scott Elaurant</td>
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<td></td>
<td>Ashok Mehta</td>
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<tr>
<td>NSW Roads and Traffic Authority</td>
<td>Brian Watters (p/t)</td>
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<td></td>
<td>Martin Nichols (p/t)</td>
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<td></td>
<td>Hari Kishan</td>
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<td>Wilson Poon</td>
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<td>John Brewer</td>
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<td></td>
<td>Steve Arnold</td>
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<td></td>
<td>Joseph Fanous</td>
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<tr>
<td>Rail Infrastructure Corporation</td>
<td>Lester Currie</td>
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<tr>
<td></td>
<td>Warren Mills</td>
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<td></td>
<td>Eugene Saw</td>
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<tr>
<td>Dept of Infrastructure, Planning and Natural Resources</td>
<td>John Bryant (p/t)</td>
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<tr>
<td></td>
<td>Sally Nunnerly</td>
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<tr>
<td>State Rail</td>
<td>Matt Hurst (p/t)</td>
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<tr>
<td>NSW Environment Protection Authority</td>
<td>Rachael Chan</td>
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<tr>
<td></td>
<td>Martin Bowles</td>
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<tr>
<td>NSW National Parks &amp; Wildlife Service</td>
<td>Ray Fowke</td>
</tr>
<tr>
<td>DEM (Aust) Pty Ltd</td>
<td>Carolyn Tallents</td>
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<tr>
<td>Sinclair Knight Merz</td>
<td>Peter Prince</td>
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<td>Jo Moss</td>
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<td>John French</td>
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<td>Stuart Manley</td>
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<td>Amer Tawfik</td>
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<td>Ken Robinson</td>
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<td>Tara Dias</td>
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<td>Lindsay Shepherd</td>
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<td>Ted Nye</td>
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<td>Barry Robertson</td>
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<tr>
<td>Tierney Page Kirkland</td>
<td>Lucie Hedman</td>
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<tr>
<td></td>
<td>Declan Tierney</td>
</tr>
</tbody>
</table>

p/t indicates participant was in attendance for part of the workshop.