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Infrastructure NSW

State Infrastructure Strategy Prioritisation Assessment

September 2012

Contents

1 Introduction

1.1 Purpose

Infrastructure NSW has been established to be an independent expert source of advice to the NSW Government on its immediate and future infrastructure priorities. At the heart of this task is the State Infrastructure Strategy, which recommends strategic directions for NSW Government infrastructure development and management over the next 20 years, focusing on major projects (individual investments or package of investments greater than $100 million) and reforms necessary for the successful provision of infrastructure.

Infrastructure NSW has engaged Deloitte to prepare a Prioritisation Assessment to inform the development of the State Infrastructure Strategy. This Prioritisation Assessment seeks to prioritise and shortlist potential major infrastructure investment options that Infrastructure NSW has identified in the development of the Strategy.

1.2 Scope

This report focuses on assigning priority to major uncommitted "hard" investments or programs whose capital value are likely to exceed $100 million, in line with Infrastructure NSW's remit, and are outside the scope of existing regulatory bodies.

The Prioritisation Assessment has focused on investments within the transport sector, including roads and motorways, public transport and freight, because most government-funded major projects are within this sector. It has also assessed major investment options within the water sector.

The Prioritisation Assessment does not attempt to prioritise potential health and social infrastructure investments, as major projects within these sectors are typically aimed at reforming operating practices or involve capital works below the $100 million threshold. The Prioritisation Assessment has not sought to prioritise infrastructure options within the energy sector as the State Infrastructure Strategy has not identified major investments that would fall outside of existing regulatory arrangements.

Finally, the assessment has not included projects which are either underway or are existing commitments by Government. Examples of projects included in this category include the North West Rail Link, the Pacific Highway Upgrade, North Sydney Freight Corridor Upgrade Stage 1, the Princes Highway Upgrade and the proposed Sydney International Convention Centre.

1.3 Structure of this Report

The multi-criteria analysis framework used to prioritise identified investment options requires the undertaking of six steps:

- Identification of objectives
- Identification of corresponding criteria
- Weighting of criteria
- Portfolio development
- Scoring
- Ranking.

After outlining the rationale and consistency of this prioritisation assessment with the Project Assurance Framework, this report details each of the abovementioned steps in order according to the following structure:

- Section 2: Approach to Prioritisation
- Section 3: Objectives and Criteria
- Section 4: Portfolio Development
- Section 5: Results
- Section 6: Recommendations
- Appendix A: Potential Projects.

1.4 Terminology

The following terms, acronyms and abbreviations are used throughout this report:

BCR	Benefit-cost ratio
Project Assurance Framework	Frameworks by which projects are assessed at critical stages in their lifecycle on a common basis. Such frameworks aim to ensure that projects are developed, managed and delivered in a manner that offers alignment with strategic priorities and value for money
The Strategy	State Infrastructure Strategy
Option	Possible but uncommitted investment in a project or program

2 Approach to Prioritisation

2.1 Overview

The Prioritisation Assessment framework has been designed to be a systematic approach to identify and prioritise potential projects and programs. The Prioritisation Assessment framework has been designed to reflect the option assessment process outlined in Infrastructure Australia's *Reform and Investment Framework*[1].

The Prioritisation Assessment process adopts an objectives-driven approach to assessing the worth of different options. Prioritisation based on such an approach is an efficient means of filtering and identifying options that are most likely to meet strategic priorities and accordingly prioritise resources to assess and confirm the merits of these options.

At this strategic stage, government business case frameworks recognise the need to improve resource allocation and increase the return on scarce Government funding by considering how options:

- Contribute to the delivery of NSW Government strategic priorities
- Prioritise resources to meet Government priorities
- Are delivered in an efficient and effective manner.

Accordingly, the Prioritisation Assessment is based on a multi-criteria analysis framework that assesses options against:

- Whether they align with strategic Government objectives
- The likelihood of successful delivery based on stakeholder support, risks and implementation
- Whether they are economically efficient.

Consistent with government business case frameworks, the Prioritisation Assessment does not negate the need to develop full business cases. Whilst this Prioritisation Assessment does outline a shortlist of high priority options, further analysis beyond the scope of this Prioritisation Assessment will be necessary to confirm strategic fit, economic efficiency and project deliverability.

2.2 The Multi-Criteria Analysis Framework

The multi-criteria analysis framework has been adopted as the principal process to rank and prioritise options to be considered for inclusion within the State Infrastructure Strategy.

The Prioritisation Assessment framework has been designed to be a systematic approach to identify and prioritise options using the option assessment process outlined in Infrastructure Australia's *Reform and Investment Framework*[2]. This process requires the:

- **Identification of evaluation criteria:** that relate to the investment goals to be achieved and the problems to be addressed to ensure that critical issues are addressed. Amongst other potential criteria, the criteria set may include economic, demand, social, environmental, financial and equity considerations

[1] Infrastructure Australia (2012), *Infrastructure Australia's Reform and Investment Framework – Better Infrastructure Decision Making Guidelines*, Version 5
[2] Infrastructure Australia (2012), *Infrastructure Australia's Reform and Investment Framework – Better Infrastructure Decision Making Guidelines*, Version 5

- **Shortlisting of options:** based on application of the identified selection criteria. These options would then be considered for further analysis, including economic cost-benefit analysis.

2.2.1 Framework Design

Based on the Infrastructure Australia approach, a number of criteria have been developed to evaluate the potential level of economic benefit as well as the importance of these benefits. The multi-criteria analysis framework provides a useful means to distil the performance of a particular project against multiple metrics into an overall score and provides the flexibility to assess impacts that are either quantitative or qualitative in nature. The multi-criteria analysis framework encompasses the following steps:

- **Identify objectives:** These are themes and statements relating to what policy makers wish to achieve
- **Identify criteria:** Criteria are defined to measure the achievement of each objective. One or more criteria may be used to measure the achievement of objectives. In some instances, criteria may be defined as 'showstoppers' to preclude the consideration of options that do not meet certain condition
- **Weight criteria:** In many cases some criteria are considered more important than others, which can be reflected in the analysis by assigned a higher weight on these criteria
- **Develop a portfolio of options:** A discrete set of options that may meet the defined objectives is selected, generally on the basis that options are mutually exclusive
- **Scoring:** For each option, a score is assigned against each criterion. Scores are based on the current metrics and indicators, predicative models or professional judgment
- **Rank options:** Using predefined weights, the scores are combined to estimate a weighted score for each option, which can then be used to rank options.

The development of each step is discussed through subsequent sections of this report.

2.2.2 Key Objectives

The multi-criteria analysis framework developed for this report has scored options against two key objectives:

- **The Strategic Objective**: Does the option address issues of strategic importance and does it offer good value for money?
- **The Project Assurance Objective**: Is there a high level of confidence associated with the planning and analysis of the option?

In keeping with an overarching intent to maximise economic efficiency, the criteria and scoring system has placed a significant weight on projects that have been shown to have the potential to provide a positive economic contribution. Collectively, the identified objectives and corresponding criteria were designed to provide a triple bottom line approach to assess whether options have the potential to deliver demonstrable positive economic returns and contribute to improving social and environmental outcomes in NSW.

The assessment has been based on individual project business cases or background reports provided to Deloitte from Infrastructure NSW or which have been sourced by Deloitte from publicly available data sources. Deloitte has taken this information at face value and has not sought to verify the contents of the respective project assessments.

In addition, there are a number of options that were assessed in this analysis for which business cases were not available. In these instances, the Prioritisation Assessment process has assigned a neutral score to the economic efficiency criteria (i.e. it assumed a BCR of 1.0) so as to not unduly penalise the option in the scoring process. A club (♣) has been used to denote where this approach has been applied on a particular option. It is recommended that the Prioritisation Assessment is updated once further information on projects' economic efficiency becomes available through business case documentation.

2.2.3 Other Prioritisation Considerations

The Prioritisation Assessment supports a top-down approach to facilitate the implementation of strategic imperatives and identify investments that are likely to have the most impact.

Although the Prioritisation Assessment is an important step towards identifying a potential 'pipeline' of works, there are a number of project specific considerations, which are no less important, that need to be considered in identifying an investment 'pipeline'.

Other issues that may need to be considered prior to finalising an investment pipeline of works include:

- **Constructability:** it may be considered desirable to defer or stage projects to reduce 'crowding out' effects and provide the private sector greater visibility with respect to future resourcing needs. Deferring projects may also be desirable to better match capacity to demand
- **Availability of funding:** ultimately, infrastructure is funded by taxpayer or users, or a combination of the two. How far each group is unwilling (or willing) to accept higher taxes, reallocated spending or user prices, some of the priorities may need to be delivered later (or sooner) than recommended
- **Lead time:** options will vary in the level of future planning and design required to bring them to a 'ready to proceed' stage. Invariably, options that may be assigned as a high priority may take many months or years to complete the necessary planning whilst options of a lower priority may require less planning work. Accordingly, the staging of options in the pipeline may differ from the Prioritisation Assessment.

These factors are best applied outside this Prioritisation Assessment process. As such, consideration of these factors could require a reprioritisation of certain options.

2.3 Alignment with the Infrastructure NSW Major Projects Assurance Framework

In keeping with Infrastructure NSW's role as a key gatekeeper for major investments exceeding $100 million in value, Infrastructure NSW is developing a Major Projects Assurance Framework, which aligns with current Gateway Review procedures, aimed at enhancing investment decision making and project governance. The Major Projects Assurance Framework will be aimed at reviewing major infrastructure projects to assess the quality of these projects prior to their inclusion of infrastructure plans such as the State Infrastructure Strategy.

Mirroring the design of existing Federal and State Government frameworks, the Major Projects Assurance Framework has seven gates at which potential projects are reviewed to ensure that planning, analysis and execution is checked throughout a project's lifecycle. These gates include:

- Program/project justification
- Strategic assessment

- Business case
- Pre-tender
- Tender evaluation
- Pre-commissioning
- Post implementation.

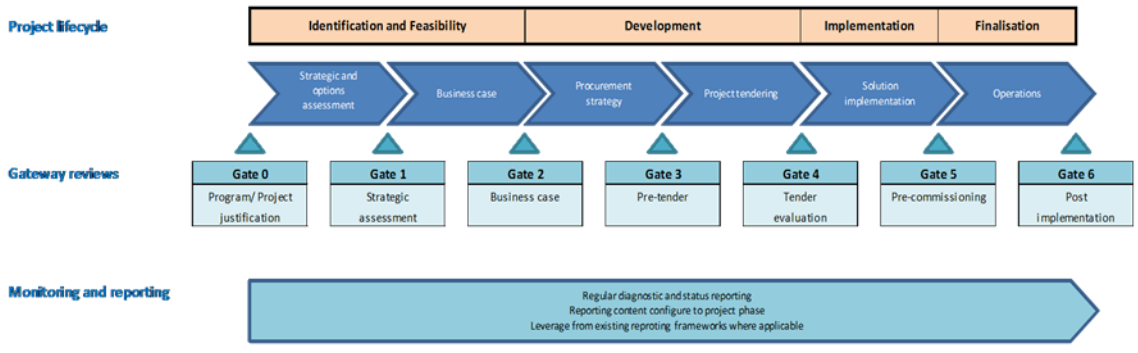
An important new component of the Major Projects Review process is an initial "gate zero" for project justification, which occurs at the time of initial project inception. At this initial stage the options considered should be wide-ranging and should include consideration of, for example:

- Alternative service delivery models that are less asset-intensive (e.g. on-line delivery)
- Options for new asset capacity versus better utilisation of existing assets
- Different forms of infrastructure with differing value-cost characteristics (e.g. roads, rail, bus)
- Substantial variations in scope and standard (e.g. 2 lane or 3 lane road over all or only a portion of the corridor being considered)
- Alternative timing for delivery
- The use of pricing or other mechanisms to moderate demand.

This Prioritisation Assessment process is intended to mirror the requirements of the first two gates of the current NSW Government Gateway Review process – project justification and strategic assessment.

Figure 2.1 illustrates Infrastructure NSW's Major Projects Assurance Framework, highlighting the location of 'gates' throughout a project's lifecycle:

Figure 2.1: Infrastructure NSW's Major Projects Assurance Framework



Source: INSW

It is important to re-emphasise that this Prioritisation Assessment does not negate a requirement for business cases to be prepared as it only encompasses the initial requirements of the Project Assurance Framework. The Prioritisation Assessment is a first step in a process that will require, for options that are taken further, the preparation of business cases for each option in order for other issues that cannot be considered at a strategic level to be considered and assessed including:

- Confirmation of economic efficiency
- Consideration of alternative options, including smaller scale options outside the remit of this study, which may deliver a comparable or improved economic outcome at a lower cost or with less complexity
- Identification and assessment of project risks and non-monetary impacts that have not been assessed at the strategic assessment gate
- Consideration of financial and commercial issues as part of an approach to deliver and implement the project.

3 Objectives and Criteria

3.1 Prioritisation Objectives

The development of prioritisation objectives is the first step towards prioritising a set of investment options. Ultimately, the scoring of options is based on how well they align to identified criteria, which in turn reflect the strategic objectives chosen.

Two overarching objectives have been identified to govern the prioritisation assessment of identified options.

The Strategic Objective:	Does the option have the potential to align well with Infrastructure NSW's investment themes and provide a value for money solution?
The Infrastructure NSW Project Assurance Objective:	Based on the level of planning and analysis undertaken to date, is there a sufficiently high level of confidence to proceed to the next stage of Project Assurance?

The two objectives collectively seek to determine the level of strategic benefits that may be offered by an investment project as well as the level of 'checks and balances' that have been undertaken. Projects that offer high levels of strategic fit and are reasonably well developed will be prioritised higher than options that offer limited strategic fit or offer a limited case for investment.

3.2 Strategic Objective Criteria

The criteria used for the Strategic Objective originate in the NSW Government's goal to "Make NSW Number One." Part of this is a vision for infrastructure that is:

"the right infrastructure in the right places, not only boosting productivity and competitiveness, but makes a difference to people's quality of life.[3]*"*

Infrastructure NSW has disaggregated this vision into three investment criteria:

Resilience	Infrastructure resilience is concerned with ensuring NSW has a reliable backbone which meets the State's basic needs now and in the future. It covers the capacity of the public and private sectors to withstand disruption, absorb disturbances, act effectively in crisis and deal with climatic variability.

[3] NSW Government 2011, NSW 2021 Plan

Connectivity

Infrastructure connectivity involves delivering projects that deliver economic growth and productivity improvements by better connecting people and business with markets and services. Connectivity is at the heart of the ability of infrastructure to enable economic growth. Infrastructure systems have network features that can shape how people interact and trade.

A better life

Infrastructure to be supported, must improve the quality of life for the people of NSW, and the benefits must exceed the costs, if the State is to continue to be an attractive place to work, live or start and run a business.

The Prioritisation Assessment adopts a fourth criterion, economic efficiency, aimed at identifying options that are more likely to offer the highest value for money.

Economic efficiency

Many infrastructure options are considered likely to generate significant economic, social and environmental benefits. However, finite resources mean prioritisation is critical to ensure that the best performing projects are delivered first.

Economic efficiency relates to whether an option is likely to generate net economic benefits i.e. accrue economic benefits in excess of the economic costs. Accordingly, options that are anticipated to generate economic benefits in excess of their economic costs are more highly valued.

Typical economic benefits include changes in perceived costs/utility/amenity, avoided costs and avoided environmental impacts, weighed against the capital, operating and maintenance costs of delivering the option. These benefits and costs would be monetised, and to account for time value of money, discounted at an appropriate rate.

The four criteria were disaggregated further into seven corresponding sub-criteria for the prioritisation assessment:

Investment Criteria	*Sub-Criteria*	*Definition*
Resilience *Is our infrastructure fit for purpose?*	***Infrastructure Flexibility***	*Can assets be used in a way that demand or supply can become more scalable?*
	Reliability	*Will quality, availability and compliance with standards improve with investment?*
Connectivity *How can the movement of people and goods be improved?*	***Capacity***	*Will investment allow current and future demand to be met or promote economic development?*
	Legibility	*Will the asset or system be easier and more convenient to use?*
A better life *Does our infrastructure*	***Cost of living and doing business***	*Will investment save time or reduce the cost of living or doing business?*

support world class quality of life?	***Amenity and liveability***	*Will investment improve comfort, happiness, social cohesion and the environment?*
Value for Money *Will investment be economically efficient?*	***Economic efficiency***	*Are economic benefits likely to exceed economic costs?*

With a significant emphasis on the delivery of economic benefits in an economically efficient manner, the Strategic Objective constitutes a triple bottom line assessment that assesses the economic, social and environmental impact of potential investment options.

Collectively, the criteria aim to identify projects that improve service delivery and capacity and to do so in an economically efficient manner in order to increase economic productivity and NSW's capacity for economic growth and development.

3.3 Project Assurance Objective Criteria

With many of the investment options varying in the depth and breadth of detail, the Project Assurance Objective assesses the level of confidence associated with the planning analysis undertaken to date. Options where there is a high level of confidence in relation to its strategic fit and level of economic benefits are more likely to be closer to delivery and accordingly, likely to score well against the Project Assurance Objective.

The Objective also considers whether the gaps in the scope, planning, analysis and proposed delivery are sufficiently material to warrant closer investigation and preclude the option from proceeding to the next stage of investigation.

Eight criteria form the Project Assurance Objective, which reflects the high level requirements of the Major Project Assurance Framework Gate 1 and NSW Treasury's Business Case Guidelines (TPP 08/05). A description of each criterion is provided as follows:

Criteria	***Definition***
Strategic Alignment	*Is there a clear alignment with key government and departmental policies and strategies?*
Cost Benefit Analysis	*How robust is the cost-benefit analysis?*
Level of Planning	*How advanced is planning, design and technical feasibility?*
Complements and Alternatives	*Have other alternatives been considered? Does the project enable benefits for other projects?*
Social, Economic and Environmental Impacts	*Are there significant non-monetary social, economic and environmental impacts?*
Project Management	*Is there a project team/agency with appropriate skill and experience to manage/monitor/deliver?*
Major Risks	*Have all major risks been identified? If so, is there a strategy to mitigate major risks?*

Stakeholder Support	*Have issues raised by stakeholders been considered with common agreement achieved?*

3.4 Scoring

By converting a number of qualitative metrics into scores, multi-criteria assessments allow the comparison of monetised and non-monetised assessments against the defined objectives.

The scoring scale has been based on rankings suggested by the Australian Transport Council Guidelines which is shown in **Table 3.1**. For each criterion, a score between -3 and 3 has been assigned, whereby the extremes represent a major negative impact or positive impact respectively. A score of zero is assigned if there is no discernible impact or the level of impact is unknown.

Table 3.1: Qualitative Assessment Ratings, Descriptions and Scores

Assessment rating	Description	Score
Strongly negative	Major negative impact with serious, long term and possibly irreversible effects.	-3
Moderately negative	Moderate negative impact, over any timeframe, which may managed.	-2
Slightly negative	Minimal negative impact, probably short term, which is able to be managed or mitigated.	-1
Neutral	No discernible impact or impacts have yet to be determined.	0
Slightly positive	Minimal positive impact, possible only short term or confined to a limited area.	1
Moderately positive	Moderate positive impact, over any timeframe, which may provide new opportunities or improvements.	2
Strongly positive	Major positive impacts resulting in substantial and long-term improvements.	3

Source: ATC Guidelines Volume 3

With many of the investment options at a pre-feasibility stage, not all categories can be measured quantitatively. Hence, based on the information available, scoring has been undertaken on a qualitative basis based on expert judgment.

In addition, at this stage of the assessment, there are a number of projects for which business cases were not available. In these instances, the multi-criteria analysis process has assigned a neutral score to the economic efficiency criteria (i.e. it assumed a BCR of 1.0) so as to not unduly penalise the project in the scoring process.

Some of the initiatives are at a formative stage and accordingly have no information available on their costs and benefits. Although a nominal score of zero has been assigned to initiatives with no cost-benefit information, initiatives without a positive benefit-cost ratio cannot achieve a Strategic Objective score higher than 50 percent in the defined assessment framework. Given this approach, it is recommended that the Prioritisation Assessment is updated once further information on projects' economic efficiency contribution becomes available through business case documentation.

3.5 Weighting

Subsequent to scoring each option against each criterion, a method of combining the scores is required to enumerate an overall score.

Where each criterion is considered equally important, the scores may simply be added. Where certain criteria are considered more important, weights can be assigned to place greater emphasis on these criteria.

To emphasise the need for investments to be economically efficient, half of the Strategic Objective score has been allocated to the economic efficiency criterion with the remaining weight spread evenly across all other Strategic Objective criteria. This reflects the importance that Infrastructure NSW places on identifying investments that are most likely to deliver a level of economic benefits in excess of their economic costs. The emphasis on economic efficiency also reflects a mandatory requirement set by NSW Treasury[4] for capital business cases to include an economic cost-benefit analysis to demonstrate value for money to assist in the allocation of scarce government resources and funding.

Equal weightings were adopted for all Infrastructure NSW Project Assurance Objective Criteria.

Table 3.2 summarises the values of the weights adopted:

Table 3.2: Adopted Weights

Strategic Objective Criteria	Weight	Weight	Infrastructure NSW Project Assurance Objective Criteria	Weight
Infrastructure Flexibility	50%	8.3%	***Strategic Alignment***	12.5%
Reliability		8.3%	***Cost Benefit Analysis***	12.5%
Capacity		8.3%	***Level of Planning***	12.5%
Legibility		8.3%	***Complements and Alternatives***	12.5%
Cost of living and doing business		8.3%	***Social, Economic and Environmental Impacts***	12.5%
Amenity and liveability		8.3%	***Project Management***	12.5%
Economic efficiency	50%	50.0%	***Major Risks***	12.5%
			Stakeholder Support	12.5%
Total	**100%**	**100%**		**100%**

As might be evident from Table 3.2, rather than combining the Strategic Objective and Infrastructure NSW Project Assurance Objective scores, the scores are kept separate. As described in the next sub-section, this procedure assists in identifying options that score well against both objectives.

Typically, multi-criteria analysis does not impose a scale on scores to guide interpretation. This approach only allows for options to be ranked against each other. As an alternative approach, total weighted scores were converted to a percentage by dividing the score by the maximum possible score[5]. This treatment imposes a 'scale' on the scoring system, facilitating an assessment of how well options fit with the Strategic and Infrastructure NSW Project Assurance Objective to highlight whether options have high strategic value, are economically efficient and are deliverable.

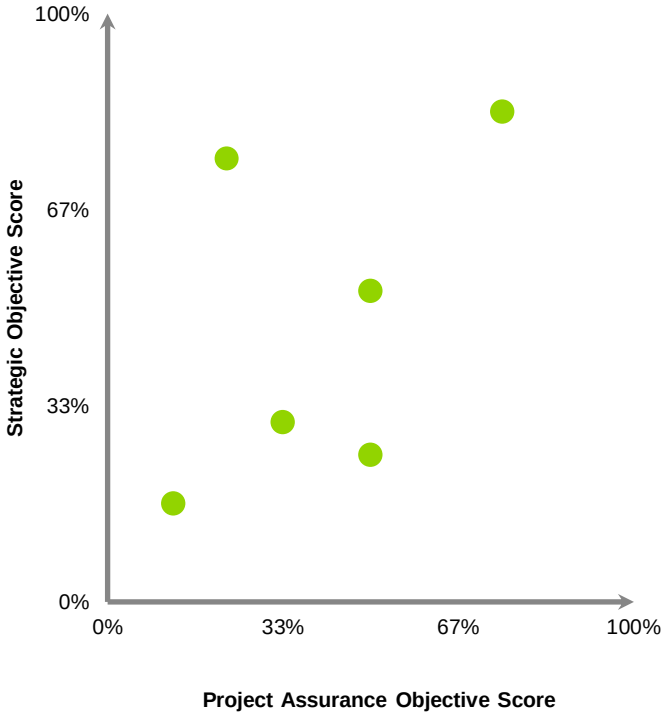
[4] See NSW Treasury Circular TC 10/12, NSW Treasury Circular TC 10/13 and Treasury Guidelines for Capital Business Cases (TPP 08/05)

[5] Maximum possible score = number of criteria × maximum number of points per criteria (being 3). Under the Strategic Objective, with seven criteria, the maximum possible score is 21 whilst under the Infrastructure NSW Project Assurance Objective, the maximum possible score is 24.

3.6 Ranking

Following the assignment of scores for each option according to the Strategic Objective and Infrastructure NSW Project Assurance Objective, the different options were mapped against each other in order to indicate their relative priority.

Figure 3.1: Conceptual Mapping of Scores



Options that are located towards the top right corner of the chart are more likely to offer high levels of strategic fit, provide positive economic returns at a high level confidence and are more deliverable than other options.

3.6.1 Classifications

One of three classifications was assigned to each option based on the position of each option on the chart. Table 3.3 provides a description and recommended timing of each class.

Table 3.3: Assigned Classifications

Assigned Classification	Interpretation	Recommended Timing
Short Term	High level of confidence that the option is of high strategic value and value for money.	These options are considered high priority and are earmarked for **immediate action**. These options should be implemented as soon as is practical within the **next 5 years.**
Medium Term	Option may be of strategic value but require more planning, analysis and design to confirm. Given the long lead times for delivering infrastructure projects, this window will include many of the most important major investments for the State – those projects which can have a game changing impact on NSW's economy and society.	These options are aimed at **planning for growth** and are recommended for implementation within a **5 – 10 year** window.
Long Term	Option offers limited strategic fit at this time. Over time, the strategic and economic merit of the option may increase. The urgency for a project may change in response to economic or society change. Accordingly, the merit of the option could be implemented at a later stage. In the interim, the option may need to be re-scoped or be considered, as conditions change, or as part of a more focused program to improve its merit.	These options offer **longer term vision** and should their development be warranted, are recommended for development in a **10 – 20 year** window or **beyond 20 years** depending on when demand levels warrants the development of the option.

3.6.2 Classification Process

The classification process assigns each option to one of the three abovementioned classes based on the level of strategic fit and project assurance.

For an investment option to be assigned into the **Short Term** category, an option needs to achieve a high level of strategic fit as well as a high level of project assurance. This ensures that projects that are considered a priority have a positive economic case and also have sufficient planning work undertaken. Specifically, the Strategic Objective and Infrastructure NSW Project Assurance scores need to both exceed 66 percent. This high threshold provides a safeguard to ensure investment options are prioritised only where there is a high level of confidence associated with the potential strategic fit and economic returns. Below this threshold, investment options are more likely to have one or more information gaps, *in particular a cost-benefit analysis,* which require development prior to the option proceeding to the next stage of the Project Assurance process.

Options with a Strategic Objective score below 33 percent were assigned into the **Long Term** category. This threshold ensures that options that do not have sufficient strategic fit are not prioritised over other options, regardless of how well progressed their planning may be.

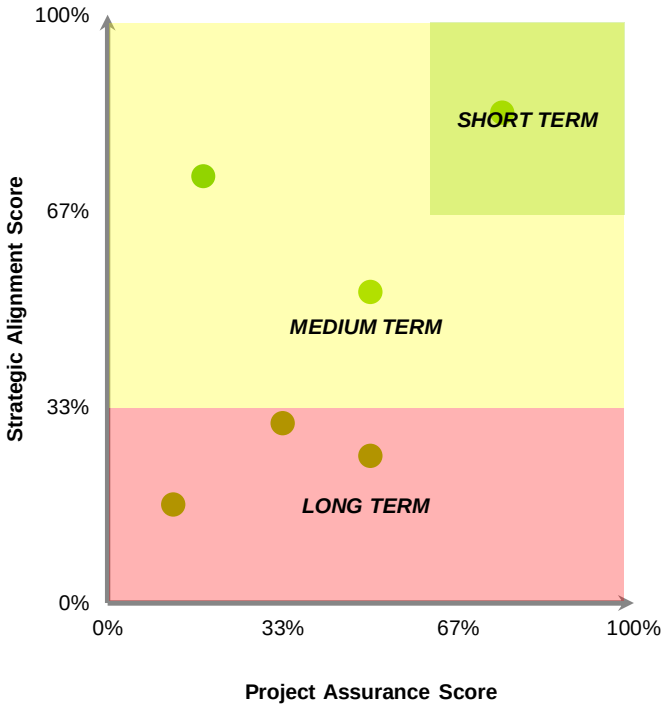
It is possible that options falling into this category may become a higher priority in the future as demand increases. In this case, there is likely to be merit in deferring expenditure. Options may fall into this category as there may be limited information available, in particular a cost-benefit analysis, to assess an option's value to the community. However, options that fall into this category may require

rescoping and consideration of more cost-effective alternatives. All other investment options were assigned into the **Medium Term** category. These options are judged to have a sufficient level of strategic fit but require further work to demonstrate strategic fit and/or the level of economic return.

Regardless of the assigned category, as further planning and analysis is undertaken and as inherent uncertainty over possible future outcomes reduces over time, it means that the appropriate level of prioritisation for an option may change as NSW itself changes over the next 20 years.

Figure 3.2 illustrates how different projects with different Strategic and Project Assurance Objective scores are mapped and ranked within the multi-criteria analysis process.

Figure 3.2: Conceptual Mapping of Multi-Criteria Analysis Scores



The next section outlines which options were considered as part of the Strategy Prioritisation Assessment. Section 5 applies the methodology described in this section against a range of investment options.

4 Portfolio Development

4.1 Overview

Most multi-criteria analysis assessments encompass an option development step to develop investment options that have some potential to meet the assessment objectives. As the Strategy Prioritisation Assessment draws upon an existing set of potential investment options, this step has been termed 'portfolio development'.

Filters were applied to identify investment options that are considered sufficiently significant to be within Infrastructure NSW's remit and have yet to be committed.

Sections 4.2 and 4.3 provide further detail on the option identification process and option filtering process respectively. Section 4.4 presents a portfolio of potential investments for prioritisation.

4.2 Option Identification

Potential options were drawn primarily from NSW Government agency asset plans as well as selected submissions by local government and the private sector considered worthy of merit by Infrastructure NSW.

4.3 Option Filtering

In keeping with Infrastructure NSW's remit to review only major investments, a number of filters have been applied to identify a set of strategic investments, which are yet to be committed to, for assessment and prioritisation.

To be considered inside the scope of the Prioritisation Assessment, all investments options provided through TAM were passed through the following filters:

- Exceeds $100 million in capital expenditure (consistent with the Infrastructure NSW Act 2011)
- Are not existing commitments of the NSW Government.

4.4 In-Scope Options

Table 4.1 outlines the options that were considered in-scope for prioritisation assessment, following the application of the filters described in Section 4.3.

A description of each in-scope road and motorway option is provided in Table 4.2. Table 4.3 and Table 4.4 provide a description of in-scope public transport and freight options respectively whilst Table 4.5 provides a description of water supply options. Further information on each option is provided in Appendix A.

Table 4.1: In-Scope Options

Sector	In-scope Investments
Roads and Motorways	Bells Line of Road/Castlereagh Freeway Enhanced North-South Link F3 - M2 Motorway F3 Extension to Raymond Terrace F6 Extension Managed Motorways Initiative Northern Beaches Link Outer Western Sydney Orbital (M9) Sydney Airport and Port Botany Pinchpoint Strategy WestConnex Program
Public Transport	Anzac Parade Light Rail CBD Underground Bus Rapid Transit East Coast High Speed Rail Eastern Suburbs Railway Extension Main Line Acceleration Program (South Coast, Central Coast and Newcastle) Northern Beaches Bus Corridor Improvement Plan Parramatta Epping/Macquarie Park Transitway Rapid Transit Extension from NWRL to CBD and Inner West Unlock City Circle Capacity
Freight	Bridges for the Bush Eastern Creek Intermodal Terminal and Western Sydney Freight Line Liverpool Ranges Capacity Augmentation Maldon – Dombarton Rail Freight Line Melbourne – Brisbane Inland Rail Line Moss Vale – Unanderra Rail Freight Line Upgrade Northern Sydney Freight Corridor Program: Stages 2 & 3 Supporting intermodal terminal road links at Moorebank
Water	Warragamba Dam Flood Mitigation Hunter Water Supply Augmentation Sydney Metropolitan Water Supply Augmentation

Table 4.2: Description of In-Scope Road and Motorway Options

Potential Investment	Proposal
Bells Line of Road/Castlereagh Freeway	Development of an extension of the M2/M7 corridor west towards Richmond and the Blue Mountains and upgrade of the Bells Line of Road.
Enhanced North-South Link	Northern extension of the Inner West Bypass from Camperdown to Rozelle and the development of a new north-south link between Rozelle and the M2.
F3 - M2 Motorway	Development of a motorway link connecting the F3 Freeway and the Sydney Orbital.
F3 Extension to Raymond Terrace	Development of a missing link connecting the F3 Freeway with the Raymond Terrace Bypass.
F6 Extension	Development of a motorway link between the Sydney Orbital southwards to the Sutherland Shire and the F6 to the Illawarra.
Managed Motorways Initiative	Implementation of smart technology and infrastructure measures to increase the efficiency and capacity of the Sydney motorway network. Potential measures include: • Coordinated on-ramp signalling • Variable speed limits

	• Lane control • Incident detection • Travel information • Closed circuit television surveillance.
Northern Beaches Link	Development of a motorway link between the Warringah/Gore Hill Freeway and The Spit.
Outer Western Sydney Orbital	Development of a motorway ring road through Outer Western Sydney between north-western and south-western Sydney via Penrith.
Port Botany and Sydney Airport Pinchpoint Program	Program of short to medium term measures aimed at addressing acute road network constraints within the vicinity of Port Botany and Sydney Airport. Potential measures include: • Introduction of one-way "pairs" on Bourke Street and O'Riordan Street • Parking for container trucks • Widening key arterial roads • Grade separation of congested junctions • Bus priority measures.
WestConnex Program	Integrated development of the M4 Extension, M5 East Expansion and part of the Inner West Bypass. The Program aims to improve connections to Sydney's international gateways, Sydney Airport and Port Botany. The Reference Scheme includes: • Widening of the M4 between Parramatta and Strathfield • M4 Extension to Camperdown • Inner West Bypass between Camperdown and the M5 East at Marsh Street • Duplication of the M5 East tunnels between Bexley Road and Marsh Street • Widening of the M5 East between Bexley Road and King Georges Road.

Table 4.3: Description of In-Scope Public Transport Options

Potential Investment	Proposal
Anzac Parade Light Rail	Development of a surface light rail corridor between Central, Moore Park and UNSW via Anzac Parade.
CBD Underground Bus Rapid Tunnel	Development of a dedicated bus tunnel between the Harbour Bridge and Town Hall with new bus terminals at Wynyard and Town Hall. Possible connections with the Cross City Tunnel to cater for east-west bus movements.
East Coast High Speed Rail	Proposed high speed rail network along the east coast of Australia connecting Brisbane, Newcastle, Sydney, Canberra and Melbourne.
Eastern Suburbs Railway Extension	Development of a southern extension of the Eastern Suburbs rail line beyond its current terminus at Bondi Junction to Maroubra Junction via Randwick.
Main Line Acceleration Program: Central Coast	Program of operational reforms and minor infrastructure works aimed at increasing service speeds along the Central Coast and Newcastle Line. Possible initiatives include: • Revised timetabling with additional express services • Signalling, track and alignment upgrades to reduce travel times.
Main Line Acceleration Program: South Coast	Program of operational reforms and minor infrastructure works aimed at increasing service speeds along the South Coast Line. Possible initiatives include: • Revised timetabling with additional express services • Signalling, track and alignment upgrades to reduce travel times.
Main Line Acceleration: Newcastle	Program of operational reforms and minor infrastructure works aimed at increasing service speeds along the Newcastle Line. Possible initiatives include:

	• Revised timetabling with additional express services • Signalling, track and alignment upgrades to reduce travel times.
Northern Beaches Bus Corridor Improvement Plan	Program of bus priority investments on the Northern Beaches Strategic Bus Corridor aimed at improving the reliability of bus services operating between the Northern Beaches and the City. Measures may include: • Extending bus lane operations into off-peak times and weekends • New clip on lanes added to the existing Spit Bridge • Other minor measures aimed at improving bus priority and junction flows.
Parramatta Epping/Macquarie Park Transitway	Development of a busway or light rail link between Parramatta and Epping or Macquarie Park.
Rapid Transit Extension from NWRL to CBD and Inner West	Resignalling and introduction of single deck rolling stock on the North Shore Line, Harbour Bridge, and Inner West Lines.
Unlock City Circle Capacity	Reconfiguration of junctions and associated works outside Central to allow more services from more lines to access the City Circle without impeding other services.

Table 4.4: Description of In-Scope Freight Options

Potential Investment	Proposal
Bridges for the Bush	Series of programs aimed at upgrading through improvements in condition, geometry and durability of pavements and structure or replacing heritage/timber bridges to enable the Higher Mass Limit (HML) traffic to use these bridges.
Eastern Creek Intermodal Terminal and Western Sydney Freight Line	Development of an intermodal terminal at Eastern Creek primarily aimed at serving industrial lands in Outer Western Sydney. The terminal would be complemented by the development of the Western Sydney Freight Line between Eastern Creek and Leightonfield providing dedicated freight access between Eastern Creek and Port Botany.
Liverpool Ranges Capacity Augmentation	Duplication of the Main North Line at Ardglen to increase track capacity through the Liverpool Ranges
Maldon - Dombarton Freight Line	Development of a rail freight connection between the Main South Line and the South Coast Line to increase rail freight connectivity and capacity to Port Kembla.
Melbourne - Brisbane Inland Rail Line	Development of an inland rail corridor between Melbourne and Brisbane via Parkes, Werris Creek and Toowomba.
Moss Vale - Unanderra Freight Line Upgrade	Lengthening of loops on the existing Moss Vale - Unanderra Line aimed at allowing for longer train sets and an increase in saleable paths.
Northern Sydney Freight Corridor: Stage 2 and 3	Development of the last two of three stages of freight rail enhancements along the Main North Line between Sydney and Newcastle. Proposed works include extra track, passing loops, bypass and signalling enhancements aimed at improving the capacity and reliability of freight and passenger movements. Specific works include: • Passing loops at Wyong • Extra track at Cowan Bank, Hornsby to North Strathfield and North Strathfield to Flemington • Freight bypass at Hornsby • Signalling enhancements between Berowra and Broadmeadow.
Supporting intermodal terminal road links at Moorebank	Enhancements on the surrounding road network to cater for heavy vehicle flows into and out of a new intermodal terminal precinct at Moorebank. Possible measures may include: • Road widening • Slip lane lengthening

	• Pavement and bridge strengthening • Additional ramps on the M5.

Table 4.5: Description of In-Scope Water Options

Potential Investment	Proposal
Hawkesbury-Nepean Valley: Flood Mitigation Measures	Development of options, including the raising of the Warragamba Dam wall, aimed at reducing the frequency and impact of major flood events within the Hawkesbury-Nepean Valley.
Hunter Water Supply Augmentation	Development of a range of options aimed at increasing water supply to augment current water sources in the Hunter. Options may include: • Desalination • Water recycling • New or upgraded storage facilities • Water sharing with the Central Coast • Demand management.
Sydney Metropolitan Water Supply Augmentation	Development of a range of options aimed at increasing water supply to augment current water sources in Sydney. Options may include: • Additional desalination capacity • Water recycling • New or upgraded storage facilities • Expansion of the Shoalhaven transfer tunnel and Upgrade of the Upper Canal to expand transfers • Demand management.

5 Results

5.1 Overview

For all in-scope options identified in Section 4, scores were assigned to each criterion.

After the application of weights, a score was calculated for each objective in percentage terms.

Section 5.2 outlines the scores for each option and compares the scores for each option under each objective by mapping the scores graphically against each other. As mentioned previously, this process facilitates a visual assessment and prioritisation of options.

It should be noted that the inclusion of any investment does not necessarily constitute endorsement by Infrastructure NSW as all options will require the development of a detailed business case to confirm the net benefits that they are projected to deliver. In addition, some projects have been assessed in the absence of a detailed business case.

5.2 Scores

Table 5.1 to Table 5.4 outline the Strategic Objective and Infrastructure NSW Project Assurance score assigned to options within the road and motorways, public transport, freight and water supply sectors. Based on these scores, a prioritisation class has been assigned based on the rules outlined in Section 3.6.

Rather than combining the Strategic Objective and Infrastructure NSW Project Assurance scores, the scores were mapped against each other to provide a visualisation for how well each option met each objective.

Some initiatives are at a formative stage and accordingly have no information available on their costs and benefits. Although a nominal score of zero has been assigned to initiatives with no cost-benefit information, initiatives without a positive benefit-cost ratio cannot achieve a Strategic Objective score higher than 50 percent. To highlight where Strategic Objective scores may be adversely impacted by the lack of economic analysis, options with no benefit-cost ratio information have been denoted with a club (♣).

Figure 5.1 to Figure 5.4 map the Strategic and Infrastructure NSW Project Assurance scores for each option within the roads and motorway, public transport, freight and water spaces respectively.

Table 5.1: Scores: Roads and Motorways

Option	Strategic Objective Score	Infrastructure NSW Project Assurance Objective Score	Assigned Timeframe for Development	Strategic Assessment	Project Assurance Assessment
Bells Line of Road/Castlereagh Freeway	14%♣	17%	**Beyond 20 Years**	In light of low demand and current works aimed at upgrading the Great Western Highway, a major upgrade of the Bells Line of Road is not warranted at this stage. Future developments in the Hawkesbury and in Western NSW may prompt a need for an upgrade and extension of the road to meet the M7.	Further work is necessary to identify what investments are necessary to support future freight movements to and from Western NSW and improved road safety. These works will also need to consider whether these investments can be delivered in a cost-effective manner.
Enhanced North-South Link	28%♣	21%	**Beyond 20 Years**	As spare road capacity across Sydney Harbour is exhausted, new road crossings will be required. The Enhanced N-S Link is one option that has the potential to provide additional cross harbour road capacity that could both bypass the CBD and provide relief on a number of inner city arterial roads.	A preliminary assessment is necessary to assess the demand, cost and economic outcomes of such an extension against other alternatives.
F3 - M2 Motorway	28%	63%	**10 to 20 Years**	The completion of a link between the Sydney Orbital and the F3 would provide a motorway grade alignment for intercity movements through Sydney. Although travel time savings and travel cost savings are notable, particularly for freight, the high capital costs associated with developing the proposed tunnel alignment impacts adversely on the viability of the link.	Further work to progress the development of the link was proposed by the Commonwealth Government.
F3 Extension to Raymond Terrace	56%	54%	**5 to 10 Years**	The proposed link is not currently encompassed within the Pacific Highway Upgrade Program despite catering for relatively high volumes of traffic. The need for an elevated structure across the Hexham Swamp and over the Hunter River contributes to the scheme's high costs, impacting on the economic viability of the scheme.	A preferred alignment and concept design has been identified. However, the proposal may warrant a detailed design and demand assessment to inform a final business case.
F6 Extension	28%♣	25%	**10 to 20 Years**	The development of the F6 Extension would connect Sydney with the Illawarra with a motorway standard road.	No business case has been prepared for an extension of the F6 Freeway. A preliminary

				No recent work has been undertaken to highlight the benefits of developing the extension although road reservations are in place to preserve the option to build the extension should it prove viable.	assessment of the corridor's potential will need to be prepared to progress the case for the development of the F6 Extension.
Managed Motorways Initiative	92%	63%	**5 to 10 Years**	Managed motorway initiatives have real potential to provide a cost-effective solution aimed at improving the efficiency of traffic flows, incident response and provide real time information to motorists during the short to medium term. In some locations, managed motorways may defer the need to add road capacity, which can be difficult, time-consuming and expensive to develop.	Prioritisation undertaken as part of the initiative has identified corridors where managed motorway initiatives are likely to have the greatest impact. Prioritisation and assessment will need to be ongoing to determine the need, location and timing of expanding the initiative across the Sydney motorway network.
Northern Beaches Link	22%♣	8%	**Beyond 20 Years**	With existing roads operating at capacity, a Northern Beaches Link could significantly reduce travel times and improve reliability, improving amenity along Military Road and improving connectivity to the Northern Beaches. However, higher growth pressures and gateway capacity needs elsewhere in Sydney may mean a motorway link may be a lower priority compared to other projects. Solutions are likely to involve tunnelling, the high cost of which will impact on the Link's potential viability.	Whilst proposals to provide a motorway grade link to the Northern Beaches have been proposed over time, no formal business case by government has been prepared to date. A multimodal assessment is likely to be required to avoid duplicating transport capacity given current intentions to upgrade public transport links to the Northern Beaches.
Outer Western Sydney Orbital	8%♣	13%	**Beyond 20 Years**	The Outer Western Sydney Orbital is a potential corridor that would provide motorway standard access through Outer Western Sydney as this region develops. In the medium term, alternative options such as widening the M7 and developing the F3-M2 links may prove to be more viable.	No formal planning has been instigated. Corridor planning will be required to determine a preferred corridor. Other alignments including the M2-F3 and M7-F3 corridors may also provide alternative solutions.
Port Botany and Sydney Airport Pinchpoint Program	47%♣	63%	**5 to 10 Years**	The implementation of a pinchpoint program offers the potential to provide short term relief on a number of arterial roads around Sydney Airport and Port Botany. The Program could also contribute to facilitating developments between the City and Sydney Airport. The program identifies a number of measures which appear to have a strong case for their implementation. However, due to the lack of available information relating to their traffic and economic impact, it has not been possible to score this group of projects highly at this stage.	Feasibility analysis and prioritisation is required to identify and implement works that are likely to deliver benefits on a cost-effective basis. However, should a strong economic case for individual measures become available, it is likely that they could require implementation within a 0 to 5 year period. Moreover, given the limited capital requirements of some measures, these schemes could be implemented relatively quickly.

WestConnex Program	83%	83%	**0 to 5 Years**	The WestConnex Program has significant potential to expand capacity to serve growing activity within Inner Sydney, in particular Sydney CBD, inner Sydney and its international gateways and improve road connections to Western Sydney. Even allowing for the high costs of construction, the scheme is projected to deliver economic returns in excess of its costs.	Significant analysis and planning has been undertaken to develop the Program to a concept stage. Future planning regarding design, staging and funding will be required. The complexity of the Program may require the Program to be developed in stages to manage delivery and risk.

♣ No benefit-cost ratio data available. Initiatives with no cost-benefit ratio data can only achieve a maximum Strategic Objective score of 50 percent.

Table 5.2: Scores: Public Transport

Option	Strategic Objective Score	Infrastructure NSW Project Assurance Objective Score	Assigned Timeframe for Development	Strategic Assessment	Project Assurance Assessment
Anzac Parade Light Rail	42%♣	63%	**5 to 10 Years**	The development of light rail along Anzac Parade could better facilitate the movement of large crowds to educational and entertainment precincts located along the corridor.	A feasibility study of light rail operations along Anzac Parade is currently being prepared. The study will assess whether light rail is viable and identify a preferred alignment.
CBD Underground Bus Rapid Transit	47%♣	38%	**5 to 10 Years**	High level investigations indicate that a CBD bus tunnel has the potential to reduce travel times by between 10 – 20 minutes during peak periods for bus passengers and provide an opportunity to pursue the pedestrianisation of parts of George Street.	Further design, demand modelling and planning will be desirable to ensure consistency with city access strategies and to inform pre-feasibility analysis.
East Coast High Speed Rail	14%♣	33%	**Beyond 20 Years**	The high cost of high speed rail is a key constraint in progressing its development. The economic case for high speed rail is dependent on the emergence of technology to significantly reduce travel times to a level where it is a viable alternative to air travel.	A final study, due to be completed this year, will identify a preferred alignment. Recommendations from this study will guide future action, including possible corridor preservation.
Eastern Suburbs Railway Extension	22%♣	29%	**Beyond 20 Years**	A mass transit option has merit for further assessment. However, this assessment should include a multimodal analysis, taking into account alternative solutions including light rail to ensure capacity is not duplicated.	A range of studies including option generation, costing, operational, demand and economic assessment are required to progress this proposal. The viability of the proposal will depend on future

					land use planning.
Main Line Acceleration Program: Central Coast	33%♣	63%	**5 to 10 Years**	Previous work on improving regional links to the Central Coast highlight significant challenges in undertaking major infrastructure works to significantly reduce travel times. Changes in stopping patterns combined with minor works may provide potential to reduce travel times cost effectively. In the short to medium term, works being carried out as part of the Northern Sydney Freight Corridor Project may provide improvements for passenger rail services.	A range of studies including option generation, costing, operational, demand and economic assessment are required to progress this proposal. The proposal may influence future works proposed under the Northern Sydney Freight Corridor Program.
Main Line Acceleration Program: South Coast	33%♣	63%	**5 to 10 Years**	Previous work on improving regional links to the Illawarra highlight significant challenges in undertaking major infrastructure works to significantly reduce travel times. Changes in stopping patterns combined with minor works may provide potential to reduce travel times cost effectively. Improving links to the South Coast to link the region to jobs in Sydney is important given the vulnerability of the local steel industry to global market trends.	A range of studies including option generation, costing, operational, demand and economic assessment are required to progress this proposal.
Main Line Acceleration: Newcastle	31%♣	54%	**10 to 20 Years**	Previous work on improving regional links to Newcastle highlight significant challenges in undertaking major infrastructure works to significantly reduce travel times. Changes in stopping patterns combined with minor works may provide potential to reduce travel times cost effectively. In the short to medium term, works being carried out as part of the Northern Sydney Freight Corridor Project could provide improvements for passenger rail services.	A range of studies including option generation, costing, operational, demand and economic assessment are required to progress this proposal. The proposal may influence future works proposed under the Northern Sydney Freight Corridor Program.
Northern Beaches Bus Corridor Improvement Plan	36%	71%	**5 to 10 Years**	Further bus priority improvements have been shown to have potential in reducing travel times and increasing bus patronage. Future option generation may need to consider how to progress future bus priority measures within a constrained corridor whilst minimising the impact on car users and adjacent property owners.	A prefeasibility study commissioned by TfNSW suggests that a fully segregated bus rapid transit may not be viable. Alternative options including bus priority measures may prove to be more viable.
Parramatta Epping/Macquarie	31%♣	46%	**10 to 20 Years**	Previous studies have assessed mass transit options without considering in detail alternative hybrid solutions	A range of studies including option generation, costing, operational, demand and economic

Park Transitway				such as busways and light rail. These options may be able to provide improved connectivity between the Global Economic Arc and Western Sydney at a lower cost.	assessment are required to progress this proposal.
Rapid Transit Extension from NWRL to CBD and Inner West	31%	67%	**10 to 20 Years**	Resignalling and single deck rollingstock to allow for higher service frequencies and faster travel speeds has been shown to have potential in increasing the carrying capacity of rail services across the Harbour Bridge. However, metro style services may need to be spread across a number of lines, which introduces operational risk, as no one line has sufficient demand to use the capacity that (up to) 30 trains per hour may provide.	Further detailed investigation is required to confirm which lines are most amenable to metro style operations, maximise passenger benefits and minimise operational risks.
Unlock City Circle Capacity	33%♣	79%	**5 to 10 Years**	The Revesby-Kingsgrove Quadruplification and SWRL, which are set for commission before or by 2016, could enable additional services on the East Hills and Airport Line to be scheduled, increasing frequencies through the City Circle. Changes to which lines serve the City Circle may need to be considered in the longer term although should changes occur, the technical, operational and demand implications across the network may require consideration.	Increasing service frequencies through the City Circle on lines that serve the City Circle are already planned. However, should services from other lines be diverted to the City Circle, preliminary assessments would need to be commissioned to outline the technical, operational and demand implications.

♣ No benefit-cost ratio data available. Initiatives with no cost-benefit ratio data can only achieve a maximum Strategic Objective score of 50 percent.

Table 5.3: Scores: Freight

Option	Strategic Objective Score	Infrastructure NSW Project Assurance Objective Score	Assigned Timeframe for Development	Strategic Assessment	Project Assurance Assessment
Bridges for the Bush	72%	75%	**0 to 5 Years**	A number of bridges across regional NSW require upgrading or replacement to cater for the increasing freight task and reduce maintenance. The Bridges for the Bush initiative will contribute to increasing freight productivity by increasing allowable mass limits and eliminating the need to take longer detours.	A package of works has already been identified by RMS which has been assessed for their viability. Further analysis may be necessary to identify and assess future potential upgrades.
Eastern Creek Intermodal Terminal and Western Sydney Freight Line	25%	58%	**10 to 20 Years**	With industrial activity intensifying within Outer Western Sydney, an intermodal terminal at Eastern Creek would complement this activity. Preliminary investigation suggest that the development of the WSFL and an Eastern Creek intermodal terminal is worthy of further consideration and would contribute to reducing the growth in truck movements between the Port and Western Sydney.	New investigations are required to confirm a site location and an associated rail corridor. Furthermore, costings may need to be reassessed to confirm the economic and commercial returns of the project.
Liverpool Ranges Capacity Augmentation	50%	58%	**5 to 10 Years**	As the Gunnedah Coalfields develop, the Main North Line through the Liverpool Ranges will need to cater for increasing volumes of coal trains. Current investments strategies support the need for capacity augmentation by duplicating the current alignment.	Current strategies for capacity augmentation are based on duplicating the current alignment. Alternative governance arrangements may need to be considered to bring forward investment and reduce commercial risk.
Maldon - Dombarton Freight Line	17%	50%	**10 to 20 Years**	Without a significant change in the activities at Port Kembla, the proposal is unlikely to be economically attractive in the short term. This conclusion is confirmed by the recent detailed feasibility study of this proposal sponsored by the Federal Government.	Should a major container port be developed or should bulk freight volumes handled by at Port Kembla be realised in the future, the development of the Maldon-Dombarton Line is more likely to become realistic although demand for the link is not likely to arise before the 2020s at least.
Melbourne - Brisbane Inland Rail Line	11%	50%	**Beyond 20 Years**	The development of the Inland Rail Line may have merit in the long run as freight volumes between these cities increase. However, previous studies suggest that demand may not be sufficiently high for the line to be viable until at	The Inland Rail Line has been assessed from time to time to assess its potential. The proposal may require a reassessment of freight demand, economic and commercial viability should it be

				least the 2030s. Upgrades to the Hume and Newell Highways and spare rail capacity through Sydney should continue to cater for volumes between Melbourne and Brisbane during the medium term.	revisited in the future.
Moss Vale - Unanderra Freight Line Upgrade	33%♣	50%	**5 to 10 Years**	In lieu of a Maldon-Dombarton Line, upgrades to the Moss Vale-Unanderra, should they be required, could be sufficient to serve projected rail freight demand to and from Port Kembla in the medium term.	Whilst upgrades have some merit, a full assessment is required to confirm the viability of upgrades on the Moss Vale-Unanderra Line in lieu of alternative options.
Northern Sydney Freight Corridor: Stage 2 and 3	31%	75%	**10 to 20 Years**	Works are currently underway to increase capacity on the Main North Line through the first stage of the Northern Sydney Freight Corridor Program. Although the first stage is anticipated to cater for medium term demands, additional capacity enhancements on the corridor may be required by the late 2020s based on the findings of previous studies.	Should demand for freight paths increase faster than anticipated, the Program outlines a set of prioritised works that could be brought forward.
Supporting intermodal terminal road links at Moorebank	33%♣	46%	**5 to 10 Years**	Should Moorebank develop as an intermodal precinct, localised improvements on Moorebank Avenue and the M5 may be required to mitigate congestion and improve local and motorway traffic flows. Other sub-regional improvements may also be warranted.	A detailed demand and economic assessment is required to develop a preferred package of works.

♣ No benefit-cost ratio data available. Initiatives with no cost-benefit ratio data can only achieve a maximum Strategic Objective score of 50 percent.

Table 5.4: Scores: Water

Option	Strategic Objective Score	Infrastructure NSW Project Assurance Objective Score	Assigned Timeframe for Development	Strategic Assessment	Project Assurance Assessment
Hawkesbury-Nepean Valley: Flood Mitigation Measures	81%	67%	**0 to 5 Years**	Various options have been developed by the NSW Government over time to prevent the occurrence of major flood events within the Hawkesbury-Nepean flood plain, and when they do occur, the damage caused by such floods. Given the significant economic and social impact of major flood events, there is significant merit in developing options aimed at mitigating against extreme flood events.	Further option development, costing, flood modelling and economic assessments are worthwhile pursuing to confirm the benefits of flood mitigation within the Hawkesbury-Nepean flood plain. The disparate nature of flood management in NSW may require remediation to ensure that strategies are optimised and can be properly executed.
Hunter Water Supply Augmentation	42%♣	38%	**5 to 10 Years**	Water supplies in the Hunter have proven to be vulnerable to drought events. With a decision not to proceed with Tillegra Dam, there is a need to consider alternative options to augment current water supplies.	The Interim Drought Management Plan and the Lower Hunter Water Plan are currently in development. The completion of these plans should provide greater policy direction and options to pursue upon completion. Although a cost-effectiveness assessment has been undertaken previously, a comprehensive cost benefit analysis is required to optimise option selection, project timing and account for externalities.
Sydney Metropolitan Water Supply Augmentation	31%♣	21%	**10 to 20 Years**	Although recent works have significantly enhanced Sydney's water supply and its resilience to drought events, continued growth is likely to necessitate supply increases to ensure that capacity continues to meet demand.	A review of the 2010 Metropolitan Water Plan is currently underway. Opportunities exist to plan for future water capacity augmentation as part of this plan.

♣ No benefit-cost ratio data available. Initiatives with no cost-benefit ratio data can only achieve a maximum Strategic Objective score of 50 percent.

Figure 5.1: Roads and Motorways Multi-Criteria Analysis Map

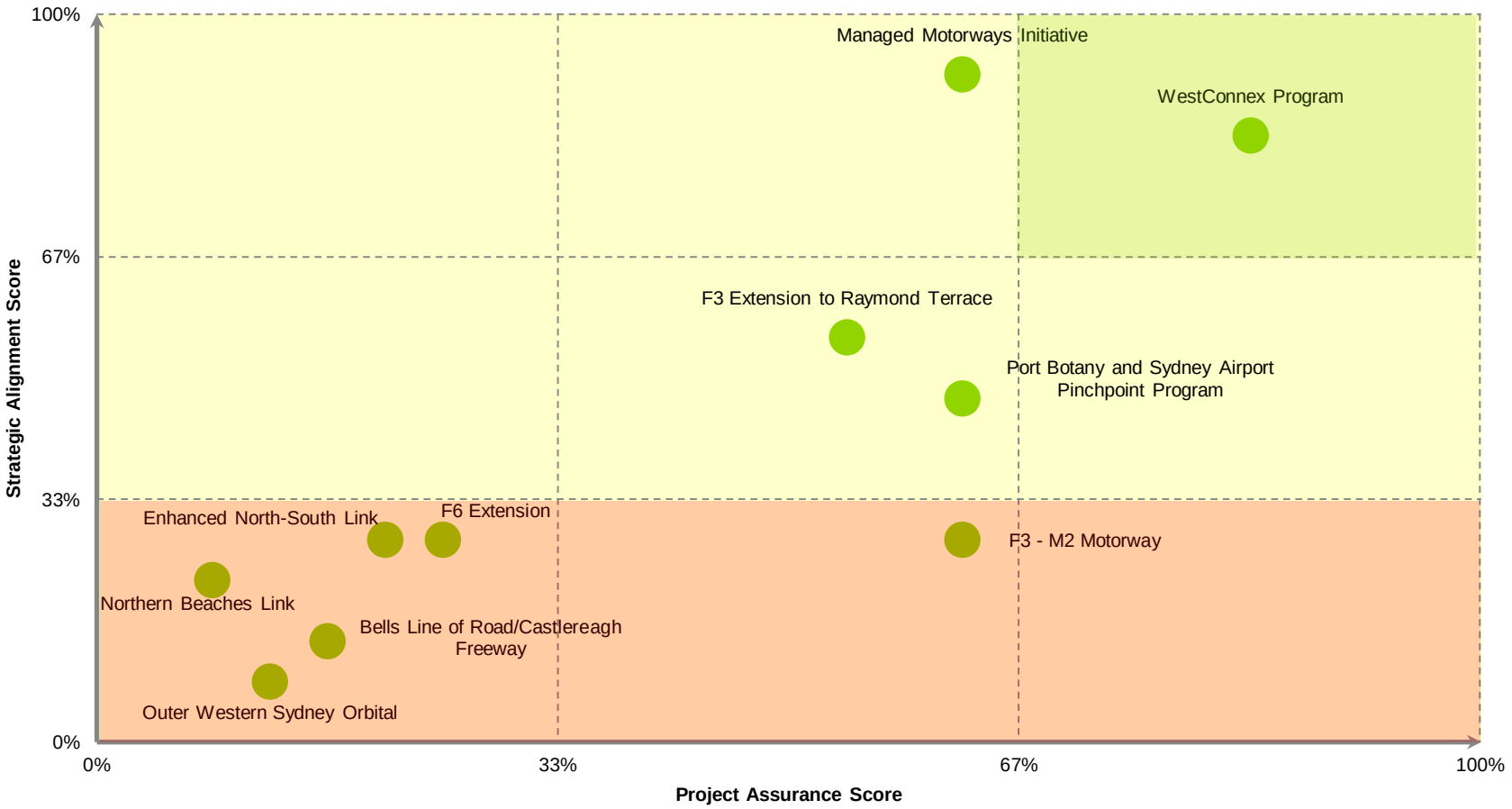


Figure 5.2: Public Transport Multi-Criteria Analysis Map

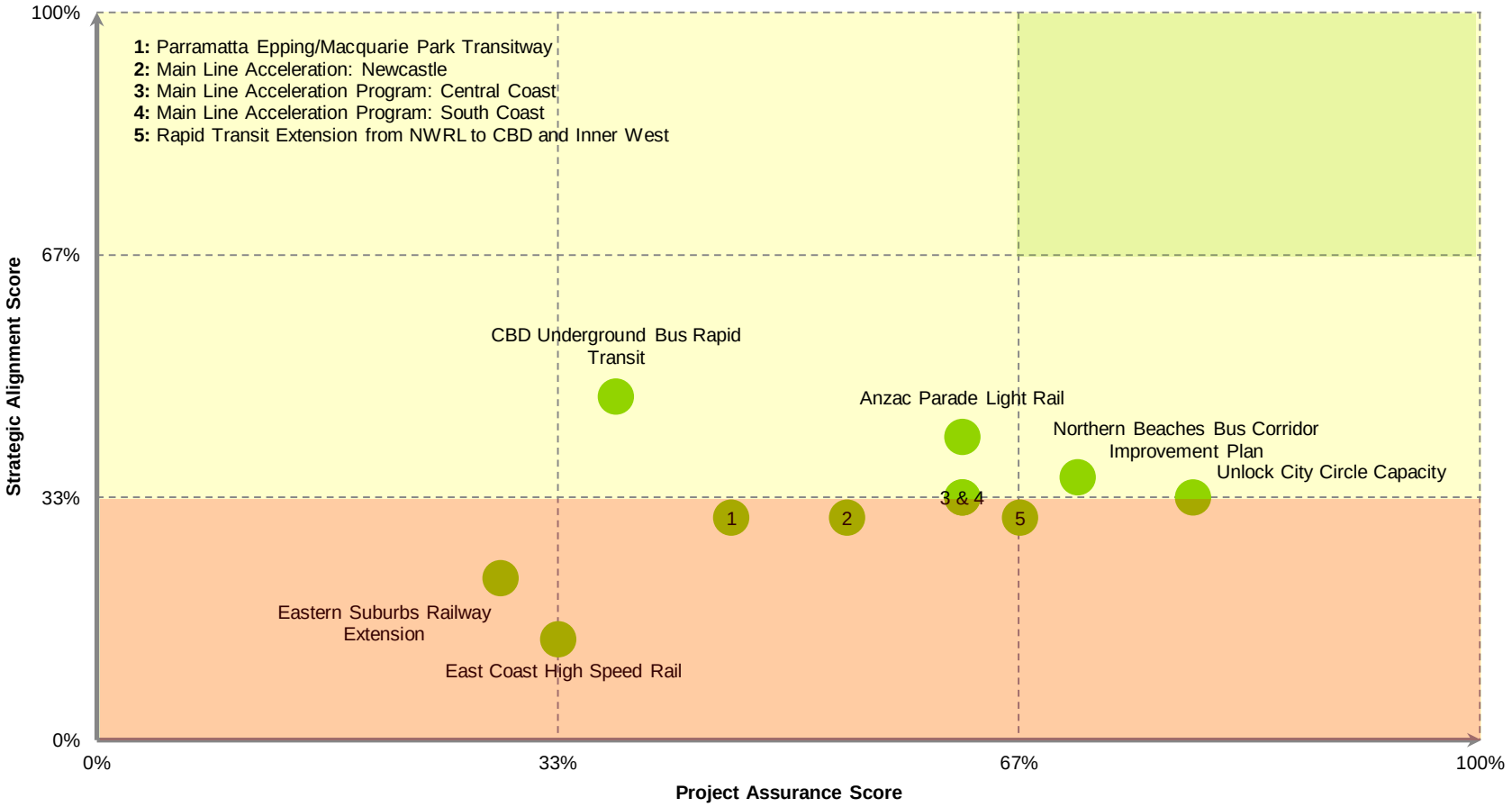


Figure 5.3: Freight Multi-Criteria Analysis Map

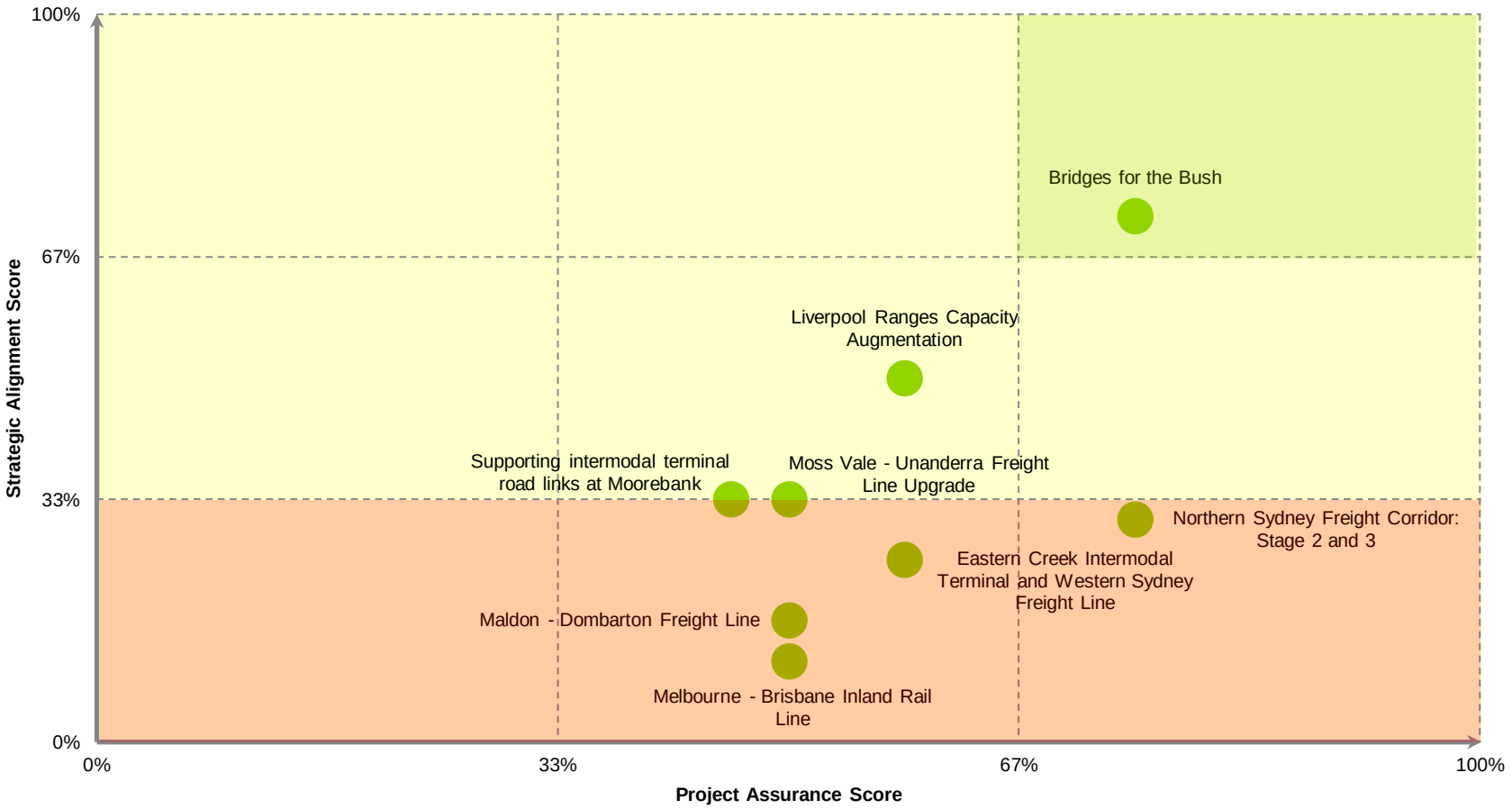
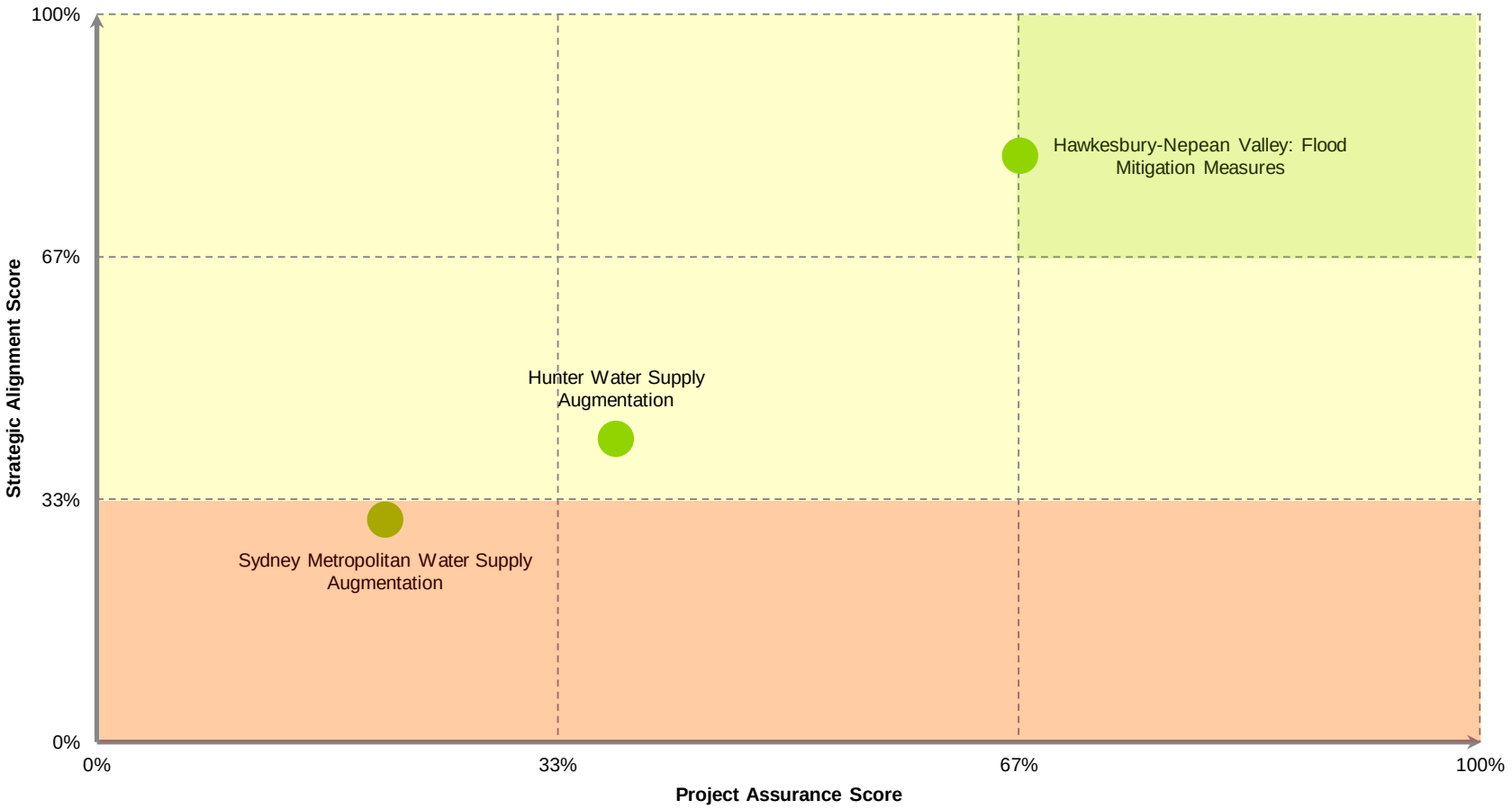


Figure 5.4: Water Multi-Criteria Analysis Map



6 Recommendations

6.1 Approach

Using a multi-criteria assessment framework, the State Infrastructure Strategy Prioritisation Assessment assessed a range of identify and prioritise a number of investment options that have been identified as being major investments but are yet to be committed to by the NSW Government. The options were assessed against two key objectives:

The Strategic Objective:	Does the option have the potential to align well with Infrastructure NSW's investment criteria and provide a value for money solution?
The Infrastructure NSW Project Assurance Objective:	Based on the level of planning and analysis undertaken to date, is there a sufficiently high level of confidence to proceed to the next stage of Project Assurance?

Each option was assessed against identified criteria corresponding to the two objectives. With one exception, weights have been evenly spread across all criteria but to emphasise the need for investments to be economically efficient, half of the Strategic Objective score has been allocated to the economic efficiency criteria with the remaining weight spread evenly across all other criteria.

Based on the Strategic Objective score and the Infrastructure NSW Project Assurance score, options were assigned to one of three classes:

- Short Term (0 to 5 Years)
- Medium Term (5 to 10 Years)
- Long Term (10 to 20 Years or Beyond 20 Years).

A suggested timing is implied by each of these classes. For options classed as 'Short Term', these options are recommended for commencement as soon as practical and if this is not possible within the next 5 years. Projects classed as 'Medium Term', these projects require some additional feasibility work to confirm strategic fit and are earmarked for potential development within a 5 – 10 year window. Other projects are not considered of high priority but could be re-scoped or reconsidered at a later stage were classed as 'Long Term'.

6.2 Recommendations

Table 6.1 summarises the classification given to each option by sector area.

Table 6.1: Summary of Strategy Prioritisation Assessment Recommendations

Sector	Short Term (0 – 5 Years)	Medium Term (5 – 10 Years)	Long Term (10 – 20 Years)	Long Term (Beyond 20 Years)
Roads and Motorways	WestConnex Program	F3 Extension to Raymond Terrace Managed Motorways Initiative Port Botany and Sydney Airport Pinchpoint Program[6]	F3 - M2 Motorway F6 Extension	Bells Line of Road/Castlereagh Freeway Enhanced North-South Link Northern Beaches Link Outer Western Sydney Orbital
Public Transport		Anzac Parade Light Rail CBD Underground Bus Rapid Transit Main Line Acceleration Program: Central Coast Northern Beaches Bus Corridor Improvement Plan Unlock City Circle Capacity Main Line Acceleration Program: South Coast	Main Line Acceleration: Newcastle Parramatta Epping/Macquarie Park Transitway Rapid Transit Extension from NWRL to CBD and Inner West	East Coast High Speed Rail Eastern Suburbs Railway Extension
Freight	Bridges for the Bush	Liverpool Ranges Capacity Augmentation Moss Vale - Unanderra Freight Line Upgrade Supporting intermodal terminal road links at Moorebank	Eastern Creek Intermodal Terminal and Western Sydney Freight Line Maldon - Dombarton Freight Line Northern Sydney Freight Corridor: Stage 2 and 3	Melbourne - Brisbane Inland Rail Line
Water	Hawkesbury-Nepean Valley: Flood Mitigation Measures	Hunter Water Supply Augmentation	Sydney Metropolitan Water Supply Augmentation	

[6] The program identifies a number of measures which appear to have a strong case for their implementation. However, due to the lack of available information relating to their traffic and economic impact, it has not been possible to score this group of projects highly at this stage. However, should a strong economic case for individual measures become available, it is likely that they could require implementation within a 0 to 5 year period. Moreover, given the limited capital requirements of some measures, these schemes could be implemented relatively quickly.

6.3 Caveats

Although the multi-criteria analysis framework provides significant flexibility in prioritising projects without necessarily requiring significant levels of analysis or data, the recommendations presented in this report should be considered in line with the following perspectives:

- The subjective nature of multi-criteria analysis may mean that some scores and rankings may not accord with the view of individual stakeholders and policymakers
- The scoring is based on information available at the time of assessment. New or revised information and analysis may impact on the prioritisation suggested in this report
- Changes in policy stances, planning, population and economic activity over time will impact on the relative merits of projects
- The prioritisation assessment does not negate a requirement for business cases to be prepared and should be seen as part of a process in the preparation of individual business cases for each option in order to confirm economic efficiency, test alternative options, assess project risks and consider the financial and commercial delivery of the option.

Although the Prioritisation Assessment is an important step towards identifying a potential 'pipeline' of works, there are a number of project specific considerations, which are no less important, that need to be considered in identifying a 'pipeline'. The Prioritisation Process is a best estimate as to when the identified infrastructure options will be needed with reference to whether or not options are likely to meet strategic needs. Other issues that may need to be considered prior to finalising a pipeline of works include:

- **Constructability:** it may be considered desirable to defer or stage projects to reduce 'crowding out' effects and provide the private sector greater visibility with respect to future resourcing needs
- **Dependencies:** some options may require other events or infrastructure to be developed first before they become viable to develop
- **Availability of funding:** ultimately, infrastructure is funded by taxpayer or users, or a combination of the two. How far each group is unwilling (or willing) to accept higher taxes, reallocated spending or user prices, some of the priorities may need to be delivered later (or sooner) than recommended
- **Lead time:** options will vary in the level of future planning and design required to bring them to a 'ready to proceed' stage. Invariably, options that may be assigned as a high priority may take many months or years to complete the necessary planning whilst options of a lower priority may require less planning work. Accordingly, the staging of options in the pipeline may differ from the Prioritisation Assessment
- **Detailed business case:** all recommended options will require detailed business case analysis to be undertaken in order to demonstrate their viability and minimise delivery risk prior to their implementation.

7 General Use Restriction

This report is prepared solely for the use of Infrastructure NSW. This report is not intended to and should not be used or relied upon by anyone else and we accept no duty of care to any other person or entity. The report has been prepared for the purpose set out in our engagement letter dated 3 May 2012. You should not refer to or use our name or the advice for any other purpose.

Appendix A Potential Projects

Project	Bells Line of Road/Castlereagh Freeway			
Sector	Roads and Motorways			
Scores	**Strategic Objective**		**Infrastructure NSW Project Assurance Objective**	
	14%♣		17%	
Recommended Timing *based on the Strategy Prioritisation Process*	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**
Description	Development of an extension of the M2/M7 corridor west towards Richmond and the Blue Mountains and upgrade of the Bells Line of Road.			
Current and emerging issues	• Both the Great Western Highway and the Bells Line of Road restrict the movement of high productivity freight vehicles • The Great Western Highway limits the movement of over height freight vehicles and long combinations (19m plus B-doubles) • The Bells Line of Road also limits the movement of long combinations.			
Potential project benefits	• A redevelopment of the Bells Line of Road would potentially facilitate the introduction of higher productivity freight vehicles between Western NSW and Sydney • Improved road safety outcomes • A future extension of the Bells Line of Road to the M7 could facilitate economic development in north western Sydney.			
Strategic Assessment	In light of low demand and current works aimed at upgrading the Great Western Highway, a major upgrade of the Bells Line of Road is not warranted at this stage. Future developments in the Hawkesbury and in Western NSW may prompt a need for an upgrade and extension of the road to the M7.			
Project Assurance Assessment	Further work is necessary to identify what investments are necessary to support future freight movements to and from Western NSW and improved road safety. These works may also need to consider whether these investment can be delivered in a cost-effective manner.			

♣ No benefit-cost ratio data available. Initiatives with no cost-benefit ratio data can only achieve a maximum Strategic Objective score of 50 percent.

Project	Enhanced North-South Link
Sector	Roads and Motorways

Scores	**Strategic Objective**	**Infrastructure NSW Project Assurance Objective**
	28%♣	21%

Recommended Timing *based on the Strategy Prioritisation Process*	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**

Description	Northern extension of the Inner West Bypass from Camperdown to Rozelle and the development of a new north-south link between Rozelle and the M2.
Current and emerging issues	• Current arterial and motorway links into Sydney CBD already operate at close to capacity during peak periods • Further residential and commercial developments close to the City will place extra demands on the arterial and sub-arterial road network.
Potential project benefits	• Travel time savings and improved reliability along Victoria Road which operate at close to capacity during peak periods east of the Gladesville Bridge • Opportunities to reallocate road space along Victoria Road for public transport services • Improve amenity and reduce severance of communities along Victoria Road • Potential to promote redevelopment of town centres including Drummoyne and Rozelle • Potential to supplement existing Harbour crossings, which also operate at close to capacity during peak periods.
Strategic Assessment	As spare road capacity across Sydney Harbour is exhausted, new road crossings may be required. The Enhanced N-S Link is one option that has the potential to provide additional cross harbour road capacity that could both bypass the CBD and provide relief on a number of inner city arterial roads.
Project Assurance Assessment	A preliminary assessment is necessary to assess the demand, cost and economic outcomes of such an extension against other alternatives.

♣ No benefit-cost ratio data available. Initiatives with no cost-benefit ratio data can only achieve a maximum Strategic Objective score of 50 percent.

Project	F3 - M2 Motorway
Sector	Roads and Motorways

Scores	**Strategic Objective**	**Infrastructure NSW Project Assurance Objective**
	28%	63%

Recommended Timing *based on the Strategy Prioritisation Process*	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**

Description	Development of a motorway link connecting the F3 Freeway and the Sydney Orbital.
Current and emerging issues	• The missing motorway link between the Sydney Orbital and the F3 remains one of few parts of the National Highway network between Brisbane, Sydney and Melbourne with traffic lights • The current arterial road has 22 sets of traffic signals and is congested during peak periods • Increasing traffic volumes including heavy trucks travelling day and night impacting on urban amenity along the route • Current proposals require the development of a long tunnel, increasing construction costs.
Potential project benefits	• Completion of a motorway grade bypass of Sydney • Improved connectivity for freight traffic moving into and out of Sydney • Improved road safety and amenity on Pennant Hills Road.
Strategic Assessment	The completion of the link would provide a motorway grade alignment for intercity movements through Sydney. Although travel time savings and travel cost savings are notable, particularly for freight, the high capital costs associated with developing the proposed tunnel alignment impacts adversely on the viability of the link.
Project Assurance Assessment	Further work to progress the development of the link was proposed by the Commonwealth Government.

Project	F3 Extension to Raymond Terrace
Sector	Roads and Motorways

Scores	**Strategic Objective**	**Infrastructure NSW Project Assurance Objective**
	56%	54%

Recommended Timing *based on the Strategy Prioritisation Process*	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**
		■		

Description	Development of a missing link connecting the F3 Freeway with the Raymond Terrace Bypass. The current concept design allows for: • 15km of grade separated dual carriageway between the F3 and Raymond Terrace • A new bridge over the Main North Line, the New England Highway and the Hunter River • Bypass of Heatherbrae.
Current and emerging issues	• The existing traffic route follows John Renshaw Drive and the New England Highway before joining the Pacific Highway, increasing travel times, vehicle operating costs and accidents • Existing traffic routes, which also cater for increasing levels of local traffic, are likely to experience higher levels of congestion and reduced local amenity • The F3 to Raymond Terrace link is not funded under the existing Pacific Highway Upgrade Program.
Potential project benefits	• Reduced travel times, vehicle operating costs and accidents • Improved amenity in localities including Heatherbrae, Black Hill and Beresfield • Greater separation of north-south (along the Pacific Highway) and east-west (along the New England Highway) traffic.
Strategic Assessment	The proposed link is not currently encompassed within the Pacific Highway Upgrade Program despite catering for relatively high volumes of traffic. The need for an elevated structure over the Hunter River contributes to the scheme's high costs, impacting on the economic viability of the scheme.
Project Assurance Assessment	A preferred alignment and concept design has been identified. However, the proposal may warrant detailed design and demand assessment to inform a final business case.

Project	F6 Extension
Sector	Roads and Motorways

Scores	**Strategic Objective**	**Infrastructure NSW Project Assurance Objective**
	28%♣	25%

Recommended Timing ***based on the Strategy Prioritisation Process***	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**

Description	Development of a motorway link between the Sydney Orbital southwards to the Sutherland Shire and the F6 to the Illawarra.
Current and emerging issues	• No direct motorway link between Sydney, Sutherland Shire and the Illawarra • Current road corridors are operating at or close to capacity • Current road corridors traverse through residential areas, reducing local amenity.
Potential project benefits	• Improved access to Sydney CBD, Sydney Airport, Port Botany, Sutherland Shire and the Illawarra • Provision of a major alternative road corridor to the Princes Highway • Reduced travel times.
Strategic Assessment	The development of the F6 Extension would connect Sydney with the Illawarra with a motorway standard road. No work has been undertaken to highlight the benefits of developing the extension although road reservations are in place to preserve the option to build the extension should it prove viable.
Project Assurance Assessment	No business case has been prepared for an extension of the F6 Freeway. A preliminary assessment of the corridor's potential will need to be prepared to progress the case for the development of the F6 Freeway.

♣ No benefit-cost ratio data available. Initiatives with no cost-benefit ratio data can only achieve a maximum Strategic Objective score of 50 percent.

Project	Managed Motorways Initiative
Sector	Roads and Motorways

Scores	**Strategic Objective**	**Infrastructure NSW Project Assurance Objective**
	92%	63%

Recommended Timing *based on the Strategy Prioritisation Process*	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**
		■		

Description	Implementation of smart technology and infrastructure measures to increase the efficiency and capacity of the Sydney motorway network. Potential measures include: • Coordinated on-ramp signalling • Variable speed limits • Lane control • Incident detection • Travel information • Closed circuit television surveillance.
Current and emerging issues	• Many key motorways across Sydney operate close or at capacity during most hours of the day, leading to greater stop-start driving and increasing the vulnerability of the network to minor incidents.
Potential project benefits	• Reduced traffic disruptions by better managing merging and altering travel speeds • Improved incident response, reducing delays associated with major incidents • Improved provision of information to road users, reducing frustration and better informing route choice • Real potential for travel time savings and improved reliability.
Strategic Assessment	Managed motorway initiatives have real potential to provide a cost-effective solution aimed at improving the efficiency of traffic flows, incident response and provide real time information to motorists during the short to medium term. In some locations, managed motorways may defer the need to add road capacity, which can be difficult and expensive to provide.
Project Assurance Assessment	Prioritisation undertaken as part of the initiative has identified corridors where managed motorway initiatives are likely to have the greatest impact. Prioritisation and assessment may need to be ongoing to determine the need and timing of expanding the initiative across the Sydney motorway network.

Project	Northern Beaches Link
Sector	Roads and Motorways

Scores	**Strategic Objective**	**Infrastructure NSW Project Assurance Objective**
	22%♣	8%

Recommended Timing ***based on the Strategy Prioritisation Process***	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**

Description	Development of a motorway link between the Warringah/Gore Hill Freeway and The Spit.
Current and emerging issues	• The Pittwater Road - Military Road corridor has been identified as the second slowest commuter route in Sydney • Existing routes are congested, leading to low travel speeds and high travel time variability on both public transport and by car • The corridor experiences heavy congestion during peak periods as well as on weekends and public holidays • The corridor has a number of competing demands including parking for local businesses as well as catering for both public transport and car flows.
Potential project benefits	• Relieving congestion on existing thoroughfares including Military Road and Spit Road • Acts as a catalyst for urban regeneration along Military Road and facilitate developments elsewhere on the Peninsula e.g. Frenchs Forest • Open opportunities to reallocate surface road space for public transport and reroute express bus services through the motorway corridor.
Strategic Assessment	With existing roads operating at capacity, a Northern Beaches Link could significantly reduce travel times and improve reliability, improving amenity along Military Road and improving connectivity to the Northern Beaches. However, higher growth pressures and gateway capacity needs elsewhere in Sydney may mean a motorway link may not be a priority concern. Solutions are likely to involve tunnelling, the high cost of which will impact on the Link's potential viability.
Project Assurance Assessment	Whilst proposals to provide a motorway grade link to the Northern Beaches have been suggested over time, no formal business case by government has been prepared to date. A multimodal assessment is likely to be required to avoid duplicating transport capacity given current intentions to upgrade public transport links to the Northern Beaches.

♣ No benefit-cost ratio data available. Initiatives with no cost-benefit ratio data can only achieve a maximum Strategic Objective score of 50 percent.

Project	Outer Western Sydney Orbital
Sector	Roads and Motorways

Scores	**Strategic Objective**	**Infrastructure NSW Project Assurance Objective**
	8%♣	13%

Recommended Timing *based on the Strategy Prioritisation Process*	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**

Description	Development of a motorway ring road through Outer Western Sydney between north-western and south-western Sydney via Penrith.
Current and emerging issues	• As Outer Western Sydney develops, the need will grow to provide motorway standard connections across the region to cater for residential development and freight movements • There exists a need to identify and secure a corridor before development begins to encroach on the corridor • Linkages to the Central Coast, Newcastle and the North are susceptible to major disruptions to major incidents (e.g. accidents and bushfires) with only one major transport corridor available.
Potential project benefits	• Improved access between Western Sydney and the Central Coast • Improved cross-regional access through Western Sydney • May serve as an alternative high capacity access route to the Central Coast.
Strategic Assessment	The Outer Sydney Orbital is a potential corridor that would provide motorway standard access through Outer Western Sydney as this region develops. In the medium term, alternative options such as widening the M7 and developing the F3-M2 links may prove to be more viable.
Project Assurance Assessment	No formal planning has been instigated. Corridor planning will be required to determine a preferred corridor. Other alignments including the M2-F3 and M7-F3 corridors may provide alternative solutions.

♣ No benefit-cost ratio data available. Initiatives with no cost-benefit ratio data can only achieve a maximum Strategic Objective score of 50 percent.

Project	Port Botany and Sydney Airport Pinchpoint Program
Sector	Roads and Motorways

Scores	**Strategic Objective**	**Infrastructure NSW Project Assurance Objective**
	47%♣	63%

Recommended Timing *based on the Strategy Prioritisation Process*	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**

Description	Program of short to medium term measures aimed at addressing acute road network constraints within the vicinity of Port Botany and Sydney Airport. Potential measures include: • Introduction of one-way "pairs" on Bourke Street and O'Riordan Street • Parking for container trucks • Widening key arterial roads • Grade separation of congested junctions • Bus priority measures.
Current and emerging issues	• Road links in and around the airport and port are heavily congested and cater for a variety of competing demands • Anticipated residential and commercial redevelopment between the city and the airport will increase demands on the road network.
Potential project benefits	• Reduced congestion and improved reliability • Improved motorway and arterial road connectivity • Greater separation between passenger vehicle traffic and freight traffic • Potential to facilitate future public transport service provision • Potential to facilitate proposed residential and commercial development.
Strategic Assessment	The implementation of a pinchpoint program offers the potential to provide short term relief on a number of arterial roads around Sydney Airport and Port Botany. The Program could also contribute to facilitating developments between the City and Sydney Airport. The program identifies a number of measures which appear to have a strong case for their implementation. However, due to the lack of available information relating to their traffic and economic impact, it has not been possible to score this group of projects highly at this stage.
Project Assurance Assessment	Feasibility analysis and prioritisation is required to identify and implement works that are likely to deliver benefits on a cost-effective basis. However, should a strong economic case for individual measures become available, it is likely that they could require implementation within a 0 to 5 year period. Moreover, given the limited capital requirements of some measures, these schemes could be implemented relatively quickly.

♣ No benefit-cost ratio data available. Initiatives with no cost-benefit ratio data can only achieve a maximum Strategic Objective score of 50 percent.

Project				WestConnex Program
Sector				Roads and Motorways
Scores	**Strategic Objective**		**Infrastructure NSW Project Assurance Objective**	
	83%		83%	
Recommended Timing *based on the Strategy Prioritisation Process*	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**
				
Description	Integrated development of the M4 Extension, M5 East Expansion and part of the Inner West Bypass. The Program aims to improve connections to Sydney's international gateways, Sydney Airport and Port Botany. The Reference Scheme includes: • Upgrades to the existing M4 between Parramatta and Strathfield • M4 Extension to Camperdown • Inner West Bypass between Camperdown and the M5 East at Marsh Street • Duplication of the M5 East tunnels between Bexley Road and Marsh Street • Widening of the M5 East between Bexley Road and King Georges Road.			
Current and emerging issues	• Access to Sydney CBD, Inner Sydney, Sydney Airport and Port Botany is impeded by high levels of congestion • The M4 and M5 Motorways operate at capacity for at least 13 hours per day • Limited spare road capacity exists to cater for future activity within the CBD, airport and port • Previous proposals to extend the M4 and expand the M5 have been characterised by issues relating to inadequate connections to the existing road network and affordability.			
Potential project benefits	• Potential for significant improvements in travel times and reliability to key centres including Sydney CBD, Sydney Airport and Port Botany • Provide significant congestion relief on the existing M4, Parramatta Road and M5 East • Provide a direct route between Western Sydney and the CBD, the airport and the port • Acts as a catalyst for urban redevelopment on key arterials and corridors within inner Sydney.			
Strategic Assessment	The WestConnex Program has significant potential to expand capacity to serve growing activity within Inner Sydney, in particular Sydney CBD, inner Sydney and its international gateways and improve road connections to Western Sydney. Even allowing for the high costs of construction, the scheme is projected to deliver economic returns in excess of its costs.			
Project Assurance Assessment	Significant analysis and planning has been undertaken to develop the Program to a concept stage. Future planning regarding design, staging and funding is likely to be required. The complexity of the Program may require the Program to be developed in stages to manage delivery and risk.			

Project	Anzac Parade Light Rail
Sector	Public Transport

Scores	**Strategic Objective**	**Infrastructure NSW Project Assurance Objective**
	42%♣	63%

Recommended Timing *based on the Strategy Prioritisation Process*	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**
		■		

Description	Development of a surface light rail corridor between Central, Moore Park and UNSW via Anzac Parade.
Current and emerging issues	• Anzac Parade is a major public transport corridor, operating at or over capacity during peak periods • For trips towards key generators (e.g. UNSW) in peak periods, normal service and special event bus operations struggle to provide capacity to move large volumes of passengers, resulting in lengthy waiting times during the morning and evening peaks • With limited bus priority, the reliability and speed of bus services are subject to congestion.
Potential project benefits	• Potential to reduce travel times and improve reliability of public transport services within by between 10 – 20 minutes during peak periods and improve the reliability of bus operations • Increased capacity to cater for large crowds moving to and from UNSW, Randwick Racecourse, SCG/Aussie Stadium/Fox Studios • Improve accessibility to Randwick and the Prince of Wales Hospital • Potential enabler of development along Anzac Parade.
Strategic Assessment	The development of light rail along Anzac Parade could better facilitate the movement of large crowds to educational and entertainment precincts located along the corridor.
Project Assurance Assessment	A feasibility study of light rail operations along Anzac Parade is currently being prepared. The study will assess whether light rail is viable and identify a preferred alignment.

♣ No benefit-cost ratio data available. Initiatives with no cost-benefit ratio data can only achieve a maximum Strategic Objective score of 50 percent.

Project	CBD Underground Bus Rapid Transit
Sector	Public Transport

Scores	**Strategic Objective**	**Infrastructure NSW Project Assurance Objective**
	47%♣	38%

Recommended Timing ***based on the Strategy Prioritisation Process***	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**
		■		

Description	Development of a dedicated bus tunnel between the Harbour Bridge and Town Hall with new bus terminals at Wynyard and Town Hall. Possible connections with the Cross City Tunnel to cater for east-west bus movements.
Current and emerging issues	• Key bus corridors through Sydney CBD are operating at or over capacity • Hence, there are significant constraints on the ability to increase public transport capacity or improve travel speeds using conventional bus services • Limited road space significantly impacts on the reliability and travel times of bus services operating to and from the city. Surveys previously undertaken by Sydney Buses suggest that buses can take up to 45 minutes to travel between Circular Quay and Central during peak periods • The need to spread bus services across a number of bus corridors to increase capacity reduces the legibility of the bus network • Dependence on a high number of bus services reduces pedestrian safety and amenity of the city centre.
Potential project benefits	• Potential to reduce travel times by between 10 – 20 minutes during peak periods and improve the reliability of bus operations • Reduced conflicts between cars, pedestrians and cyclists • Improved network legibility and integration with CityRail services • Opportunities to redevelop at-street space (possible full pedestrianisation of George St) • Reduced bus operating costs.
Strategic Assessment	High level investigations indicate that a CBD bus tunnel has the potential to reduce travel times by between 10 – 20 minutes for bus passengers during peak periods and provide an opportunity to pursue the pedestrianisation of parts of George Street.
Project Assurance Assessment	Further design, demand modelling and planning will be desirable to ensure consistency with city access strategies and to inform pre-feasibility analysis.

♣ No benefit-cost ratio data available. Initiatives with no cost-benefit ratio data can only achieve a maximum Strategic Objective score of 50 percent.

Project	East Coast High Speed Rail
Sector	Public Transport

Scores	**Strategic Objective**	**Infrastructure NSW Project Assurance Objective**
	14%♣	33%

Recommended Timing ***based on the Strategy Prioritisation Process***	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**

Description	Proposed high speed rail network along the east coast of Australia connecting Brisbane, Newcastle, Sydney, Canberra and Melbourne.
Current and emerging issues	• Intercity public transport links along the eastern seaboard are uncompetitive compared to car due to higher costs and longer travel times • Public transport capacity will become constrained with increasing demand from competing rail freight services and competing suburban services within urban areas • With a formal decision regarding the site of Sydney's second airport yet to be determined, HSR is perceived by some as providing an alternative option to additional aviation capacity • Increasing cost of land has been argued as a potential barrier to HSR should it prove viable in the future.
Potential project benefits	• Economic development of regional centres may be enhanced by the provision of HSR • Potential to defer development of aviation capacity • Externality benefits such as local air pollution, noise, accidents and greenhouse gas emissions, road congestion could all be reduced as a result of HSR.
Strategic Assessment	The high cost of high speed rail is a key constraint in progressing its development. The economic case for high speed rail is dependent on the emergence of technology to significantly reduce travel times to a level where it is a viable alternative to air travel.
Project Assurance Assessment	A final study, due to be completed this year, will identify a preferred alignment and the projected economic and financial resources required to realise an East Coast high speed rail network.

♣ No benefit-cost ratio data available. Initiatives with no cost-benefit ratio data can only achieve a maximum Strategic Objective score of 50 percent.

Project	Eastern Suburbs Railway Extension
Sector	Public Transport

Scores	**Strategic Objective**	**Infrastructure NSW Project Assurance Objective**
	22%♣	29%

Recommended Timing ***based on the Strategy Prioritisation Process***	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**

Description	Southern extension of the Eastern Suburbs rail line beyond its current terminus at Bondi Junction to Maroubra Junction via Randwick.
Current and emerging issues	• The Eastern Suburbs Line is the least utilised in terms of the proportion of seats utilised during peak periods due to its short length • Buses experience significant congestion during peak periods, reducing reliability and increasing travel times • The scope and effectiveness of increasing bus service frequency is limited due to downstream congestion and 'bus bunching'.
Potential project benefits	• Travel time savings of between 5 and 20 minutes for passengers travelling to Sydney CBD • Significant uplift in public transport capacity across multiple corridors to the city • Provision of cross regional mass transit through the Eastern Suburbs • Potential to improve the utilisation of the current bus fleet by diverting bus services that would otherwise be caught in downstream congestion • Potential to promote redevelopment at key centres including Kingsford, Randwick and Maroubra
Strategic Assessment	A mass transit option has merit for further assessment. However, a multimodal analysis, taking into account alternative solutions including light rail to ensure capacity is not duplicated is required.
Project Assurance Assessment	A range of studies including option generation, costing, operational, demand and economic assessment are required to progress this proposal. The viability of the proposal is likely to depend on future land use planning.

♣ No benefit-cost ratio data available. Initiatives with no cost-benefit ratio data can only achieve a maximum Strategic Objective score of 50 percent.

Project	Main Line Acceleration Program: Central Coast			
Sector	Public Transport			
Scores	**Strategic Objective**		**Infrastructure NSW Project Assurance Objective**	
	33%♣		63%	
Recommended Timing ***based on the Strategy Prioritisation Process***	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**
		■		
Description	Program of operational reforms and minor infrastructure works aimed at increasing service speeds along the Central Coast and Newcastle Line. Possible initiatives include: • Revised timetabling with additional express services • Signalling, track and alignment upgrades to reduce travel times.			
Current and emerging issues	• Average intercity train speeds are relatively low at between 50-60km/h • Limited capacity in terms of paths and seats as well as low speeds constrain passenger growth and places pressure on the F3 Freeway • The V-set fleet, which are currently used to provide intercity rail services between Sydney and the Central Coast are close to the end of their economic life.			
Potential project benefits	• Potential to reduce travel times from key centres on the Central Coast • Reduced road congestion on the F3 Freeway • Potential to increase connectivity to employment opportunities in Sydney • Opportunities to jointly consider the replacement of the V-Set fleet with below-rail infrastructure improvements to optimise costs and benefits.			
Strategic Assessment	Previous work on improving regional links to the Central Coast highlight significant challenges in undertaking major infrastructure works to significantly reduce travel times. Changes in stopping patterns combined with minor works may provide potential to reduce travel times cost effectively. In the short to medium term, works being carried out as part of the Northern Sydney Freight Corridor Project could provide improvements for passenger rail services.			
Project Assurance Assessment	A range of studies including option generation, costing, operational, demand and economic assessment are required to progress this proposal. The proposal may influence future works proposed under the Northern Sydney Freight Corridor Program.			

♣ No benefit-cost ratio data available. Initiatives with no cost-benefit ratio data can only achieve a maximum Strategic Objective score of 50 percent.

Project	Main Line Acceleration Program: South Coast
Sector	Public Transport

Scores	**Strategic Objective**	**Infrastructure NSW Project Assurance Objective**
	33%♣	63%

Recommended Timing *based on the Strategy Prioritisation Process*	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**

Description	Program of operational reforms and minor infrastructure works aimed at increasing service speeds along the South Coast Line. Possible initiatives include: • Revised timetabling with additional express services • Signalling, track and alignment upgrades to reduce travel times.
Current and emerging issues	• Average intercity train speeds are relatively low at between 50-60km/h • Limited capacity in terms of paths and seats as well as low speeds constrain passenger growth and places pressure on the F6 Freeway and the Princes Highway.
Potential project benefits	• Potential to reduce travel times between the Illawarra and Sydney • Reduced road congestion • Potential to increase connectivity to employment opportunities in Sydney.
Strategic Assessment	Previous work on improving regional links to the Illawarra highlight significant challenges in undertaking major infrastructure works to significantly reduce travel times. Changes in stopping patterns combined with minor works may provide potential to reduce travel times cost effectively. Improving links to the South Coast to link the region to jobs in Sydney is important given the vulnerability of the local steel industry to global market trends.
Project Assurance Assessment	A range of studies including option generation, costing, operational, demand and economic assessment are required to progress this proposal.

♣ No benefit-cost ratio data available. Initiatives with no cost-benefit ratio data can only achieve a maximum Strategic Objective score of 50 percent.

Project	Main Line Acceleration: Newcastle
Sector	Public Transport

Scores	**Strategic Objective**	**Infrastructure NSW Project Assurance Objective**
	31%♣	54%

Recommended Timing *based on the Strategy Prioritisation Process*	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**

Description	Program of operational reforms and minor infrastructure works aimed at increasing service speeds along the Newcastle Line. Possible initiatives include: • Revised timetabling with additional express services • Signalling, track and alignment upgrades to reduce travel times.
Current and emerging issues	• Average intercity train speeds are relatively low at between 50-60km/h • Limited capacity in terms of paths and seats as well as low speeds constrain passenger growth and places pressure on the F3 Freeway • The V-set fleet, which are currently used to provide intercity rail services between Sydney and Newcastle are close to the end of their economic life.
Potential project benefits	• Potential to reduce travel times from key centres located on the Newcastle Line • Reduced road congestion on the F3 Freeway • Potential to increase connectivity between Newcastle and Sydney • Opportunities to jointly consider the replacement of the V-Set fleet with below-rail infrastructure improvements to optimise costs and benefits.
Strategic Assessment	Previous work on improving regional links to the Newcastle highlight significant challenges in undertaking major infrastructure works to significantly reduce travel times. Changes in stopping patterns combined with minor works may provide potential to reduce travel times cost effectively. In the short to medium term, works being carried out as part of the Northern Sydney Freight Corridor Project could provide improvements for passenger rail services.
Project Assurance Assessment	A range of studies including option generation, costing, operational, demand and economic assessment are required to progress this proposal. The proposal may influence future works proposed under the Northern Sydney Freight Corridor Program.

♣ No benefit-cost ratio data available. Initiatives with no cost-benefit ratio data can only achieve a maximum Strategic Objective score of 50 percent.

Project	Northern Beaches Bus Corridor Improvement Plan			
Sector	Public Transport			
Scores	**Strategic Objective**		**Infrastructure NSW Project Assurance Objective**	
	36%		71%	
Recommended Timing *based on the Strategy Prioritisation Process*	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**
		■		
Description	Program of bus priority investments on the Northern Beaches Strategic Bus Corridor aimed at improving the reliability of bus services operating between the Northern Beaches and the City. Measures may include: • Extending bus lane operations into off-peak times and weekends • Additional clip on lanes added to the existing Spit Bridge • Other minor measures aimed at improving bus priority and junction flows.			
Current and emerging issues	• Poor network legibility with a variety of stopping patterns offered to passengers, many of which do not share a common stopping pattern • Bus services are caught in congestion along Spit Road, Military Road and access into Sydney CBD, increasing travel times and reducing reliability of bus services • Without bus priority measures, there is limited or no excess road capacity to increase services during peak periods • Limited opportunities for express buses to bypass all-stop buses without mixing with general traffic.			
Potential project benefits	• Improved travel times and reliability • Improved passenger amenity through improved stations and stops • Opportunities to better streamline stopping patterns and simplify bus routes improve legibility.			
Strategic Assessment	Further bus priority improvements have been shown to have potential in reducing travel times and increasing bus patronage. Future option generation may need to consider how to progress future bus priority measures within a constrained corridor whilst minimising the impact on car users and adjacent property owners.			
Project Assurance Assessment	A prefeasibility study commissioned by TfNSW suggests that a fully segregated bus rapid transit scheme may not be viable. Alternative options including bus priority measures may prove to be more viable.			

Project	Parramatta Epping/Macquarie Park Transitway
Sector	Public Transport

Scores	**Strategic Objective**	**Infrastructure NSW Project Assurance Objective**
	31%♣	46%

Recommended Timing ***based on the Strategy Prioritisation Process***	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**

Description	Proposed busway or light rail link between Parramatta and Epping or Macquarie Park.
Current and emerging issues	• Using current public transport services, it takes one hour to travel between Parramatta and Macquarie Park, limiting connectivity between employment opportunities in the Global Economic Arc and Western Sydney • The Carlingford Line is underutilised and its potential may be better realised through improved connections to key centres including Parramatta and Epping.
Potential project benefits	• Improved access for cross-regional journeys to Sydney's major employment centres and educational institutes (Macquarie University and UWS) • Opportunities to promote economic development outside the CBD • Reduced travel times on cross-regional trips • Reduced crowding on citybound trains by creating opportunities for passengers to avoid travelling into the city • Potential to enhance social inclusion within Western Sydney.
Strategic Assessment	Previous studies have assessed mass transit options without considering in detail alternative hybrid solutions such as busways and light rail. These measures may have potential to provide improved connectivity between the Global Economic Arc and Western Sydney at a lower cost.
Project Assurance Assessment	A range of studies including option generation, costing, operational, demand and economic assessment are required to progress this proposal.

♣ No benefit-cost ratio data available. Initiatives with no cost-benefit ratio data can only achieve a maximum Strategic Objective score of 50 percent.

Project	Rapid Transit Extension from NWRL to CBD and Inner West			
Sector	Public Transport			
Scores	**Strategic Objective**		**Infrastructure NSW Project Assurance Objective**	
	31%		67%	
Recommended Timing *based on the Strategy Prioritisation Process*	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**
Description	Resignalling and introduction of single deck rolling stock on the North Shore Line, Harbour Bridge, and Inner West Lines.			
Current and emerging issues	• Although double deck trains have higher seating capacities, double deck trains are slower to unload and load and cannot accelerate as fast as single deck trains, increasing travel times • The operation of double deck trains does not match well with the needs of inner city train trips, which require trains to operate at high frequencies, fast travel speeds, with multiple doors to board and alight and with ample room to stand • Increasing capacity on services approaching the city from the North Shore will require changes to signalling and rollingstock.			
Potential project benefits	• Maximisation of train capacity across the Sydney Harbour Bridge, with the potential to increase paths from 20 tph up to at least 28tph in each direction and increasing carrying capacity from 24,000 passengers per hour to a target of 40,000 passengers per hour • Increases in Harbour Bridge carrying capacity may defer the need for a second rail harbour crossing • Travel time savings of between 5 – 10 minutes may be achievable with faster single deck operations.			
Strategic Assessment	Resignalling and single deck rollingstock to allow for higher service frequencies and faster travel speeds has been shown to have potential in increasing current cross-harbour capacity. However, metro style services may need to be spread across a number of lines as no one line has sufficient demand to use the capacity that (up to) 30 trains per hour may provide.			
Project Assurance Assessment	Further detailed investigation is required to confirm which lines are most amenable to metro style operations, maximise passenger benefits and minimise operational risks.			

Project	Unlock City Circle Capacity
Sector	Public Transport

Scores	**Strategic Objective**	**Infrastructure NSW Project Assurance Objective**
	33%♣	79%

Recommended Timing *based on the Strategy Prioritisation Process*	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**
		■		

Description	Reconfiguration of junctions and associated works outside Central to allow more services from more lines to access the City Circle without impeding other services.
Current and emerging issues	• Passenger entries and exits are relatively low at Circular Quay, St James and Museum relative to other City Circle stations • Lower train frequencies through these stations contribute to lower usage of these stations • Platform crowding at Town Hall and Wynyard is impacting of the reliability of train services and reducing passenger safety.
Potential project benefits	• Higher service frequencies through the City Circle would contribute to reduced crowding at Town Hall and Wynyard • Reduced platform crowding at Town Hall and Wynyard may defer capital expenditure required to upgrade these stations to handle higher passenger flows.
Strategic Assessment	The Revesby-Kingsgrove Quadruplification and SWRL, which are set for commission before or by 2016, will enable additional services on the East Hills and Airport Line to be scheduled, increasing frequencies through the City Circle. Changes to which lines serve the City Circle may need to be considered in the longer term although should changes occur, the technical, operational and demand implications across the network may require consideration.
Project Assurance Assessment	Increasing service frequencies on lines that serve the City Circle are already planned. However, should services from other lines be diverted to the City Circle, preliminary assessments would need to be commissioned to outline the technical, operational and demand implications.

♣ No benefit-cost ratio data available. Initiatives with no cost-benefit ratio data can only achieve a maximum Strategic Objective score of 50 percent.

Project	Bridges for the Bush
Sector	Freight

Scores	**Strategic Objective**	**Infrastructure NSW Project Assurance Objective**
	72%	75%

Recommended Timing *based on the Strategy Prioritisation Process*	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**
				

Description	Series of programs aimed at upgrading through improvements in condition, geometry and durability of pavements and structure or replacing heritage/timber bridges to enable the HML traffic to use these bridges.
Current and emerging issues	• Portions of the road network not accessible by higher productivity vehicles, particularly "last mile" connections • Currently, 249 bridges have been assessed as unsuitable for HML B-double vehicles • Many parts of the highway network, which are capable of catering for higher productivity vehicles, cannot be enabled for higher productivity vehicles without replacing key bridges • Some bridges are only capable of handling loads of up to 17t, whereas some HML vehicles carry loads of up to 100t • Many bridges require significant ongoing maintenance to maintain current levels of service.
Potential project benefits	• Improved HML access would support the competitiveness for regional NSW industries, contributing to job retention, growth and new investment opportunities • Reduced freight transport costs through improved productivity • Reduced bridge lifecycle costs.
Strategic Assessment	A number of bridges across regional NSW require upgrading or replacement to cater for the increasing freight task and reduce maintenance. The Bridges for the Bush initiative will contribute to increasing freight productivity by increasing allowable mass limits and eliminating the need to take long detours.
Project Assurance Assessment	A package of works has already been identified by RMS and have been assessed for their viability. Further analysis may be necessary to identify and assess future potential upgrades.

Project	Eastern Creek Intermodal Terminal and Western Sydney Freight Line
Sector	Freight

Scores	**Strategic Objective**	**Infrastructure NSW Project Assurance Objective**
	25%	58%

Recommended Timing ***based on the Strategy Prioritisation Process***	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**
			■	

Description	Development of an intermodal terminal at Eastern Creek primarily aimed at serving industrial lands in Outer Western Sydney. The terminal would be complemented by the development of the Western Sydney Freight Line between Eastern Creek and Leightonfield providing dedicated freight access between Eastern Creek and Port Botany.
Current and emerging issues	• Container throughput at Port Botany is expected to continue to grow between 5% and 7% per annum in the next 20 years • Intermodal terminal capacity within Sydney may be exhausted prior to 2021 • Distribution of freight containers within Sydney continues to move west out to Outer Western and South Western Sydney • Intermodal terminal capacity along with supporting rail infrastructure are likely to be highly valued in proximity of already developing industrial areas within the Western Sydney Employment Lands as the area has no dedicated rail link.
Potential project benefits	• Provide a direct path for freight from Western Sydney and Western NSW to Port Botany • Improve reliability for both freight and passenger services by separating freight services from passenger services • Provide additional intermodal terminal capacity to growing industrial lands in Western Sydney • Reduced externalities associated with a shift from road-based to rail-based freight distribution.
Strategic Assessment	With industrial activity intensifying within Outer Western Sydney, an intermodal terminal at Eastern Creek would complement this activity. Preliminary investigation suggest that the development of the WSFL and an Eastern Creek intermodal terminal is worthy of further consideration and would contribute to reducing the growth in truck movements between the Port and Western Sydney.
Project Assurance Assessment	New investigations are required to lock down a site and the associated rail corridor. Furthermore, costings may need to be reassessed to confirm economic and commercial returns.

Project	Liverpool Ranges Capacity Augmentation
Sector	Freight

Scores	**Strategic Objective**	**Infrastructure NSW Project Assurance Objective**
	50%	58%

Recommended Timing *based on the Strategy Prioritisation Process*	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**

Description	Duplication of the Main North Line at Ardglen to increase track capacity through the Liverpool Ranges
Current and emerging issues	• With the potential development of the Gunnedah Coal Basin, coal volumes, which will need to be moved by rail, are projected to increase from 10Mtpa to 50Mtpa • The current rail line is also used for grain movements and CountryLink passenger services, which may be crowded out if capacity does not increase ahead of coal demand. • The current single track alignment between Scone and Werris Creek traverses the Liverpool Ranges, where gradients require additional locomotives to pull trains over the range, increasing operating costs and decreasing available track capacity
Potential project benefits	• The duplication of the Main North through the Liverpool Ranges would facilitate the development of additional coalfield prospects located within the Gunnadah Coalfields
Strategic Assessment	As the Gunnedah Coalfields develop, the Main North Line through the Liverpool Ranges will need to cater for increasing volumes of coal trains. Current investments strategies support the need for capacity augmentation by duplicating the current alignment.
Project Assurance Assessment	Current strategies for capacity augmentation are based on duplicating the current alignment. Alternative governance arrangements may need to be considered to bring forward investment and reduce commercial risk.

Project	Maldon - Dombarton Freight Line
Sector	Freight

Scores	**Strategic Objective**	**Infrastructure NSW Project Assurance Objective**
	17%	50%

Recommended Timing *based on the Strategy Prioritisation Process*	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**

Description	Development of a rail freight connection between the Main South Line and the South Coast Line to increase rail freight connectivity and capacity to Port Kembla.
Current and emerging issues	• The Illawarra escarpment present significant challenges in facilitating the efficient and safe movement on all road and rail corridors • The Illawarra Line has limited spare capacity to cater for additional rail movements between Sydney and Port Kembla with CityRail services competing for paths with freight services • Should Port Kembla develop as NSW's 2nd container terminal, direct rail connections to Western Sydney are likely to be desirable.
Potential project benefits	• Provides a more direct option for freight to access Port Kembla from Sydney and from the Western Coalfields • Enhances the attractiveness of Port Kembla as a alternative container port • Alleviates pressure on the Illawarra line, where capacity enhancements are likely to be costly.
Strategic Assessment	Without a significant change in the activities at Port Kembla, the proposal is unlikely to be economically attractive. This conclusion is confirmed by the recent detailed feasibility study of this proposal sponsored by the Federal Government.
Project Assurance Assessment	Should a major container port be developed or should bulk freight volumes handled by at Port Kembla be realised in the future, the development of the Maldon-Dombarton Line is more likely to become realistic although demand for the link is not likely to arise before the 2020s at least.

Project	Melbourne - Brisbane Inland Rail Line
Sector	Freight

Scores	**Strategic Objective**	**Infrastructure NSW Project Assurance Objective**
	11%	50%

Recommended Timing *based on the Strategy Prioritisation Process*	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**

Description	Development of an inland rail corridor between Melbourne and Brisbane via Parkes, Werris Creek and Toowomba.
Current and emerging issues	• Currently, rail on the East Coast is primarily coastal and is unable to effectively compete with road freight which is faster, cheaper, more reliable and more flexible • Interstate rail freight has to traverse through Sydney which is congested and prioritises passenger freight during certain periods of the day • Chain of responsibility regulations have increased the attractiveness of using rail over road.
Potential project benefits	• Faster travel times, with journeys being 7 hours faster and 170km shorter than the existing coastal railway • Promote economic development of regional NSW, particularly around potential freight hubs at Parkes and Dubbo • Increase the competitiveness of rail between Melbourne and Brisbane • Reduce pressure to invest in upgrades on the Newell Highway • Reduced externalities through improved road safety and reduced environmental externalities.
Strategic Assessment	The development of the Inland Rail Line may have merit in the long run as freight volumes between these cities increase. However, previous studies suggest that demand may not be sufficiently high for the line to be viable until at least the 2030s. Upgrades to the Hume and Newell Highways and spare rail capacity through Sydney should continue to cater for volumes between Melbourne and Brisbane during the medium term.
Project Assurance Assessment	The Inland Rail Line has been assessed from time to time to assess its potential. The proposal may require a reassessment of freight demand, economic and commercial viability should it be revisited in the future.

Project	Moss Vale - Unanderra Freight Line Upgrade
Sector	Freight

Scores	**Strategic Objective**	**Infrastructure NSW Project Assurance Objective**
	33%♣	50%

Recommended Timing *based on the Strategy Prioritisation Process*	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**

Description	Lengthening of loops on the existing Moss Vale - Unanderra Line aimed at allowing for longer train sets and an increase in saleable paths.
Current and emerging issues	• The Moss Vale to Unanderra Line is currently underutilised, primarily due to steep grades and the longer distances to use it from Sydney • Despite its constraints, the line provides a direct connection from Port Kembla to the Riverina and Victoria and provides an alternative access route to the Illawarra from Sydney.
Potential project benefits	Despite the limitations imposed by the geographic location of the line, improvements to the Moss Vale to Unanderra Line could prove a cost-effective option relative to other options to increase rail freight capacity to the Illawarra.
Strategic Assessment	In lieu of a Maldon-Dombarton Line, upgrades to the Moss Vale-Unanderra, should they be required, could be sufficient to serve projected rail freight demand to and from Port Kembla in the medium term.
Project Assurance Assessment	Whilst upgrades have some merit, a full assessment is required to confirm the viability of upgrades on the Moss Vale-Unanderra Line in lieu of alternative options.

♣ No benefit-cost ratio data available. Initiatives with no cost-benefit ratio data can only achieve a maximum Strategic Objective score of 50 percent.

Project	Northern Sydney Freight Corridor: Stage 2 and 3
Sector	Freight

Scores	**Strategic Objective**	**Infrastructure NSW Project Assurance Objective**
	31%	75%

Recommended Timing *based on the Strategy Prioritisation Process*	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**

Description	Development of the last two of three stages of freight rail enhancements along the Main North Line between Sydney and Newcastle. Proposed works include extra track, passing loops, bypass and signalling enhancements aimed at improving the capacity and reliability of freight and passenger movements. Specific works include: • Passing loops at Wyong • Extra track at Cowan Bank, Hornsby to North Strathfield and North Strathfield to Flemington • Freight bypass at Hornsby • Signalling enhancements between Berowra and Broadmeadow.
Current and emerging issues	• Rail freight growth along the eastern seaboard is anticipated to grow from about 90 paths per week to 268 paths per week by 2028 • There is significant competition for paths on the RailCorp network with both CityRail and Countrylink services competing with freight services • Passenger priority provisions are activated during peak periods, with freight trains kept outside or parked within the network during commuter peaks, reducing the reliability of freight services.
Potential project benefits	• Meet growing demand for rail freight transport on the east coast interstate network • Expected to reduce freight transport costs by $210m p.a. by 2021 from road to rail switch • Improved transport reliability expected to benefit industry by over $100m p.a. by 2023 • Reduced externalities including reduced greenhouse gas emissions and road accidents from mode switch to rail.
Strategic Assessment	Works are currently underway to increase capacity on the Main North Line through the first stage of the Northern Sydney Freight Corridor Program. Although the first stage is anticipated to cater for medium term demands, additional capacity enhancements on the corridor may be required by the late 2020s based on the findings of previous studies
Project Assurance Assessment	Should demand for freight paths increase faster than anticipated, the Program outlines a set of prioritised works that could be brought forward.

Project	Supporting intermodal terminal road links at Moorebank
Sector	Freight

Scores	**Strategic Objective**	**Infrastructure NSW Project Assurance Objective**
	33%♣	46%

Recommended Timing ***based on the Strategy Prioritisation Process***	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**

Description	Enhancements on the surrounding road network to cater for heavy vehicle flows into and out of a new intermodal terminal precinct at Moorebank. Possible measures may include: • Road widening • Slip lane lengthening • Pavement and bridge strengthening • Additional ramps on the M5.
Current and emerging issues	• Moorebank Avenue, the proposed access route, is one lane in each direction, and may require widening to cater for increased traffic to accommodate traffic growth generated by an intermodal development as well as background traffic growth • Current slip lanes on the ramps at the Moorebank Avenue interchange are likely to require lengthening to cater for increased queuing • The Moorebank Avenue interchange is likely to also require redesigning to cater for longer trucks.
Potential project benefits	• Reduced queue lengths associated with additional slip lane capacity • Improved mobility of heavy vehicle movements to and from intermodal facilities.
Strategic Assessment	Should Moorebank develop as an intermodal precinct, localised improvements on Moorebank Avenue and the M5 may be required to mitigate congestion and improve local and motorway traffic flows. Other sub-regional improvements may also be warranted.
Project Assurance Assessment	A detailed demand and economic assessment is required to develop a preferred package of works.

Project	Hawkesbury-Nepean Valley: Flood Mitigation Measures			
Sector				Water
Scores	**Strategic Objective**		**Infrastructure NSW Project Assurance Objective**	
	81%		67%	
Recommended Timing *based on the Strategy Prioritisation Process*	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**
Description	Development of options, including the raising of the Warragamba Dam wall, aimed at reducing the frequency and impact of major flood events within the Hawkesbury-Nepean Valley.			
Current and emerging issues	• The Hawkesbury Nepean Valley in Sydney's western suburbs has a history of severe floods. The high and narrow gorges that form the lower reaches of the Hawkesbury River limit the maximum water carrying capacity of Hawkesbury-Nepean River System. In the event of high rainfall within the catchment of the river system, flood waters can back up from the gorges into the Hawkesbury-Nepean floodplain, on which key centres such as Penrith and Windsor are built on. • Continued urban development around Penrith, Windsor and Riverstone increase the number of people and property exposed to the risk of flooding. • Under a Probably Maximum Flood scenario, recent studies suggest that up to 90,000 people may need to be evacuated although current evacuation plans are based on the evacuation of up to 60,000 people • At least 8,000 dwellings and 60ha of commercial and industrial land have been left undeveloped due to evacuation constraints.			
Potential project benefits	• Avoided economic and social costs associated with flood damage • Flood mitigation may providing opportunities to accelerate development of otherwise flood-prone lands.			
Strategic Assessment	Various options have been developed by the NSW Government over time to prevent the occurrence of major flood events within the Hawkesbury-Nepean flood plain, and when they do occur, the damage caused by such floods. Given the significant economic and social impact of major flood events, there is significant merit in developing options aimed at mitigating against extreme flood events.			
Project Assurance Assessment	Further option development, costing, flood modelling and economic assessments are worthwhile pursuing to confirm the benefits of flood mitigation within the Hawkesbury-Nepean flood plain given its potential. The disparate nature of flood management in NSW may require remediation to ensure that strategies are optimised and can be properly executed.			

Project	Hunter Water Supply Augmentation
Sector	Water

Scores	**Strategic Objective**	**Infrastructure NSW Project Assurance Objective**
	42%♣	38%

Recommended Timing ***based on the Strategy Prioritisation Process***	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**

Description	Development of a range of options aimed at increasing water supply to augment current water sources in the Hunter. Options may include: • Desalination • Water recycling • New or upgraded storage facilities • Water sharing with the Central Coast • Demand management.
Current and emerging issues	• Water supply in the Hunter is less secure than in Sydney • Dams are relatively small or shallow and are subject to significant evaporation losses in drought conditions • The decision not to proceed with Tillegra Dam requires alternative options to be developed • Continued population growth places upward pressure on water resources • The Hunter may require additional water sources by 2020.
Potential project benefits	• Reduce constraints on economic development within the Hunter • Better cater for growing demand for water due to population growth • Increase resilience to drought conditions.
Strategic Assessment	Water supplies in the Hunter have proven to be vulnerable to drought events. With a decision not to proceed with Tillegra Dam, there is a need to consider alternative options to augment current water supplies.
Project Assurance Assessment	The Interim Drought Management Plan and the Lower Hunter Water Plan are currently in development. The completion of these plans should provide greater policy direction and options to pursue upon completion. Although a cost-effectiveness assessment has been undertaken previously, a comprehensive cost benefit analysis is required to optimise option selection, project timing and account for externalities.

♣ No benefit-cost ratio data available. Initiatives with no cost-benefit ratio data can only achieve a maximum Strategic Objective score of 50 percent.

Project	Sydney Metropolitan Water Supply Augmentation			
Sector	Water			
Scores	**Strategic Objective**		**Infrastructure NSW Project Assurance Objective**	
	31%♣		21%	
Recommended Timing ***based on the Strategy Prioritisation Process***	**0 – 5 Years**	**5 – 10 Years**	**10 – 20 Years**	**Beyond 20 Years**
			■	
Description	Development of a range of options aimed at increasing water supply to augment current water sources in Sydney. Options may include: • Additional desalination capacity • Water recycling • New or upgraded storage facilities • Expansion of the Shoalhaven transfer tunnel and Upgrade of the Upper Canal to expand transfers • Demand management.			
Current and emerging issues	• Although water efficiency measures have reduced per capita consumption, there are limits to future gains in efficiency and demand management • Sydney may require additional water sources by 2025 to cater for future demand.			
Potential project benefits	• Reduce constraints on economic development within the Hunter • Better cater for growing demand for water due to population growth • Increase resilience to drought conditions.			
Strategic Assessment	Although recent works have significantly enhanced Sydney's water supply and its resilience to drought events, continued growth may necessitate supply increases to ensure that capacity continues to meet demand.			
Project Assurance Assessment	A review of the 2010 Metropolitan Water Plan is currently underway. Opportunities exist to plan for future water capacity augmentation as part of this plan.			

♣ No benefit-cost ratio data available. Initiatives with no cost-benefit ratio data can only achieve a maximum Strategic Objective score of 50 percent.

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