Capital Metro

Full Business Case

Prepared by:

CAPITAL METRO AGENCY

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Document sign-off sheet

Contact officers

Name	Role	Directorate	Date	Signature
[name]	Contact Officer	Capital Metro Agency, Requesting Directorate	[dated]	[signed]
[name]	Reviewing Officer	Chief Minister, Treasury and Economic Development Directorate	[dated]	[signed]
[name]	Reviewing Officer	Chief Minister, Treasury and Economic Development Directorate	[dated]	[signed]

Sign-offs

Name	Role	Requesting Directorate	Date	Signature
[name]	Director General	Capital Metro Agency, Requesting Directorate	[dated]	[signed]
[name]	Director General	Chief Minister, Treasury and Economic Development Directorate	[dated]	[signed]
[name]	Under Treasurer	Chief Minister, Treasury and Economic Development Directorate	[dated]	[signed]

Other sign-offs are contained at the conclusion of:

- Chapter 3.0 (Chief Minister, Treasury and Economic Development Directorate – Design and Output Specifications)
- Chapter 4.0 (Chief Minister, Treasury and Economic Development Directorate – Needs Analysis)
- Chapter 8.0 (Chief Minister, Treasury and Economic Development Directorate – Delivery Model)
- Chapter 9.0 (Chief Minister, Treasury and Economic Development Directorate – Financial Analysis)

Contents

1.0 Executive summary 12
1.1 Project 12
1.2 Purpose and recommendation 12
1.3 Project need 12
1.4 Route and alignment 13
1.5 Delivery model 14
1.6 Financial and economic considerations 14
1.6.1 Capital delivery cost 14
1.6.2 Public Sector Comparator versus PPP Proxy 16
1.6.3 Benefit cost ratio 16
1.7 Dependencies 17
1.8 Project timetable 17

2.0 Introduction 18
2.1 Context and Focus of the Full Business Case 18
2.2 Preceding documents 18
2.3 Purpose and Recommendation 19
2.4 Consultation 20
2.5 Other important notes 20

3.0 Project outline 23
3.1 Description of the project 23
3.1.1 Overview 23
3.1.2 Scope of works 30
3.1.3 Scope of services 45
3.2 Review 1 (CMTEDD): Status of functional brief / output specification 46

4.0 Needs analysis 47
4.1 Overview – Linking Objectives and Benefits 47
4.2 Key problems addressed by this project 49
4.2.1 Overview 49
4.2.2 Problem 1: the need to build future alternative transport capacity 49
4.2.3 Problem 2: a need for sustainable urban re-development and increased urban densification 54
4.2.4 Problem 3: economic challenges 58
4.2.5 Problem 4: sub-optimal gateway to the Capital 59
4.3 Key benefits to be realised from the project 61

4.3.1 Overview 61
4.3.2 Benefits of addressing problem 1: building alternative transport capacity 64
4.3.3 Benefits of addressing problem 2: sustainable urban development and urban densification 66
4.3.4 Benefits of addressing problem 3: economic challenges 69
4.3.5 Benefits of addressing problem 4: Sub-optimal gateway to the Capital 70
4.3.6 Other potential benefits 72
4.3.7 Importance of benefits for Government 74
4.4 Options analysis 76
4.4.1 Strategic solutions analysis and recommended strategic solution 76
4.4.2 Project solutions analysis 77
4.5 Review 2 (CMTEDD): Needs Analysis 78
5.0 Cost and contingency 79
5.1 Cost estimate 79
5.1.1 Overview notes 79
5.1.2 Capex delivery cost estimate 79
5.1.3 Capex delivery cost estimate notes 80
5.1.4 Profile of capex 81
5.1.5 Benchmarking 81
5.1.6 Comparison to previous capex estimate 82
5.1.7 Opex and whole of life expenditures 84
5.1.8 Capital Metro Agency costs 86
5.2 Contingency 86
5.2.1 Project contingency 86
6.0 Economic analysis 88
6.1 Summary 88
6.1.1 Important Notes 90
6.2 Cost Benefit Analysis (Economic efficiency analysis) 91

6.2.1 Overview of method 91
6.2.2 Economic guidelines 92
6.2.3 Economic assumptions 92
6.2.4 Source of inputs 92
6.2.5 Project costs 93
6.2.6 Summary of project costs 94
6.2.7 Project benefits 95
6.2.8 Transport benefits 95
6.2.9 Summary of transport benefits 98
6.2.10 Benefits from land use change 99
6.2.11 Summary of land use benefits 101
6.2.12 Wider economic impacts 101
6.2.13 Summary wider economic impacts 102
6.2.14 Summary cost benefit analysis 102
6.3 Sensitivity analysis 103
6.3.1 Caution in comparing previous BCR estimates 104
7.0 Dependencies 106
7.1 Land development 106
7.2 Other influencing factors 106
8.0 Delivery model analysis 108
8.1 Background and approach 108
8.1.1 Important note 109
8.2 Outline of key risks 109
8.2.1 Risk management process 109
8.2.2 Key risks 109
8.3 Delivery model assessment 111
8.3.1 General principles – delivery model assessment 111
8.3.2 Data gathering 113
8.3.3 Shortlisted delivery models 113
8.3.4 Delivery model option analysis 118
8.3.5 Market sounding validation 119
8.4 Recommended delivery model 122
8.5 Commercial principles – procurement strategy 122
8.6 Review 3 (CMTEDD): Delivery Model Selection 123

9.0 Financial analysis **124**
9.1 Methodology and assumptions 124
9.1.1 Introduction 124
9.1.2 Rounding 124
9.1.3 Cost estimates 124
9.1.4 PSC and PPP Proxy assumptions 125
9.2 Public sector comparator 126
9.2.1 Overview 126
9.2.2 Raw PSC 127
9.2.3 Competitive Neutrality 128
9.2.4 Risk Adjustments 128
9.2.5 Risk Adjusted PSC 129
9.2.6 PSC Results 130
9.2.7 Important notes regarding retained risks 131
9.3 PPP Proxy 132
9.3.1 Base case PPP Proxy 132
9.4 Financial impact of a government capital contribution 133
9.5 Comparison between the PSC & PPP Proxy Model 134
9.6 Term 135
9.7 Cashflow impact and funding strategy 136
9.7.1 Summary 136
9.8 Revenue from operations 136
9.8.1 Impact on Bus Network 137
9.8.2 Value Capture 137
9.8.3 Other costs 139
9.9 Affordability 139
9.9.1 Affordability Signal 139
9.9.2 Costs in excess of affordability 139
9.10 Accounting treatment 140
9.10.1 Overview 140
9.10.2 Accounting Standard Current Status 140
9.11 Review 4 (Chief Minister, Treasury and Economic Development): Financial (only PPP/DCMO) 141

10.0 Project governance **142**
10.1 Governance 142

10.1.1 Structure 142
10.1.2 Key milestones 143
10.1.3 Key roles and responsibilities 143
11.0 Stakeholder engagement 146
11.1 Our customers 146
11.2 Other stakeholders 146
11.2.1 External stakeholders 146
11.2.2 Internal stakeholders 147
11.3 Communication and consultation 147
11.3.1 Communication strategy 147
11.3.2 Consultation approach 147
11.3.3 Consultation channels 148
11.4 Documenting stakeholder engagement 148
12.0 Advisor engagement plan 149
12.1 Proposed advisor roles 149
13.0 Timeline 151
13.1 Project timetable 151
13.1.1 Overview 151
13.1.2 Procurement phase 151
13.1.3 Delivery phase 152
13.1.4 Immediate next steps 152

Tables

Table 1	Capital cost estimate (P75), $m nominal	15
Table 2	Comparison of total cost ($m NPC) of PSC and PPP Proxy	16
Table 3	Indicative timetable	17
Table 4	Potential physical features of the Capital Metro project	24
Table 5	Project objectives	28
Table 6	Key milestones	30
Table 7	Indicative summary of trackform types	35
Table 8	Scope of operation and maintenance	45
Table 9	Minutes lost per vehicle due to congestion between points along the route in peak (compared to free flow conditions)	52
Table 10	Approximate historical and projected population growth by district	57
Table 11	The value of expected benefits resulting from the Capital Metro project	62
Table 12	Economic benefits of increased urban density resulting from light rail	66
Table 13	Impact of light rail on property values	71
Table 14	Government plans and alignment with the Capital Metro project	75
Table 15	Project capital delivery cost estimates ($m, nominal, P75)	80
Table 16	Operating, maintenance and lifecycle costs ($m, nominal)	85
Table 17	Capital cost estimate (P50, P75, P90), $m, nominal	86
Table 18	Cost benefit analysis (present values, $m)	89
Table 19	Economic assumptions	92
Table 20	Sources of inputs to the cost benefit analysis	93
Table 21	Summary of operating, maintenance and lifecycle costs (real $m, year ended 30 June)	93
Table 22	Summary of operating, maintenance and lifecycle costs (real $m, year ended 30 June)	94
Table 23	Summary of project costs (real $m from 2015 to 2048)	95
Table 24	Summary of transport benefits (total and present values, $m)	98
Table 25	Approach for value of change in land use	99
Table 26	Benefits of urban densification efficiency savings	100
Table 27	Summary of land use benefits (total and present values, $m)	101
Table 28	Summary of wider economic impacts (total and present values, $m)	102
Table 29	Cost benefit analysis by category (present values, $m)	103
Table 30	Sensitivity analysis of BCR to a range of assumptions and variations	104
Table 31	ACT Government policy considerations which may influence project benefits (non-exhaustive)	107
Table 32	Key potential project risks	110
Table 33	Key project considerations	112
Table 34	Packaging strategy considerations: infrastructure and services with urban development	114
Table 35	Unbundled versus bundled models	116
Table 36	Shortlisted delivery models	117
Table 37	Summary evaluation of PPP and DCMO delivery options	119
Table 38	Raw Cost Estimates ($million, nominal and NPC)	125
Table 39	Timing assumptions (PSC and PPP Proxy)	125
Table 40	Risk Allocation Summary	129
Table 41	Risk-adjusted PSC Capital Cost Estimate on a P50, P75 and P90 basis	130
Table 42	Risk-adjusted PSC O&M Cost Estimate on a P50, P75 and P90 basis	130
Table 43	Total Risk-adjusted PSC Cost Estimate on a P50, P75 and P90 basis	131
Table 44	Base Case P75 Cost Estimates ($million)	133
Table 45	Total cost ($m NPC) of PSC and PPP Proxy	134
Table 46	Potential revenues from ticket sales	136
Table 47	Value capture mechanisms	138
Table 48	Procurement milestones	143
Table 49	Directorates represented in the governance structure	143
Table 50	Summary of six week consultation activity	148
Table 51	Key external advisors engaged as at August 2014	150
Table 52	Discount and inflation rates	153
Table 53	Appraisal parameters	153
Table 54	Value of Time per person hour	153
Table 55	Journey factors	154
Table 56	Car vehicle operating (resource) costs (cents per km)	154
Table 57	Public transport operating costs (cents per km)	154
Table 58	Externality benefits (cents per km)	155

Table 59 Health benefit of active transport per km 155
Table 60 Wider Economic impact assumptions 156
Table 61 Wider Economic impact wage share and elasticity assumptions 157
Table 62 Key assumptions 158

Figures

Figure 1 Indicative Capital Metro light rail route (note: Sandford St stop is no longer proposed) 13
Figure 2 Indicative Capital Metro alignment 14
Figure 1 Progression of the Business Case 19
Figure 2 Indicative Capital Metro light rail route (note: Sandford St stop is no longer proposed) 26
Figure 3 Artist's impression of the operations of light rail. 27
Figure 4 Griffin Map 30
Figure 5 Capital works project breakdown 31
Figure 6 Typical example from tree impact plans showing light rail tracks (grey) and tree protection zone (the space needed to protect the tree, therefore showing trees at risk) 32
Figure 7 Existing bus routes in the City-Gungahlin corridor 33
Figure 8 Gungahlin Terminus preferred option Hibberson Street, east of Gungahlin Place 36
Figure 9 The City Terminus preferred option Northbourne Avenue north of Alinga Street 36
Figure 10 Indicative stop locations (note: Sandford Street stop is no longer proposed) 38
Figure 11 Linking objectives and benefits, as described in this document 48
Figure 12 Public transport mode share for those who live and also work on the Stage 1 corridor compared to Australian cities (AM and PM commuter peaks), based on 2011 census 51
Figure 13 Delay per trip (in minutes) for southbound movements along the corridor. 52
Figure 14 Population densities in Canberra compared to other cities 55
Figure 15 Images of Northbourne Avenue 60
Figure 16 Population density on the corridor in 2011 61
Figure 17 Potential areas for urban intensification 68
Figure 18 Case study: Minneapolis St Paul 70
Figure 19 Case study: Commercial land use changes in Perth 72
Figure 20 Profile of capital expenditure ($m, nominal, year ended 30 June) 81
Figure 21 Comparison of cost estimates (adjusted to show in comparable $m nominal terms) 83
Figure 22 Comparison of cost estimates (adjusted to show in $m, $2014-15) 84
Figure 23 Total Risk-adjusted Capex Distribution Profile (in nominal terms $m) 87
Figure 24 General approach to cost benefit analysis 91
Figure 25 Capital expenditure distribution (undiscounted real $m, by year ended 30 June) 94
Figure 26 Contractor integration options 114
Figure 27 Nine delivery models 116
Figure 28 Components of the PSC (for indicative purposes only) 127
Figure 29 Total PSC transferred and retained risk adjustment estimates on a P50, P75 and P90 basis ($m nominal) (including capex and opex risk adjustment) 131
Figure 30 Comparison of PSC and PPP Proxy ($m NPC) 135
Figure 31 Capital Metro operating fare revenues 137
Figure 32 Governance structure for the project 142

Appendices

Appendix A Assumptions book 153

A.1 Economic Values 153

A.2 Financial Analysis Cost Assumptions 157

1.0 Executive summary

1.1 Project

The Capital Metro project (the **project**) contemplated by this *Full Business Case* entails:

- The design and construction of a 12km light rail route from Gungahlin to the City with associated stops, depot, road, signalling, preparatory and other works; and
- The ongoing operation and maintenance of that light rail system.

Capital Metro Agency has adopted a 'customer-centric' approach in developing the project.

1.2 Purpose and recommendation

The purpose of this *Full Business Case* is to seek Capital Metro Sub-Committee of Cabinet (**Cabinet**) approval for the ACT Government, represented by Capital Metro Agency, to procure the project on the basis set forth herein. Capital Metro Agency recommends that:

1. The ACT Government procure the project in a form substantially similar to that described herein, including the procurement of the project via an *Availability Public-Private Partnership*.
2. The ACT Government approval contemplated by the foregoing paragraph be subject to:
    a. Subsequent decisions of Cabinet from time to time, including approvals to be sought from Cabinet at various points during the project's procurement process; and
    b. Subsequent decisions of the Project Board, Project Director or Capital Metro Agency Executive from time to time, to the extent:
        i. Such stakeholders are authorised to make decisions regarding the project; and
        ii. Such decisions are not in material conflict with the project as described herein.

1.3 Project need

Canberra is a growing and vibrant city. Capital Metro is the first stage of a light rail network that will have a transformative effect on Canberra. It will also substantially enhance other city transformation activities which are planned or underway. Capital Metro addresses current issues and future-proofs against others likely to arise. The project builds upon Walter Burley Griffin's vision for light rail within Canberra.

As with any city transformation activity, the project should not be viewed in isolation. Instead, it should be viewed as also improving outcomes from other urban renewal activities underway in Canberra. For example, Capital Metro and the ACT Government's *City to the Lake* program may together have a compounding transformational effect on Canberra's city centre.

The project addresses:

- The need to build future transport capacity in the ACT. Canberra experiences a high and growing level of car dependency and usage, with associated traffic congestion and other problems (particularly along the Northbourne Avenue – Federal Highway corridor); and

- The need for enhanced sustainable urban re-development and densification in the ACT (as outlined in the *ACT Planning Strategy*). Potential constraints exist to the future supply of developable greenfield land in the ACT.

In addressing these needs, the project will also deliver attendant economic, social and other benefits for Canberra. Such benefits are discussed in more detail throughout this *Full Business Case*.

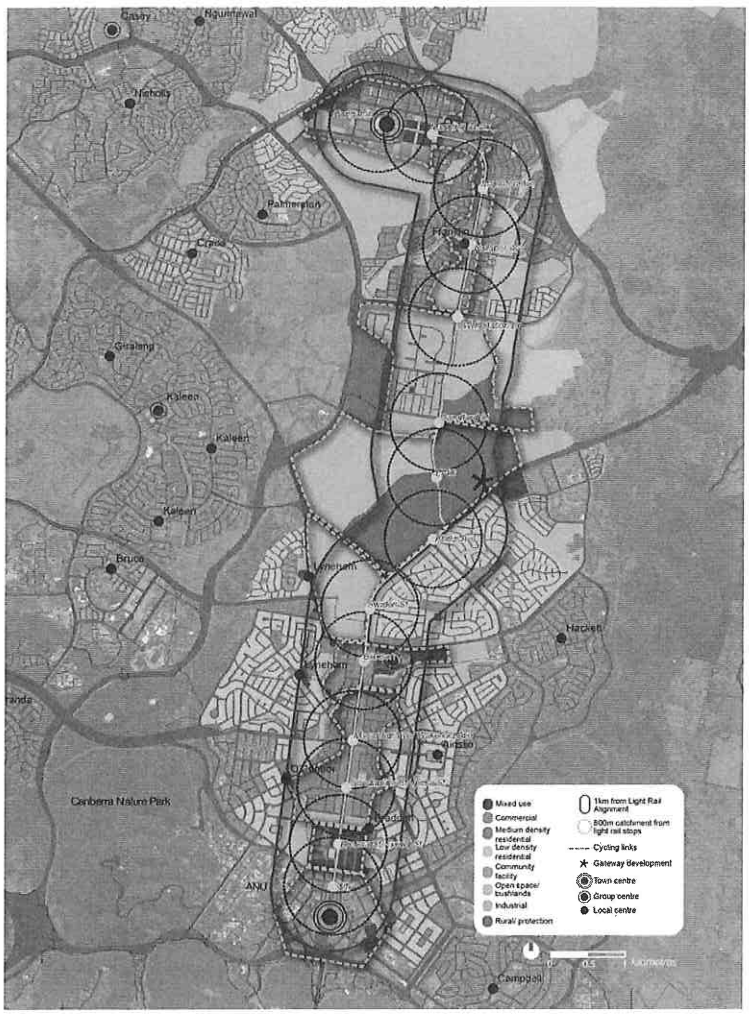
Given the background to this project, including analysis previously performed and decisions already made by Government, this *Full Business Case* considers the business case for a 12km light rail route from the City to Gungahlin. It does not extend to an analysis of alternative transportation means or routes.

1.4 Route and alignment

Physical features of the project shall evolve throughout the project's community consultation, approval and procurement stages. Certain project features shall be subject to approval by Cabinet and / or shall only be confirmed during the project's tender phase. Nevertheless, recommended or likely key project features are described in Chapter 3.0.

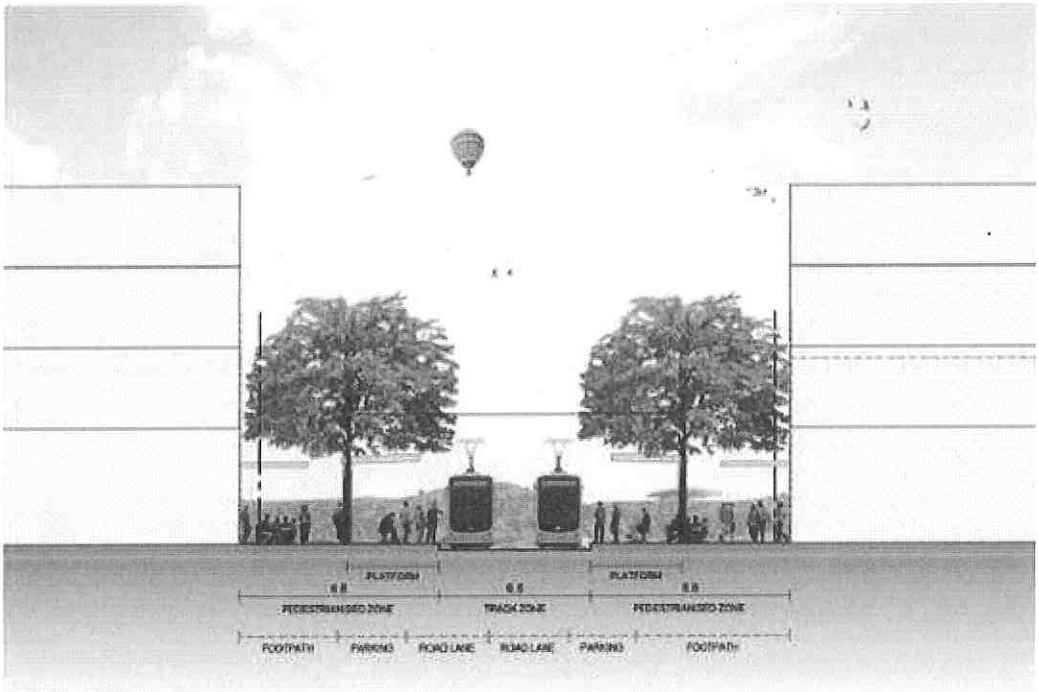
The proposed Capital Metro route is set forth below.

Figure 1 Indicative Capital Metro light rail route (note: Sandford St stop is no longer proposed)



Capital Metro is proposed to have median alignment throughout the route. Illustrative alignment is shown below.

Figure 2 Indicative Capital Metro alignment



1.5 Delivery model

It is recommended the project be procured via an Availability Public-Private Partnership (PPP) delivery model. Under this model, the design, construction, operations and maintenance of the light rail system shall be bundled with private sector finance for a proposed operating term equal to an anticipated three year construction period plus 20 years. This delivery model has been recommended due to:

- The heightened degree of risk transfer and cost certainty it offers over other delivery models;
- The greater scope for innovation it offers compared to other delivery models; and
- A comparison between the project's 'public sector comparator' and 'PPP proxy' (discussed below).

These features are particularly important given the ACT Government's lack of familiarity with rail projects of this size or complexity. This recommendation was reached following market feedback and analysis facilitated by Capital Metro Agency's commercial advisor.

1.6 Financial and economic considerations

1.6.1 Capital delivery cost

It is anticipated the project's total capital delivery costs will be $783m ($nominal), including rolling stock and contingencies:

Table 1 Capital cost estimate (P75), $m nominal

Cost Area	$m Nominal
Stops and Precincts	11
Roads and Utilities Infrastructure	118
Rail Alignment	96
Signalling, Rail Systems and Power	137
Depot and Stabling	59
Contractor's Overhead and Profit	59
Total Construction Cost	**479**
Rolling Stock	65
Total Alignment Costs	**545**
Escalation	65
Sub Total	**610**
Contingency	173
Total Project Outturn Cost	**783**

Please note: the table above does *not* represent a project budget. It represents an estimate of capital delivery costs only. A project budget shall only be finalised following completion of the project's procurement process. Rounding accounts for any apparent summation errors.

This cost estimate has been based upon a concept design produced in July 2014 by Capital Metro Agency's technical advisors and the contingency has been estimated through a risk quantification process. The following is noted regarding the foregoing figure:

- It is an estimate only, and is not based upon final project design (which will only occur following the project's procurement process). It is the market – not Capital Metro Agency – which will ultimately determine the cost of the project. The occurrence (or otherwise) and severity of risk events may also influence ultimate project costs;
- It contains exclusions as described in this document;
- The capital delivery estimate should not be confused with the project's 'public sector comparator.' This is discussed throughout Chapter 9.0;
- It represents a P75 estimate. A discussion of contingency estimates is contained in section 5.2.1;
- When calculated on a consistent basis, Capital Metro Agency's current capital delivery cost estimate is in the order of an earlier $614m estimate for a City to Gungahlin light rail route; and
- The project's capital delivery cost is not paid upfront by the ACT Government under an Availability PPP model. Instead, an ongoing availability payment which encompasses capital delivery, operating, whole of life and financing costs is to be made by ACT Government to the successful project company over the proposed operating term.

1.6.2 Public Sector Comparator versus PPP Proxy

Results of a comparison between the project's estimated public sector comparator (PSC) and PPP Proxy are as follows:

Table 2 Comparison of total cost ($m NPC) of PSC and PPP Proxy

Cost category (PSC)	PSC NPC $m	Cost category (PPP Proxy)	PPP Proxy NPC $m
Total Raw PSC	**$775m**	**Total PPP Proxy**	**$804m**
Competitive Neutrality	$0m		
Transferred Risk	$124m		
Retained Risk	$71m	Retained Risk	$71m
Total Risk Adjusted PSC	**$970m**	**PPP Proxy + Retained Risk**	**$874m**

Notes: Based upon PSC and PPP Proxy discount rates as applicable.

Both the PSC and PPP Proxy cost estimates have been based on a P75 basis, as discussed below in section 9.2.4.

The foregoing PSC and PPP Proxy are illustrative estimates only. The PPP Proxy represents an analysis of a hypothetical, risk-adjusted whole-of-life cost for the project that is assumed for comparison purposes to be delivered by the private sector. Actual private sector bids may differ materially from the PPP Proxy. It is the market – not Capital Metro Agency – which will ultimately determine the cost of the project. Likewise, the PSC is an illustrative financial model which estimates the hypothetical whole of life costs to Government of developing and operating the proposed project under a traditional delivery model.

The 'retained risk' figure contained above is reflective of a number of potential retained or shared risks, including an allowance made for potential retained planning risks associated with the project.

1.6.3 Benefit cost ratio

The project is anticipated to deliver a benefit cost ratio (BCR) of 1.2, comprising a transportation and land use value BCR of 1.0 and the remainder representing wider economic impacts. As the total BCR is greater than one, the economic analysis anticipates the project will deliver a net benefit to the ACT community. This does not take into account further potential social benefits which have not been quantified (refer section 6.1.1).

Cost Scenario	Value $m PV
Project Benefits	
Transport Benefits	406
Land Use Benefits	381
Wider Economic Impacts	198
Total project Benefits	**984**
Project Costs	
Capex	619
Opex	204
Total Project Costs	**823**
Project Economic Indicators	
BCR (transport and land use)	**1.0**
Net Present Value (transport, land use & WEIs)	161
BCR (transport, land use & WEIs)	**1.2**

Further detail on the economic and financial analysis can be found in Chapters 6.0 and 9.0 respectively.

1.7 Dependencies

The benefits anticipated in this business case are founded upon a number of assumptions. While such assumptions are realistic, actions shall be required by current and future Governments to ensure stated benefits are realised and maximised.

A non-exhaustive list of factors wholly or partly within ACT Government's control which may influence the recognition or maximisation of light rail benefits includes land development decisions undertaken by ACT Government; ticketing and fare setting; bus and park & ride integration; parking charges; value capture activities; signalling priorities; the location of ACT Government staff in the corridor; and other undertakings to promote economic activity in the ACT.

1.8 Project timetable

Key indicative project milestones are as outlined in Table 3.

Table 3 Indicative timetable

Milestone	Anticipated Timeline
Industry briefing	September 2014
EOI Process	Q4 2014 – Q1 2015
RFP Process	Q2 2015 – Q4 2015
Contract Negotiations	Q1 – Q2 2016
Contract Commencement	H1 2016
Operations Commence	2019

2.0 Introduction

2.1 Context and Focus of the Full Business Case

This *Full Business Case* has been drafted in the context of:

- One of the 2012 Territory election commitments of the current Government being the development of light rail in Canberra;
- The 2 November 2012 *Parliamentary Agreement,* which states:

  "2.2 Progress a light rail network for Canberra by:

  a) Establishing a statutory independent authority to implement the light rail project and associated development in the corridor;

  b) undertaking the necessary design studies, preparatory works, financing, procurement and tendering arrangements, with a target date for the laying of tracks for the first route commencing in 2016;

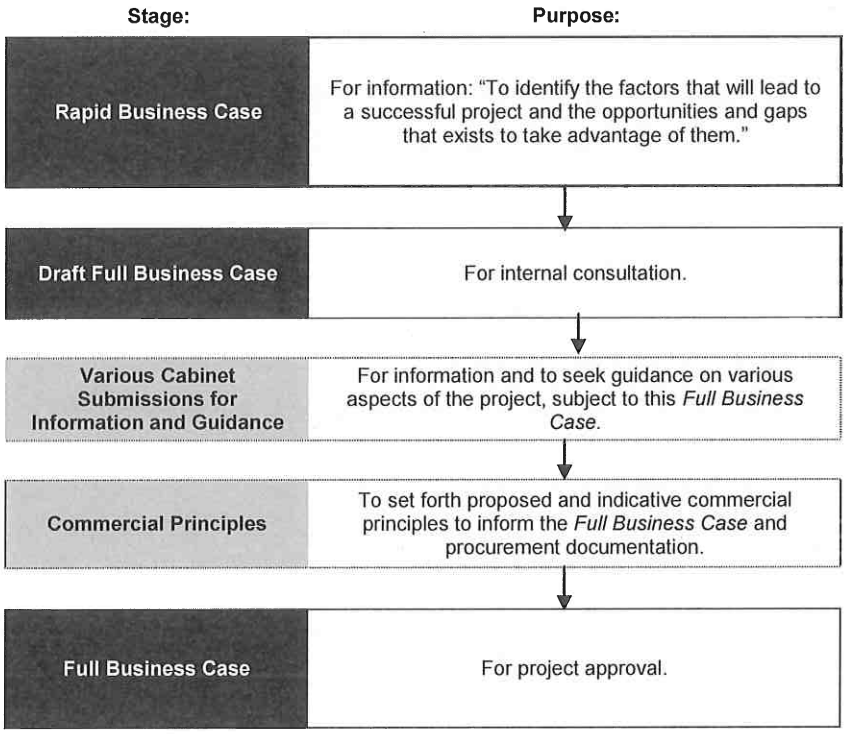
  c) Creating a Canberra wide light rail network master plan."
- Capital Metro Agency having been established as an ACT Government directorate to manage all aspects of the ongoing planning, design and delivery of the project;
- The project's objectives (approved by Cabinet in June 2013 and repeated herein) and public communications associated with Capital Metro Agency being based upon a City to Gungahlin light rail project; and
- Various studies and reports in connection with Canberra transportation options which were conducted prior to the establishment of Capital Metro Agency and which supported a City to Gungahlin light rail system.

Given this background and the focussed remit of Capital Metro Agency, including analysis already performed and decisions made, this *Full Business Case* considers the business case for a 12km light rail route from the City to Gungahlin. It does not extend to an analysis of alternate light rail routes, nor does it extend to considering alternate means of transport such as bus rapid transit.

2.2 Preceding documents

This *Full Business Case* follows various other documents which have preceded it. The diagram below summarises certain preceding documents.

Figure 1 Progression of the Business Case



2.3 Purpose and Recommendation

The purpose of this *Full Business Case* is to seek Cabinet approval for the ACT Government, represented by Capital Metro Agency, to procure the project on the basis set forth herein.

Capital Metro Agency recommends that:

1. The ACT Government procure:

    a. The design and construction of a 12km light rail route from Gungahlin to the City with associated stop, depot, road, signalling, preparatory and other works as described herein; and

    b. The ongoing operation and maintenance of that light rail system,

    in a form substantially similar to that described herein, including the procurement of the project via an *Availability Public-Private Partnership*.

2. The ACT Government approval contemplated by the foregoing paragraph be subject to:

    a. Subsequent decisions of Cabinet from time to time, including approvals to be sought from Cabinet at various points during the project's procurement process; and

    b. Subsequent decisions of the Project Board, Project Director or Capital Metro Agency Executive from time to time, to the extent:

        i. Such stakeholders are authorised to make decisions regarding the project; and

        ii. Such decisions are not in material conflict with the project as described herein.

2.4 Consultation

This *Full Business Case* was prepared following consultation with:

- The Project Board, containing senior executives from throughout ACT Government and independent members;
- Directors General and other senior executives within the ACT Public Service;
- Capital Metro Agency executives; and
- Capital Metro Agency advisors, including technical, commercial, cost and other advisors.

Significant community consultation has been undertaken by Capital Metro Agency. This has assisted in shaping this *Full Business Case* and its underlying assumptions.

2.5 Other important notes

The following important points are also noted:

- ***Route Augmentation to Russell or Intermediate Location*:** Cabinet has authorised Capital Metro Agency to undertake preliminary investigations into the potential augmentation of the light rail line from the City to Russell or some intermediate location. This *Full Business Case* excludes consideration of such potential line augmentation. Instead, it is anticipated the results of such investigations will be presented to Cabinet at a future date when those investigations are complete;
- ***Information Sources:*** This *Full Business Case* utilises information and analysis from a variety of sources, including advisor analysis and other third-party materials. Certain information, such as information attributable to individual firms during the project's market sounding process, is commercial in confidence. Consequently, source references relevant to this *Full Business Case* are contained in a separate confidential document; and
- ***The Capital Framework* and *The Partnerships Framework:*** This *Full Business Case* has been prepared with reference to *The Capital Framework*, *The Partnerships Framework* and the *Single Assessment Framework Business Case Tier 3 Template*. The establishment of Capital Metro Agency pre-dated the adoption of the aforementioned documents, with the consequence that elements of Capital Metro Agency's activities to date may vary from that contemplated by *The Capital Framework* (for example, Capital Metro Agency was established as an ACT Government directorate with governance arrangements that, in certain respects, are more expansive than those contemplated by *The Capital Framework*). Sign-offs required under *The Capital Framework* are contained within this *Full Business Case*. A cross-reference between the *Single Assessment Framework Business Case Tier 3 Template* and this *Full Business Case* is as follows:

SAF Tier 3 Template Section Reference		Full Business Case Section Reference
1.	Executive Summary	1.0
2.	Project Outline	3.0
2.1	Description of the Project	3.1
2.1.1.	Overview	3.1.1
2.1.2.	Scope of works	3.1.2
2.1.3.	Scope of services	3.1.3
2.2	Review 1 (CWD): Status of Functional Brief/Output	3.2

SAF Tier 3 Template Section Reference		Full Business Case Section Reference
Specification		
3.	Needs Analysis	4.0
3.1	Problem	4.2
3.2	Benefits	4.3
3.2.1.	Benefits to be delivered	4.3
3.2.2.	Importance of the benefits for Government	4.3.7
3.3	Options Analysis	4.4
3.3.1.	Strategic Solutions Analysis	4.4
3.3.2.	Recommended Strategic Solution	4.4
3.3.3.	Project Solutions Analysis	4.4
3.3.4.	Base Case	4.4
3.3.5.	Recommended Project Solution	4.4.1
3.4	Review 2 (Treasury): Needs Analysis	4.5
4.	Cost & Contingency	5.0
4.1	Preliminary Cost Estimate	5.1
4.2	Contingency	5.2
4.2.1.	Project Contingency	5.2
4.2.2.	Delivery Model Contingency	5.2
4.3	Whole of Life	5.1.7
4.4	Budget / Funding Strategy	9.7
5.	Economic Analysis	6.0
5.1	Cost Benefit Analysis (Economic Efficiency Analysis)	6.2
5.2	Wider Economic Benefits (where applicable)	6.2.12
6.	Delivery Model Analysis	8.0
6.1	Outline of Key Risks	8.2
6.2	Commercial Principles	8.5
6.3	Delivery Model Assessment	8.3
6.4	Recommended Delivery Model	8.4
6.5	Review 3 (CWD): Delivery Model Selection	8.6
7.	Financial Analysis (PPP and DCMO only)	9.0
7.1	Financing Assumptions	9.1
7.2	PPP/DCMO Payment Stream	9.3
7.3	Incremental Procurement/Transaction Costs	9.8.3
7.4	Public Sector Comparator	9.2
7.5	Review 4 (Treasury): Financial (only PPP/DCMO)	9.11
8.	Project Governance	10.0
9.	Stakeholder Engagement Plan	11.0
9.1	Stakeholder Identification	11.0
9.2	Stakeholder Involvement & Interest	11.0
9.3	Stakeholder Engagement Plan	11.0
10.	Advisor Engagement Plan	12.0
10.1	Proposed Advisors Roles	12.1
10.1.1.	Legal	12.1
10.1.2.	Commercial Procurement	12.1
10.1.3.	Commercial Financial	12.1
10.1.4.	Technical Design & Engineering	12.1
10.1.5.	Other Specialists	12.1
10.1.6.	Stakeholder Management and Communication	12.1
10.1.7.	Project Management	12.1

SAF Tier 3 Template Section Reference	Full Business Case Section Reference
11. Timeline	13.0
11.1 Project Timetable	13.0
11.1.1. Outline	13.0
11.1.2. Proposed float	13.0
11.1.3. Project constraints and/or deadlines	13.0
11.1.4. Project decision points	13.0
12. Appendices	Appendices
Appendix A – Functional Brief/Output Specification	4.0 / Separately, confidentially maintained by Capital Metro Agency
Appendix B – Investment Logic Map	N/A
Appendix C – Cost Estimate	5.0
Appendix D – Risk Register	Separately, confidentially maintained by Capital Metro Agency
Appendix E – Project Programme	Separately, confidentially maintained by Capital Metro Agency
Appendix F – Assumptions Book	Appendices
Appendix G – Risk Management Plan	Separately, confidentially maintained by Capital Metro Agency
Appendix H – Stakeholder Engagement Plan	Separately, confidentially maintained by Capital Metro Agency

3.0 Project outline

Key messages

- The project's objectives reflect that it is a *city transformation* project, not simply a transportation project.
- The Capital Metro project entails the establishment of a 12km light rail route from Gungahlin to the City with associated stops, depot, road, signalling, preparatory and other works.
- Contractual and financial arrangements with a delivery partner are anticipated to be finalised in 2016, with operations established during 2019. Such timing is indicative only, and is subject to change (i) following the conduct of the procurement process, and (ii) should potential risk events materialise.

3.1 Description of the project

3.1.1 Overview

Canberra is a growing and vibrant city. The project provides an opportunity to transform Canberra in its own right, as well as to substantially enhance other city transformation activities which are planned or underway.

The project has two key rationale:

- To increase overall levels of transportation service for Canberrans, facilitating a shift to public transport consistent with ACT Government policy; and
- To spur further sustainable urban development and revitalisation along the proposed rail corridor, with employment, economic and other benefits potentially extending to all Canberrans.

Associated with these rationale are attendant economic and other benefits for Canberra. Those benefits are discussed in more detail throughout this *Full Business Case*, particularly Chapter 6.

Physically, the project entails the proposed design and construction of a 12km light rail route and associated infrastructure commencing on Hibberson Street in Gungahlin, then aligned via Flemington Road, the Federal Highway and Northbourne Avenue, before terminating on Northbourne Avenue in the City immediately north of Alinga Street.

Key proposed physical features of the project are described in section 3.1.2, though a summary is provided in Table 4 for convenience. These features have guided the development of community consultation and cost estimates for the project. It is noted certain of these features may be subject to change during the procurement process. To the greatest extent appropriate, Capital Metro Agency proposes to seek private sector innovation and guidance in respect of the project's physical features. These features are also subject to Cabinet and other stakeholder approvals. It is also noted that Capital Metro Agency, to the fullest extent appropriate, shall not seek 'bespoke' solutions which unduly increase the cost of the project.

Table 4 Potential physical features of the Capital Metro project

Physical Feature	Description
Route	The light rail is proposed to commence in Hibberson Street in Gungahlin and will terminate at Northbourne Avenue, just north of Alinga Street in the City.
Running Alignment	The light rail is proposed to have median alignment throughout the route. On Hibberson Street in Gungahlin this median alignment is proposed to run through a pedestrianised zone from Gungahlin Place East to Hinder Street. The existing road traffic arrangement between Hinder Street and Kate Crace Street may also be adjusted to 'light rail only' subject to decisions to be made by Cabinet. The median alignment is the simplest and fastest solution for light rail operations as: • There is less interaction with cyclists and pedestrians; • It allows for higher operating speeds; • It is the simplest solution for road traffic, as it eliminates the impact of driveways crossed by tracks, as well as eliminates the impact of road traffic decelerating to turn left into minor side roads which would cause conflicts and delays; and • It means lanes of traffic do not need to be used for light rail, which in turn minimises congestion and parking impacts.
Track Appearance	A standard gauge, double track light rail route that is at grade (i.e. not on elevated pylons) is proposed. Track finishing (i.e. grass, concrete or some other materials surrounding the tracks) will be determined during finalisation of the procurement process.
Stops	Termini are proposed to be situated at Hibberson Street east of Gungahlin Place and in Northbourne Avenue north of Alinga Street. The route will include approximately 11 intermediate stops currently envisaged at: - Flemington Rd / Manning Clark Crescent (north) - Flemington Rd / Mapleton Ave - Flemington Rd / Nullarbor Ave - Flemington Rd / Well Station Drive - Flemington Road / Randwick Road (for special events at EPIC only) - Federal Highway / Phillip Ave - One stop to serve Downer at Swinden Street / opposite Yowani Country Club - Dickson Interchange - Northbourne Ave / Wakefield Ave / Macarthur Ave - Northbourne Ave / Condamine St / Ipima St - Northbourne Ave / Gould St / Elouera St No definitive decision on these stop locations has yet been made. Other proposals for stops include deferring the construction of the stop at the Visitor Information Centre and similarly at Sandford Street in Mitchell (though still provisioning for future construction).

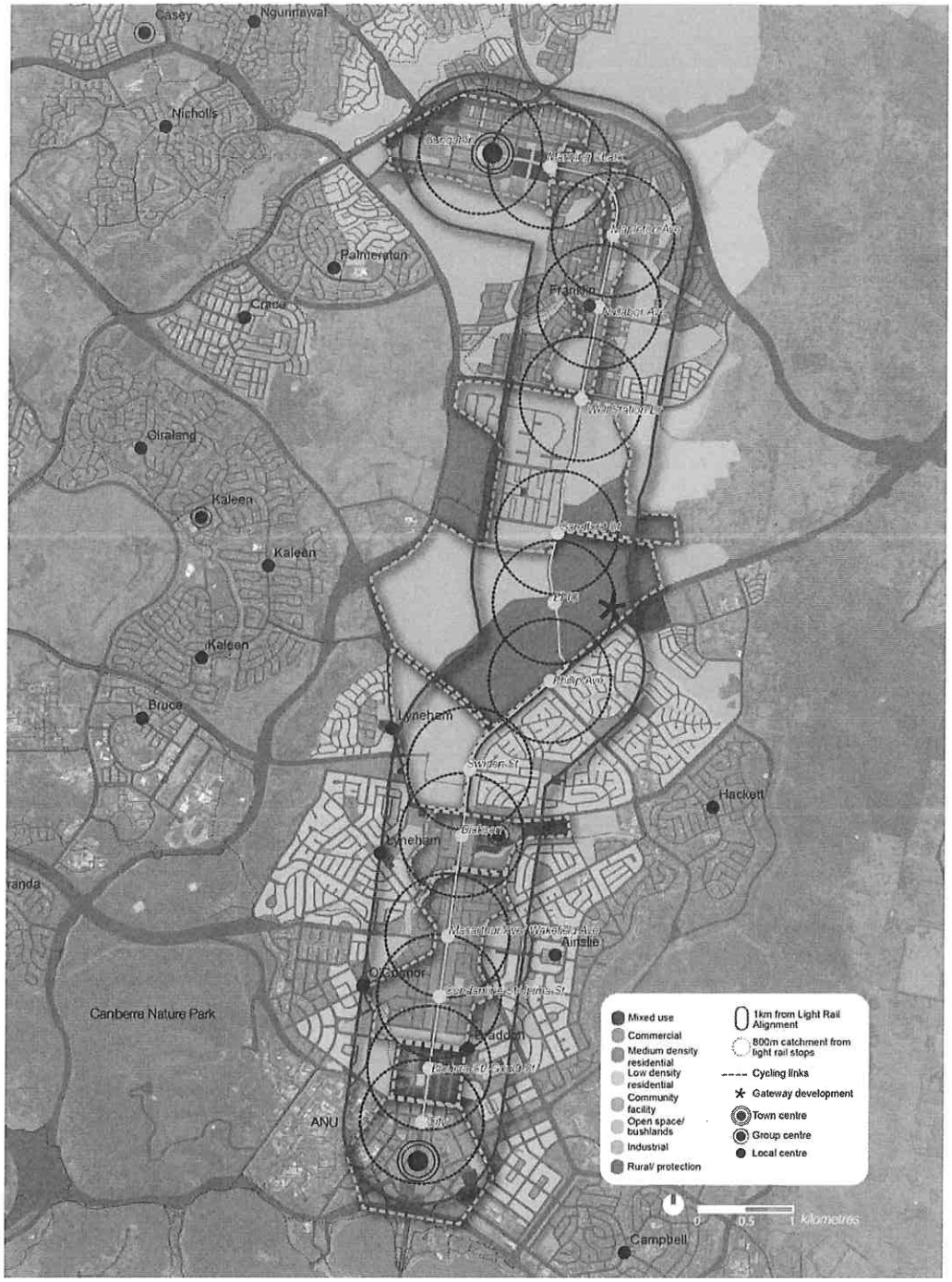
Power transmission and supply	Capital Metro Agency proposes not to prescribe whether an overhead wired or wireless power system is preferred for the procurement process. However, on a cost and technological risk basis, it is currently more likely that the project will adopt a wired power delivery system. On this basis, the project would likely utilise an overhead 750 volt dc power supply (a typical light rail vehicle operating range is between 525 and 900 volt dc). This would necessitate the construction of an overhead (though potentially discrete) wiring system, including poles. Seven potential traction power substations have been identified for establishment along the light rail alignment. The traction system will be designed to enable full service operations with any one substation out of service.
Depot	A light rail stabling area for overnight storage of all vehicles is proposed to be located in Mitchell, next to the existing TAMS site at 9 Sandford Street. This will be the headquarters of the network's physical operations and will incorporate the control centre. It shall also have facilities for maintenance and storage space for spare parts.
Park & Ride	Existing park and ride facilities are currently located at the EPIC site. A new 350 space facility within Gungahlin town centre was announced in May 2014 which will be located within walking distance of the new light rail terminus. The current proposed scope of works does not include any new park and ride facilities, but exploration of park and ride opportunities is anticipated to feature during the project's procurement process. A park and ride site has also been proposed by ACT Government at Well Station Drive.
Bus / Light Rail Interchanges	Current bus interchange arrangements in the City are likely to serve well for bus / light rail interchange purposes in the future. The current scope of works does not include the provision of interchanges within the project, but opportunities exist to enhance current arrangements and / or provide new interchange arrangements. Sites potentially appropriate for interchange facilities exist at Gungahlin, Well Station Drive, Dickson and the City. Continued dialogue is occurring within ACT Government in this regards.
Signalling	Traffic signalling is required to manage potential conflicts between light rail vehicles and road vehicles at intersections. It is proposed light rail will be given signal priority. To maintain safe pedestrian access to stations, and so as to enable light rail operations to achieve desired trip durations, new traffic signals are proposed. Modelling of the optimum configuration of signals is currently being undertaken to minimise light rail vehicle waiting times whilst also minimising the impact on users of other modes of transport and pedestrians.
Light Rail Vehicles	The estimated total fleet requirement is 14 vehicles of approximately 33 metres in length. This accounts for one vehicle assumed to be under maintenance and another for unscheduled repairs, with 12 light rail vehicles in service. Note that this fleet size has been used to inform costings, but is not prescribed for the purposes of the procurement process.
Enabling Works	Works required to be undertaken prior to the commencement of major works include geotechnical and survey works, relocation or protection of utilities, site establishment, tree preparations, traffic control, and minor land acquisitions. As a general principle, such activities are proposed to be undertaken within a PPP scope of works to the greatest extent appropriate.

3.1.1.1 Route

The Capital Metro light rail project links Canberra's expanding northern suburbs with the City's central business district. As shown in Figure 2, the proposed light rail route commences in the proposed pedestrianised section of Hibberson Street and travels east along Flemington Road before turning to the

south. There, it travels along Canberra's primary approach route via the Federal Highway and Northbourne Avenue.

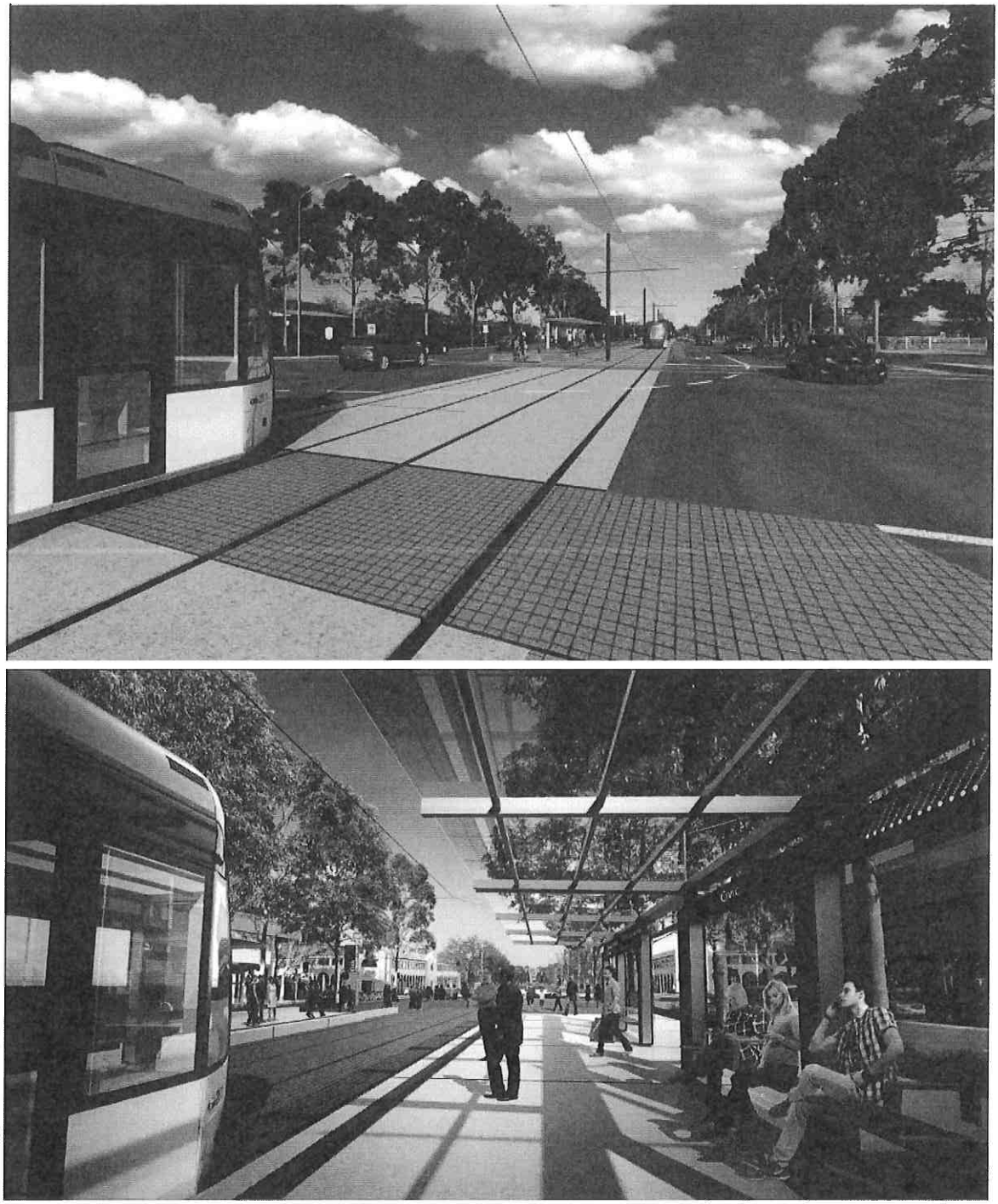
Figure 2 Indicative Capital Metro light rail route (note: Sandford St stop is no longer proposed)



3.1.1.2 Artist's impression

An artist's impression of the operation of the proposed light rail is provided in Figure 3. Please note that these are indicative only. The final appearance of light rail vehicles, catenary, tracks, stations and other project features shall be subject to future design works and procurement process outcomes.

Figure 3 Artist's impression of the operations of light rail.



3.1.1.3 Project vision and objectives

The project's vision as previously approved by Cabinet is as follows:

Vision	**To boost Canberra's sustainable development by changing and improving transport options, settlement patterns and employment opportunities.**

The eight project objectives for Capital Metro previously approved by Cabinet are listed in Table 5.

Table 5 Project objectives

Project Objective	Category	Explanation
Increase the mode share of public transport (direct)	**Transport**	When complete the Capital Metro will increase the number of trips taken using public transport. The main focus is to move people from car-based trips to Capital Metro. In addition, a new, legible and easy to use service would generate trips, particularly into the central retail and commercial precinct of the City. To do this the service needs to be safe, convenient, attractive, frequent, reliable, affordable and integrated with a modified bus and pedestrian network.
Optimise frequency and service reliability (direct)	**Transport**	Light rail on dedicated track is one of the most reliable forms of public transport service. Capital Metro will provide commuters and other users with high levels of on-time running.
Stimulate sustainable, urban re-development along the corridor (direct)	**Economic**	The Northbourne Avenue Corridor is ear-marked for significant growth via re-development. Capital Metro is a complementary project that supports higher density land use, which in turn increases patronage on the service.
Grow a more diversified Canberra economy (indirect)	**Economic**	Capital Metro will be a direct and indirect stimulus to a Canberra economy that needs to diversify its base to reduce its reliance on government administration and defence. A world-class transport service will support economic activity in many ways. It will improve vital connections between people, stimulate business innovation, and assist in attracting and retaining skilled workers, enterprising businesses and students to Canberra.
Affordable capital and operational costs (direct)	**Economic**	The service should be developed with financial prudence and value for money outcomes for the ACT.
Revitalise the Northbourne Avenue corridor (indirect)	**Community**	The Northbourne Avenue Corridor is a gateway to Canberra for residents entering the City or visitors entering from the north. Revitalisation would make it a more active and socially connected precinct for all types of Canberrans and a fitting gateway to the nation's capital. The Capital Metro will increase activity at ground level and boost the image of the city.
Increase social and economic participation (indirect)	**Community**	The service will provide greater opportunities for non-motor vehicle owning people to access jobs, education, health services and other social activities.
Reduce carbon and other emissions	**Environmental**	The additional passenger capacity and demand will replace trips by motor vehicle and consequently reduce greenhouse emissions. In addition, other motor vehicle emissions such as

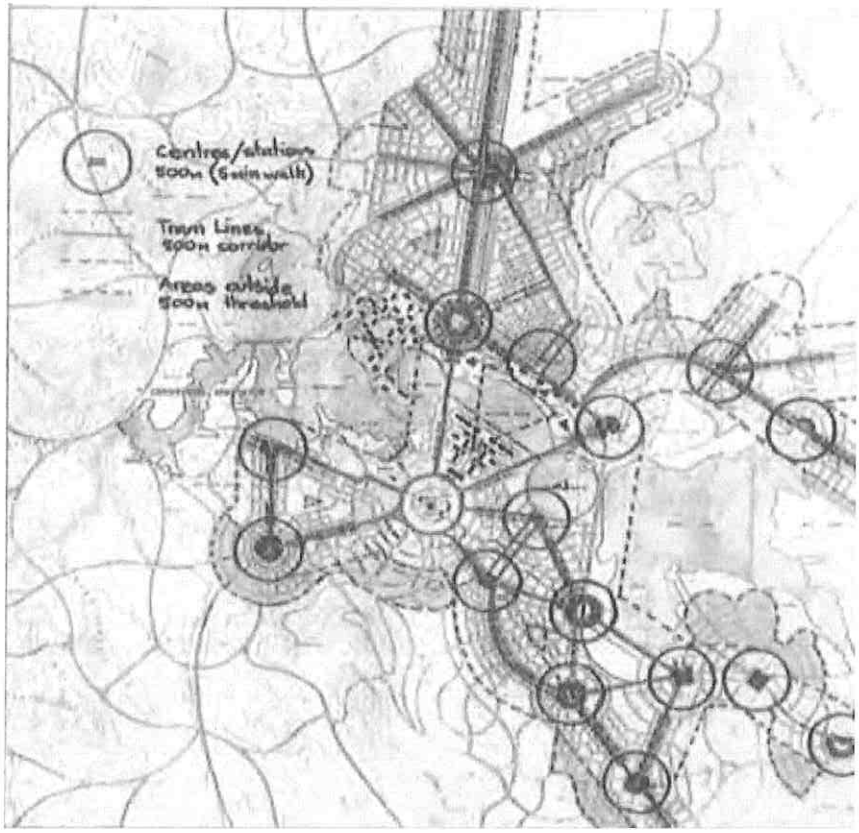
(direct)		particulate matter, nitric oxides and carbon monoxide would also be reduced. The economic benefits taken into consideration in this business case cover operational emissions and takes into account increased fuel efficiency over time.

3.1.1.4 Prior activities and studies

Significant activities and studies have been enacted prior to the development of this business case. Activities preceding the development of this business case include:

- **Election:** One of the 2012 Territory election commitments of the current Government included the development of light rail in Canberra.
- **Parliamentary agreement:** On 2 November 2012 the *Parliamentary Agreement* was signed, setting forth a commitment to progress a light rail network for Canberra.
- **Establishment of Capital Metro:** Until 30 June 2013, activities associated with the project were conducted within the Environment and Sustainable Development Directorate. Capital Metro Agency was established as an administrative unit of the ACT Government on 1 July 2013 in order to (among other items) manage all aspects of the ongoing planning, design and delivery of the project. Governance arrangements were established for the project, including the creation of a Project Board and Board Charter.
- **Engagement of advisors:** Key advisors have been appointed to progress the project to its current stage. Note that advisors are subject to change as the project progresses.
- **Project planning activities and previous studies:** A number of studies associated with the development of light rail in Canberra have been undertaken over the past ten years. These include studies reflected in various Infrastructure Australia submissions, together with studies supporting ACT Government policy documents such as *Transport for Canberra* (March 2012).
- **Historic Plans:** As a planned city, transport networks and linkages have been at the forefront of Canberra's conceptualisation and development over time. Indeed, Walter Burley Griffin designed the major avenues in Canberra, including Northbourne Avenue, to include electric street cars, operating within broad central medians. Griffin designed Canberra for active street life with wide shopping streets, public gardens and promenades, as seen in Figure 4. Early Griffin plans included the use of trams, including down Northbourne Avenue, as depicted below. Griffin's vision of a well administered tram service for Canberra has not yet been realised.

Figure 4 Griffin Map



3.1.2 Scope of works

3.1.2.1 Key milestones

Indicative key milestones for the project are summarised in Table 6. It is noted that such timing is indicative only, and is subject to change (i) following the conduct of the procurement process, and (ii) should potential risk events materialise.

Table 6 Key milestones

Milestone	Anticipated Timeline
Industry briefing	September 2014
EOI Process	Q4 2014 – Q1 2015
RFP Process	Q2 2015 – Q4 2015
Contract Negotiations	Q1 – Q2 2016
Contract Commencement	H1 2016
Operations Commence	2019

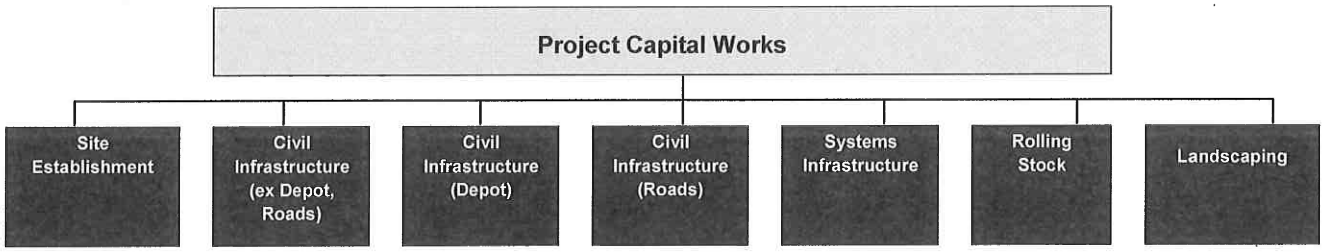
3.1.2.2 Scope of works - overview

The following describe the known and likely elements of capital works to be undertaken as part of the project. The scope of the capital works to be undertaken will be a function of the final project design, which will be developed by the successful consortium based on the functional brief (output specification) provided to the market during the procurement process. Other than mandatory specifications to be set forth in a functional brief, consortia will be encouraged to innovate so as to achieve desired cost, urban design and customer service level outcomes. Consequently, certain elements of the anticipated capital works detailed below may be subject to alteration during the procurement process. These works are also subject to Cabinet and other approvals as set forth in section 10.1.2.

Capital works delivery risks are discussed in section 8.2.2.

Capital works associated with the project may be considered under the following broad headings (outlined diagrammatically in Figure 5). In practice, these work areas may overlap.

Figure 5 Capital works project breakdown



3.1.2.3 Scope of works – enabling works

Known, proposed and /or likely elements of site establishment works associated with the project are as follows:

- **Geotechnical and survey works:** Geotechnical, survey and other investigations co-ordinated by Capital Metro Agency's technical advisor commenced in July 2014 to increase the accuracy of the concept design and determine the level of services diversions required.

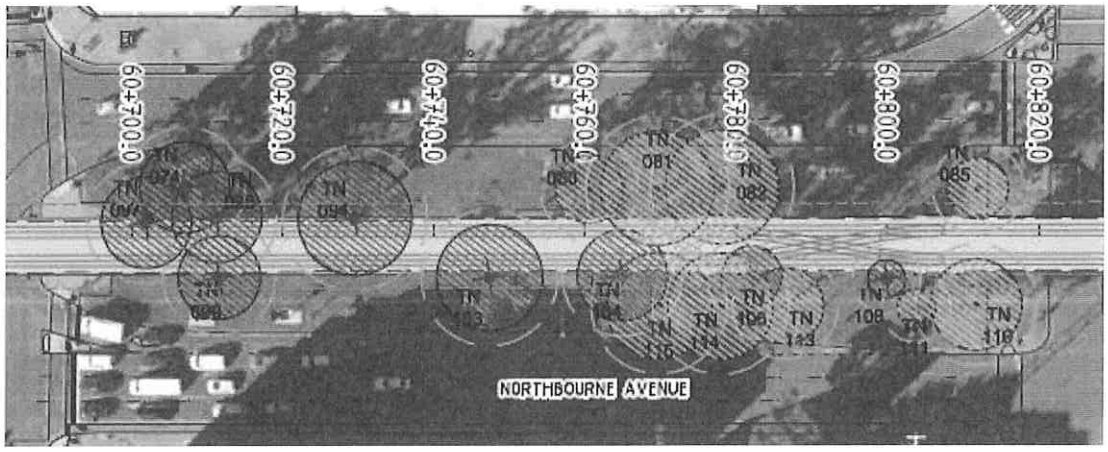
- **Relocation of utilities and services:** Light rail infrastructure will likely require relocation and adjustment to a number of existing services, including longitudinal gas, telecommunication and stormwater services in the median from Antill Street to Sandford Street, and telecommunications in the median along Northbourne Avenue from Barry Drive to Antill Street. Electricity, water supply mains, sewer and street lighting may also be affected. An underground and overhead utilities survey and associated investigation works commenced in July 2014.

  Capital Metro Agency's technical advisors have prepared a preliminary overview of the proposed treatment for utility services impacted by the light rail infrastructure. It is currently proposed that services relocation will form part of the main procured works. However, it is noted that it will likely be desirable from a value for money perspective for ACT Government to adopt a risk sharing / risk adoption approach to any high risk work components not within the potential control of a delivery partner.

- **Tree strategy:** Since 1913, Northbourne Avenue has gone through three distinct successions of tree plantings, from an initial formal avenue of trees to the recent Eucalyptus elata planted in 1986.

A detailed tree survey has been completed and the species, size, health and expected longevity of each tree along the Capital Metro alignment has been documented, including the impacts and risks to the existing trees as a result of the light rail alignment. Approximately 350 existing trees are most likely to be removed due to the light rail construction. An example from the tree impact plans is shown in Figure 6. Site establishment works shall require tree removals to be undertaken. During the course of the project, it is conceivable all existing median trees will require removal, with an opportunity existing to replace trees in impacted areas with trees more suited to the location and climate.

Figure 6 Typical example from tree impact plans showing light rail tracks (grey) and tree protection zone (the space needed to protect the tree, therefore showing trees at risk)



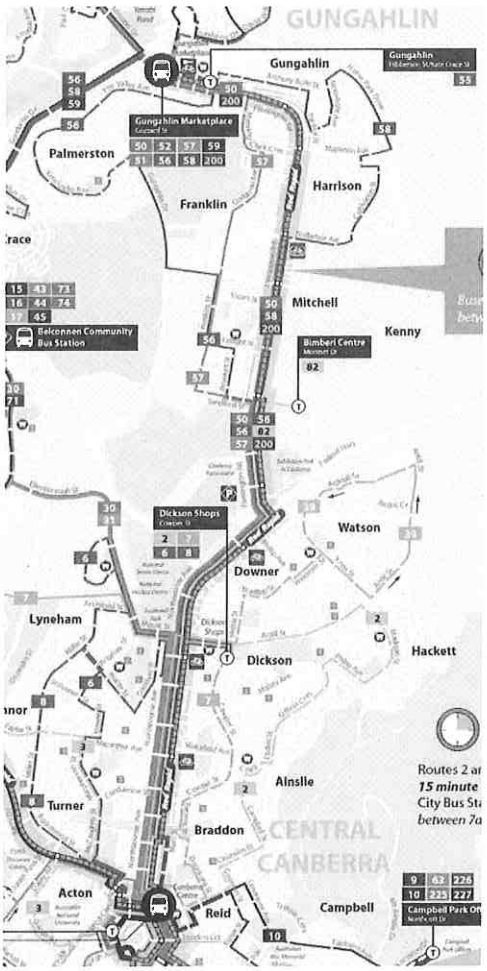
- **Bus routes:** It is likely that changes to the existing bus network (see Figure 7) will be sought in the future to avoid the duplication of services once light rail is operational and to enable efficient interchange between travel modes. The following major interchange locations between bus and light rail will be explored with relevant ACT Government stakeholders (and noting such interchanges do not form part of the Capital Metro business case):
    - Gungahlin Town Centre: Bus network adjusted to a new terminus in Gungahlin Place.
    - Mitchell: Bus stops in Sandford Street or Well Station Drive.
    - Dickson: New bus interchanges in the Cape Street Extension on the east side of Northbourne Avenue.
    - The City: Bus interchange in Alinga Street, Northbourne Avenue and East Row.

Although future bus network changes will be sought to avoid the duplication of services once light rail is operational, it is noted that a very limited number of bus routes may travel with general traffic in limited sections of the corridor on Flemington Rd. This may be the case where such routes are not a general duplication of the light rail service, and where re-routing to avoid conflict with the light rail corridor is not feasible.

Changes to bus routes and services would be co-ordinated by ACT Government in conjunction with ACTION and other relevant stakeholders.

For more information regarding the integration of the light rail and bus network, refer to section 3.1.2.11. The financial implications of changes to bus routes and services are addressed in section 9.8.1.

Figure 7 Existing bus routes in the City-Gungahlin corridor



- **Traffic control during early works and construction:** Construction traffic movements between compounds and work faces are to be confined to travel along the permanent way alignment as far as is practicably possible. Where use of the permanent way is not possible, construction traffic is to use routes planned to minimise disruption to the public.

  Local accesses to properties and businesses are proposed to be maintained in a trafficable condition to the greatest extent possible with minimal denial of access. Where local access is between carriageways, traffic control plans are to be prepared and implemented to minimise disruption to the public. Traffic control works are subject to consultation within ACT Government. As there is anticipated to be minimal disruption to property and business access during construction, it is not expected there will be a need to provide compensation to local businesses and residents during the construction period.

- **Land acquisition:** An objective in developing the design was to minimise land acquisition and impact on property outside the existing road corridor. A full assessment of potential impacts is dependent on

the results of future traffic modelling, which in turn will assist in determining the need for additional lanes at intersections. Areas most at risk besides intersections include:

- Flemington Road immediately south of Kate Crace St, where provision of a new two lane northbound carriageway to the west of the light rail may not be possible within the existing road reserve.
- Lysaght Street intersection layout, which is constrained by the nature reserve and the hillside to the east. It also has limited width of the road reserve to accommodate light rail as well as additional through and turning lanes to provide traffic capacity at the intersection. The light rail alignment may need to shift west in order to use the available road space most effectively. Further investigation is required.
- EPIC / Randwick Road stop / intersection layout. Land acquisition may be required across from Randwick Road to provide the proposed new main entry to EPIC and be extended to connect into the EPIC road system.
- EPIC, near the corner of Flemington Road and the Federal Highway, a small parcel of land may be required to enable widening of the South bound traffic.
- Widening of the Federal Highway will be required in the vicinity of Phillip Avenue and Swindon Street to accommodate the planned stops.
- Swindon Street and Yowani, to enable new four way intersection.
- Northbourne Avenue at Morphett Street and Murdoch Street (deleting elements of the median).
- It is also noted that land acquisition may be required in relation to a new Dickson bus interchange which falls outside the scope of this business case (but which is otherwise within the contemplation of ACT Government).

3.1.2.4 Scope of works – civil infrastructure (ex. depot, roads, park & ride)

Known, proposed and / or likely elements of civil infrastructure work associated with the project (excluding depot, roads and park and ride facilities) include the track, terminus points, stops, power stations and substations.

Track alignment and appearance

A standard 1435mm gauge, double track light rail route will be used at ground level. Light rail will run along the median of Northbourne Avenue and Federal Highway. On Flemington Road the light rail alignment will run in a newly created median reservation about 8m wide on Flemington Road between Federal Highway and Well Station Drive. There will continue to be one car lane in each direction following removal of a 'bus only' lane which will no longer be required, with any further road works which may be desired by ACT Government in this section not being within the scope of this business case. The light rail will run along a newly pedestrianized section of Hibberson Street between Gungahlin Place and Hinder Street, which will remove car / light rail conflicts in that area.

A summary of trackform types and where they may be used is outlined in Table 7. For cost estimation purposes, various trackforms (in different locations) have been assumed. Track finishing will be determined during finalisation of the procurement process.

Table 7 Indicative summary of trackform types

Type	Description	Location
1	Concrete single tracks	Generally
2	Concrete double width with Vignoles rail	At intersections adjoining Type 1
3	Embedded grooved rail with Paver finish	Gungahlin town centre pedestrianised zone
4	Embedded grooved rail with Cement stabilised decomposed aggregate	Northbourne Avenue from Alinga Street to Federal and Barton Highways intersection, including at stops
5	Embedded grooved rail with Bitumen finish	Future pedestrianised block in Gungahlin (between Hinder and Kate Crace St)
6	Concrete with higher quality exposed aggregate finish	At intersections adjoining Types 3, 4, and 5
7	Rail over track slab	Potentially between Randwick Rd and Kate Crace St
8	Ballast track	May be permitted to tenderers in some median, non-pedestrianized zones
9	Grass track	Not proposed, but not precluded to tenderers

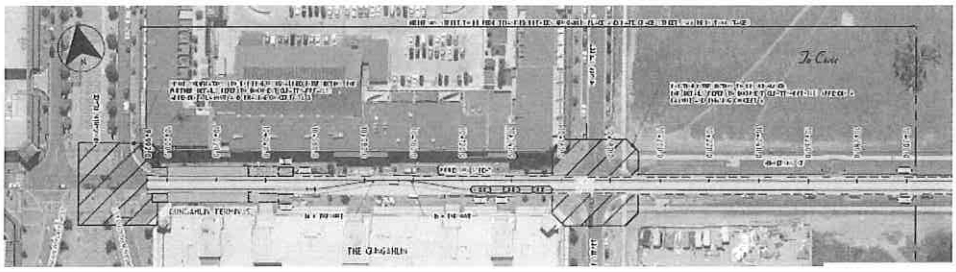
Terminus points

The northern terminus is proposed to be on Hibberson Street, Gungahlin, east of Gungahlin Place. This location has been selected on the basis that:

- It represents a central location given projected future growth of the Gungahlin town centre;
- Construction costs are likely to be lower than elsewhere within the Gungahlin town centre;
- The location is suited to bus interchanges, though consideration of impacts will need to be considered further within ACT Government;
- The location is suitable for the proposed associated pedestrianisation of a section of Hibberson Street; and
- Access to the car park on the corner of Hibberson Street and Gozzard Street may be maintained.

The terminus is shown in Figure 8. Local community consultation is planned in the area, including contacting nearby shop owners regarding the proposed terminus location.

Figure 8 Gungahlin Terminus preferred option Hibberson Street, east of Gungahlin Place

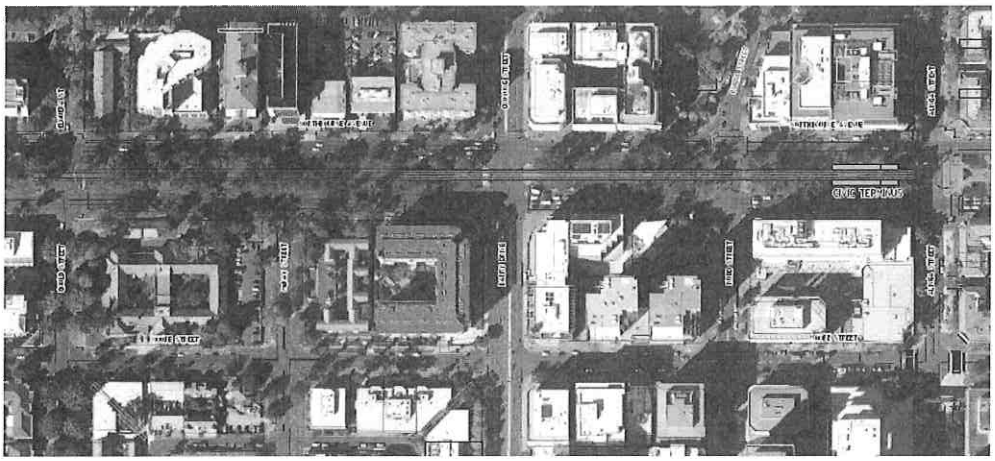


The southern terminus is proposed be on Northbourne Avenue, the City, north of Alinga Street. This location has been selected on the basis that:

- It represents a reasonably central location in proximity to existing bus interchange facilities; and
- It best provides for future growth of the light rail network. From this location, future network expansion may occur down Alinga Street and City Walk towards Russell and the Airport, straight ahead along the Commonwealth Avenue Bridge, or left towards the Australian National University.

The terminus is shown in Figure 9.

Figure 9 The City Terminus preferred option Northbourne Avenue north of Alinga Street



Stops

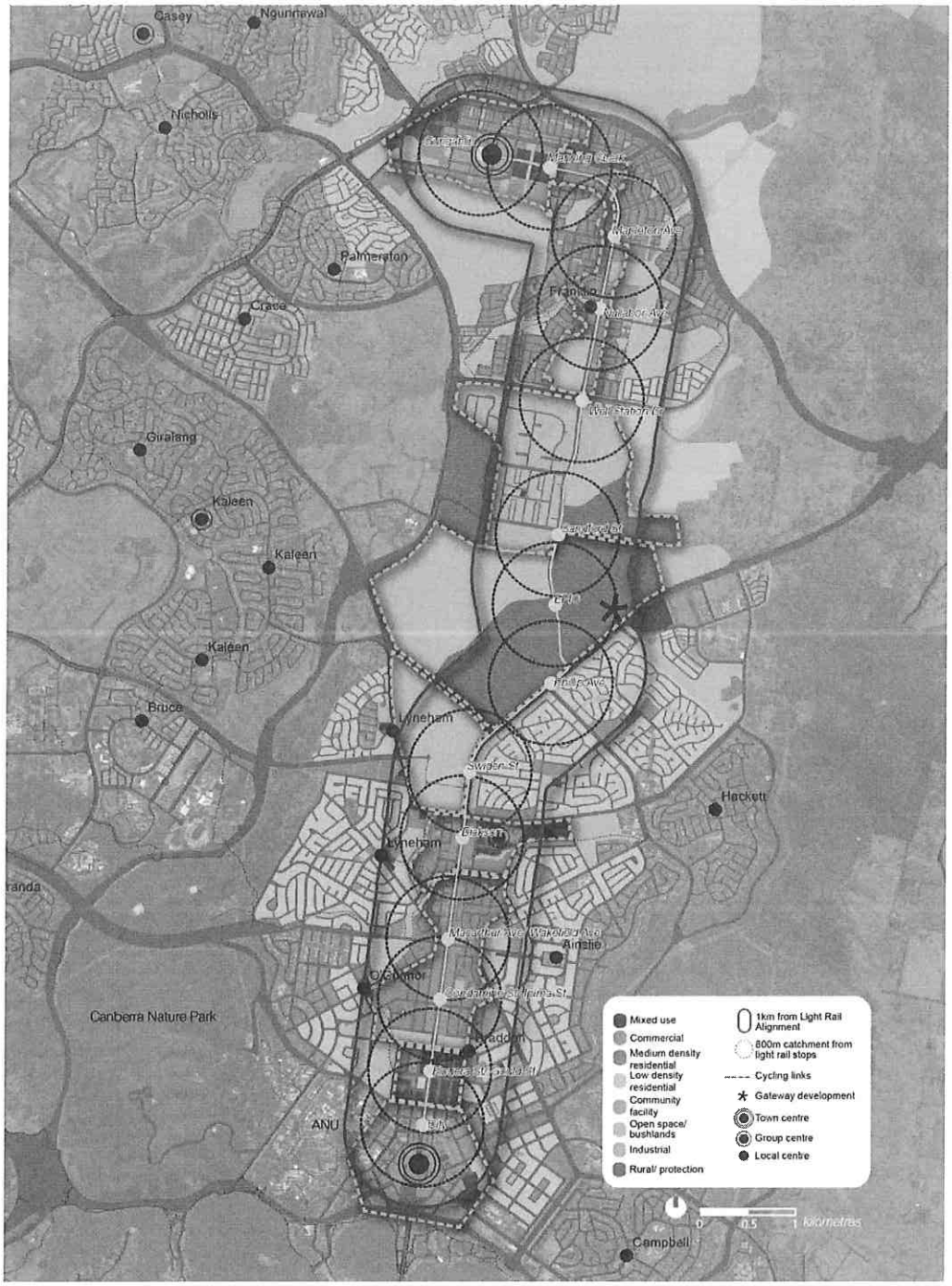
The location of stops shall be finalised during the procurement process following consortia input and all necessary stakeholder approvals. Community consultation shall also inform the ultimate location of stops. Based upon the project's concept design, indicative stop locations are (listed north to south):

- Flemington Road / Manning Clark Drive;
- Flemington Road / Mapleton Avenue;
- Flemington Road / Nullarbor Avenue;
- One stop to serve Mitchell at Well Station Drive;
- Flemington Road / Randwick Road (for special events at Epic only);

- Federal Highway / Phillip Avenue;
- Federal Highway at Swinden / Yowani;
- Dickson Interchange;
- Northbourne Avenue / Wakefield Avenue / Macarthur Avenue;
- Northbourne Avenue / Condamine Street / Ipima Street; and
- Northbourne Avenue / Gould Street / Elouera Street.

These stops and the terminus points are shown in Figure 10.

Figure 10 Indicative stop locations (note: Sandford Street stop is no longer proposed)



Other proposals for stops include deferring the construction of the stop at the Visitor Information Centre and Sandford St.

Stops will comprise a mixture of island and side-by-side platforms with appropriate weather protection and equipment (such as ticketing facilities and passenger emergency / information systems).

Power transmission

During the procurement process, Capital Metro Agency proposes not to prescribe whether an overhead wired or wireless power system is preferred. However, on a cost and technological risk basis, it is currently more probable than not that the project will adopt a wired power delivery system. On this basis, the project would likely utilise an overhead 750 volt dc power supply (noting that a typical light rail vehicle operating range is between 525 and 900 volt dc). This would necessitate the construction of an overhead wiring system (which may potentially be discrete), including poles.

Sub-stations

For planning approval purposes, seven potential traction power substation (TPS) sites have been identified for establishment along the light rail alignment at:

- Kate Crace Street;
- Collaroy Street;
- Vicars Street;
- Depot;
- Barton Highway;
- Macarthur House; and
- Mort Street.

The traction system will be designed to enable full service operations with any one TPS out of service (n+1 contingency) in the event of 11kV supply outage or equipment failure. Each TPS supplied from the same zone substations will be supplied from different busbar sections within the zone substations.

The availability of reliable, high quality power supplies to Capital Metro's intended TPS locations is a technical requirement which will continue to be developed in liaison with Canberra's electricity distribution service provider. TPS locations will also be placed clear of existing civil infrastructure such as public access ways, and cycle routes.

3.1.2.5 Scope of works – civil infrastructure (depot)

Known and / or likely elements of depot civil infrastructure work associated with the project are as follows:

- **Location:** A light rail stabling area for overnight storage of all vehicles is proposed to be located in Mitchell, next to the existing ACT Government site at 9 Sandford Street. No other suitable site has been identified for the depot facilities. This will be the headquarters of the network's physical operations, incorporating the control centre, maintenance facilities and storage space for spare parts. Mitchell is a light industrial suburb and the aforementioned vacant ACT-owned land is available.
- **Buildings:** A light rail vehicle maintenance workshop, wash plant and sanding silo is proposed be constructed.

- **Stabling:** Stabling will be constructed to hold 14 light rail vehicles and will be initially constructed for 33m light rail vehicles, with the availability of land for a future extension to accommodate light rail vehicles up to 45m if necessary.

- **New bridge at stabling yard:** This is a new bridge which will be constructed over an existing drainage channel to connect the light rail alignment from Flemington Road to the depot, which is located near the intersection with Sandford Street.

- **Contamination:** Preliminary discussions with the ACT Environmental Protection Authority indicate that the proposed depot site is highly likely to be contaminated (it is understood it has been subjected to continual tipping, has been the site for previous incineration activities, dipping, and/or asbestos is present). If contamination is found to exist, works will be necessary to address such contamination. A contamination desktop study has been completed and further detailed surveys are being carried out to determine the degree of contamination along the route. Contamination allowances have been made in both the project's base cost estimate and in contingency amounts.

- **Flooding:** Preliminary assessments are being carried out of previous studies, the output from which is yet to be received. Once data has been evaluated consideration may be required as to any potential impacts on design. It is noted that the site is next to a National Archives facility.

3.1.2.6 Scope of works – civil infrastructure (roads, park & ride)

Known and / or likely elements of roads and park and ride civil infrastructure work associated with the project are as follows:

- **Road design:** Integrating a light rail network into Canberra's existing road network will necessitate changes to the road network, particularly at intersections. Kerb widening, lane adjustments and existing intersection modifications will be required to accommodate the recommended alignment. Modifications will generally comprise:

  - Modifications to intersection layouts;
  - Modifications to traffic signal phasing;
  - Installation of new traffic signals;
  - Removal of right-turns;
  - Widening of the road carriageway;
  - Lane duplications and removals; and
  - Changes to property access.

  The existing right turns on Flemington Road at the Mitchell Waste Management Centre and Lysaght Street, and Northbourne Avenue, Rudd Street and Bunda Street are proposed to be retained with signal controls in place under the current design proposal. New traffic signals at ten locations are expected to be necessary to ensure that all vehicle movements across the light rail are signalised (see below).

Lane duplications in both directions shall occur on Flemington Rd between Kate Crace St and Manning Clarke Cr. Southbound on Flemington Rd between Lysaght St and Sandford St two car lanes shall be reduced to one, and between Sandford St and the Federal Highway two lanes (one bus, one car) shall be reduced to one car lane. Northbound on Flemington Rd between Randwick Rd and Lysaght St two car lanes shall be reduced to one.

- **Bridge works:** Four minor bridges have been identified along the proposed alignment and will need adjustments for light rail. These bridges are located at:
  - Bridge 2015: Northbourne Avenue and Morphett St, Dickson, a single span, single deck bridge, over a storm drain.
  - Bridge 2032 and 2033: Flemington Road, near Randwick Road (Southern), two single span bridges.
  - Bridge 1334: Flemington Road, near Clare Burton Circuit (Northern), two span bridges. The second was built in 2009 as a duplication of the first.
  - New bridge at stabling yard: This is a new bridge which will be constructed over an existing drainage channel to connect the light rail alignment from Flemington Road to the depot, which is located near the intersection with Sandford Street.
- **Park & ride facility:** Existing park and ride facilities are currently located at the EPIC site. If that park and ride facility is to be retained, it will require modification. A new 350 space facility within Gungahlin town centre was announced in May 2014 which would be located within walking distance of the new light rail terminus. The current scope of works does not include any new park and ride facilities, but exploration of park and ride opportunities is anticipated to feature during the project's procurement process. A park and ride site has also been proposed at Well Station Drive for consideration.
- **Bus / Light Rail Interchanges:** Though these are not considered as part of the Capital Metro business case, these facilities do have the potential to enhance the usability of the system. There is an existing bus / light rail interchange at the City which is not considered to require further enhancement. Other potential interchange locations are being considered by ACT Government at Dickson, Well Station Drive and Gungahlin (at Gungahlin Place).

3.1.2.7 Scope of works – systems infrastructure

Known and / or likely elements of systems infrastructure work associated with the project are as follows:

- **Signalling**: Capital Metro will be essentially a line-of-sight light rail system. As with a road vehicle, it is the light rail driver's responsibility to observe the route ahead and stop before any obstruction. No signalling system is therefore required to maintain separation between light rail vehicles and other vehicles on plain track.

  Traffic signalling is required to manage potential conflicts between light rail vehicles and road vehicles at intersections. Light rail will be given signal priority. To maintain safe pedestrian access to stations, and so as to enable light rail operations to achieve desired trip durations, new traffic signals are indicatively proposed at ten locations:

  - Hibberson Street and Hinder Street;

- Flemington Road and Kate Crace Street;
- Flemington Road and Mitchell Resource Management Centre;
- Flemington Road and Lysaght Street;
- Flemington Road and the proposed Light Rail Depot;
- Flemington Road and Randwick Road;
- Pedestrian Crossing at EPIC to replace the current Zebra Crossing;
- Northbourne Avenue and Swinden Street;
- Northbourne Avenue and Murdoch St; and
- Northbourne Avenue and Morphett St.

Further, it is proposed pedestrian signals on Northbourne Avenue near TransACT House shall be relocated to the proposed Dickson light rail stop.

The necessity for signals at each of these locations will be considered as the project progresses. Note that signals at the light rail depot will only stop traffic as light rail vehicles depart and return at either end of the day.

- **Communications and passenger systems:** ICT and Customer Informatics Systems will play a vital role in providing operational services and determining customers' experience and expectations of Capital Metro. The objective of these systems will be to provide timely, safe and reliable transmission of voice, data and video traffic from key operational locations throughout the light rail network. Equipment for these systems will be spread across the network and will be located at light rail stops, within light rail vehicles, traction substations, the central control room, radio transmission towers and at the stabling yard. The precise nature of communications and passenger systems shall be determined during the procurement process.

3.1.2.8 Scope of works – rolling stock

The rolling stock component of the project is likely to entail the provision of 14 light rail vehicles with capacity of approximately 200 people and a length of approximately 33 metres. This is the most usual currently available configuration for light rail vehicles. The light rail will have level boarding at all doors, priority seats for mobility impaired and designated areas for wheelchairs and pushchairs.

The purchasing of 14 vehicles accounts for one vehicle assumed to be under maintenance and another for unscheduled repairs, with 12 light rail vehicles in service. Note that this fleet size has been used to inform costings, but is not prescribed for the purposes of the procurement process.

The light rail vehicle model chosen should ideally be capable of conversion with on-board energy storage to support limited lengths of wire-free operation. This is not an unusual rolling stock feature and best allows for future extensions of Canberra's light rail network. Light rail vehicles will be standard supplier models, which shall minimise costs and reduce risk of delays.

Purchasing a light rail vehicle capable of being retrofitted should not add a material amount to the cost, however it is worth noting that there may be a case for fitting a wireless solution at build as retrofitting the upgrade itself is more expensive. It is therefore currently proposed that the option for both a retrofit and fit at build is a priced option in the contract to enable the evaluation of these options on a value for money basis.

3.1.2.9 Scope of works – landscaping

Known and / or likely elements of landscaping work associated with the project (subject to ongoing review by other stakeholders) are as follows:

- **Tree regeneration**: Regeneration of areas impacted by tree removals with suitable tree species.
- **Median strip landscaping:** The landscaping along Northbourne Avenue continues to be a key consideration for the project. The selection and arrangement of any replacement plantings along the Northbourne Avenue corridor is being designed to respond to its landscape heritage values as part of the Griffin concept for Canberra. This aspect does however require further confirmation based on the final design and consultation with the NCA, stakeholders within ACT Government, and other stakeholders.

3.1.2.10 Corridor development

Whilst the project will facilitate property development within the rail corridor, this business case does not seek any approvals for the conduct of such development. Rail corridor property development does not form part of the scope of works for the project. Corridor development is discussed in section 7.1 (as a key dependency) and Chapter 8.0.

Capital Metro Agency:

- Considers, based upon preliminary investigations, that the urban revitalisation and densification benefits outlined in this paper are best achieved through the adoption of a rail corridor development strategy. Capital Metro Agency will liaise closely with stakeholders within ACT Government in the establishment of such a strategy;
- Notes the adoption of a property development strategy will have a positive impact upon light rail patronage; and
- Recommends an approach to rail corridor development which appropriately balances residential, commercial, social, community and retail development. Such an approach will assist in optimising light rail patronage outside peak hours.

3.1.2.11 Bus integration with light rail

As discussed earlier, the existing bus network (see Figure 7) is proposed to be restructured to avoid the duplication of services once light rail is operational and to ensure a comprehensive integrated public transport network.

Light rail will act as the backbone of the public transport network in the City to Gungahlin corridor, with buses feeding into the system at three main interchanges at City, Gungahlin Town Centre and Dickson. Any works to bus interchanges do not form part of the project's business case, but are being considered by ACT Government.

City

The existing City Bus Station is adjacent to the proposed City light rail terminus at Alinga Street. Some reallocation of bus bays within the bus station may be desirable to facilitate the heaviest passenger movements. Some upgrading of the existing bays on Northbourne Ave may also be desirable.

Gungahlin Town Centre

In Gungahlin Town Centre, the existing main bus stops are proposed to be relocated from Hibberson Street (at the Market Place) to Gungahlin Place, adjacent to the light rail terminus. A new taxi rank and 'kiss & ride' bays may also be desirable in Gungahlin Place.

Dickson

At Dickson, a new bus station may be considered adjacent to the light rail stop to accommodate about nine bus routes. A new taxi rank and 'kiss & ride' bays may also be desirable in Challis Street.

The design of the possible bus station could connect light rail with important east - west bus routes. It may also allow bus routes to extend conveniently to service the main retail core of Dickson Group Centre further to the east. A new bus layover facility may be considered along Antill Street (adjacent to the Dickson District Playing Fields), away from the busy Group Centre, to facilitate efficient bus operations.

Other

Less significant interchange will also occur in Mitchell, at the proposed light rail stop at Well Station Drive. As only one bus route is involved at that location, no special facilities are foreshadowed. The light rail and bus stop will be located as closely as possible and a convenient pedestrian connection provided.

The proposed restructuring of bus routes will result in no bus routes operating along Flemington Road between Manning Clarke Crescent (North) and Sandford Street, or along Northbourne Avenue between City and Dickson. Permanent bus stops could be removed from these sections, though regard will be had to the occasional need to operate buses while trackwork occurs. To retain public transport connectivity and reduce the need for passengers to make multiple transfers, one or two bus routes would continue to operate between Mitchell and Dickson, along Flemington Road, Federal Highway and Northbourne Avenue. Due to the small number of buses, they would operate in the general traffic lanes, without specific priority measures.

The restructuring of bus routes will be coordinated with feedback during the procurement process, and in consultation with ACT Government and other relevant stakeholders.

The changes to bus routes and services are addressed in Section 9.8.1. Savings recognised from these changes have been considered within the calculation of benefits of light rail. Although a matter for Treasury, it is understood that any ACTION savings will be recognised within future budgets.

For people without direct access to a light rail stop or a convenient connecting bus service, 'park & ride' facilities will play an important role in ensuring good accessibility to the light rail. Such facilities are discussed in section 3.1.2.6 above.

3.1.3 Scope of services

3.1.3.1 Scope of operations and maintenance

Table 8 outlines the post-commissioning services which will be included in the procurement specifications.

Table 8 Scope of operation and maintenance

Service	Description
Light Rail Operations	All aspects of light rail operations for the operating term (described in the delivery model Chapter 8.0), including: • Passenger services including driver operations, safety management, customer services, revenue collection and protection. • Security services (including CCTV surveillance) • Signalling / control centre operations • Communication and rail control systems including rail systems, stop systems, phone systems, passenger information display and announcement systems, supervisory control and data acquisition, signalling, control centre and light rail vehicle systems • Other associated light rail operational services • Note that it is anticipated that ACT Government will maintain responsibility for ticketing systems. However, certain services associated with fare collection may form part of the services performed by PPP Co.
Light Rail Maintenance	All aspects of light rail maintenance for the operating term, including: • Maintenance of light rail vehicles • Depot maintenance • Track, signalling and associated infrastructure maintenance • Station and vehicle cleaning
Finance	Private sector financing shall be in place for the duration of the concession term, subject to capital contributions which may be made by ACT Government. Please refer to the delivery model Chapter 8.0 and section 9.4.
Other Services	As bidding consortia will be requested to propose innovative solutions which reduce cost, reduce risk, enhance design or enhance customer service outcomes for the ACT Government, other services may fall within the final scope of the procured outcome to the extent such services provide added value to the project. An example may be the management of retail services at stop locations.

3.1.3.2 Light rail service outcomes

The following service outcomes are subject to development during the project's procurement phase.

- **Travel time**: The target journey time will be approximately 25 minutes in peak from Gungahlin to the City with approximately 11 intermediate stops (plus two termini), running entirely in the road median; and

- **Frequency:** It is anticipated that light rail operations will achieve a frequency of at least 10 minutes on weekdays between the core hours of 7am and 6pm. Outside these hours on weekdays and all day on Saturdays the frequency is anticipated to be at least every 15 minutes. The frequency on Sunday is

anticipated to be at least every 20 minutes. A 5 minute frequency will operate during peak periods if deemed necessary.

The light rail service is proposed to commence in Gungahlin at or before 6am and conclude its run in Gungahlin at or after 11.15pm Monday to Saturday. On Sundays it is proposed to start in Gungahlin 2 hours later at 8am and conclude before 11pm. Light rail is anticipated to depart from the City at or before 6.15am Monday to Saturday and before 8.30am on Sundays. On Sundays through to Thursdays the last light rail is proposed to leave the City before 11.30pm. On Friday and Saturday nights the last light rail is proposed leave the City at or after 1.00am the following morning.

Each of the proposed frequencies set forth above may be subject to optimisation over the course of the concession term following liaison between ACT Government and the operator.

3.2 Review 1 (CMTEDD): Status of functional brief / output specification

The functional design brief and output specification will be completed in the approach to the project's 'request for proposals' phase.

To the greatest extent reasonably possible, Capital Metro Agency shall:

- Minimise mandatory design specifications; and
- Frame project requirements as output specifications.

The aforementioned approach will be adopted so as to best utilise one of the greatest potential advantages of the PPP delivery model - the benefit of the private sector having sufficient scope to innovate in proposing project features which best meet desired cost, service level and urban design outcomes sought by the ACT Government.

CMTEDD (formerly CWD) directorate to sign off that the design and output specification processes have been undertaken in a manner sufficient to proceed to market for Expressions of Interest.	
Review 1 (CMTEDD) Officer Name:	
Signature:	[signed]
Date:	[dated]

4.0 Needs analysis

Key messages:

- Canberra is a vibrant and growing city. Capital Metro is the first stage of a potentially broader light rail network that will have a transformative effect on Canberra. It also provides an opportunity to substantially enhance other city transformation activities which are planned or underway.
- The key benefits to be delivered by the project include:
  - A modal shift to public transport in Canberra with attendant benefits.
  - Further urban densification and revitalisation along the rail corridor. Without light rail, any corridor development would almost certainly occur more slowly than would be the case with light rail.

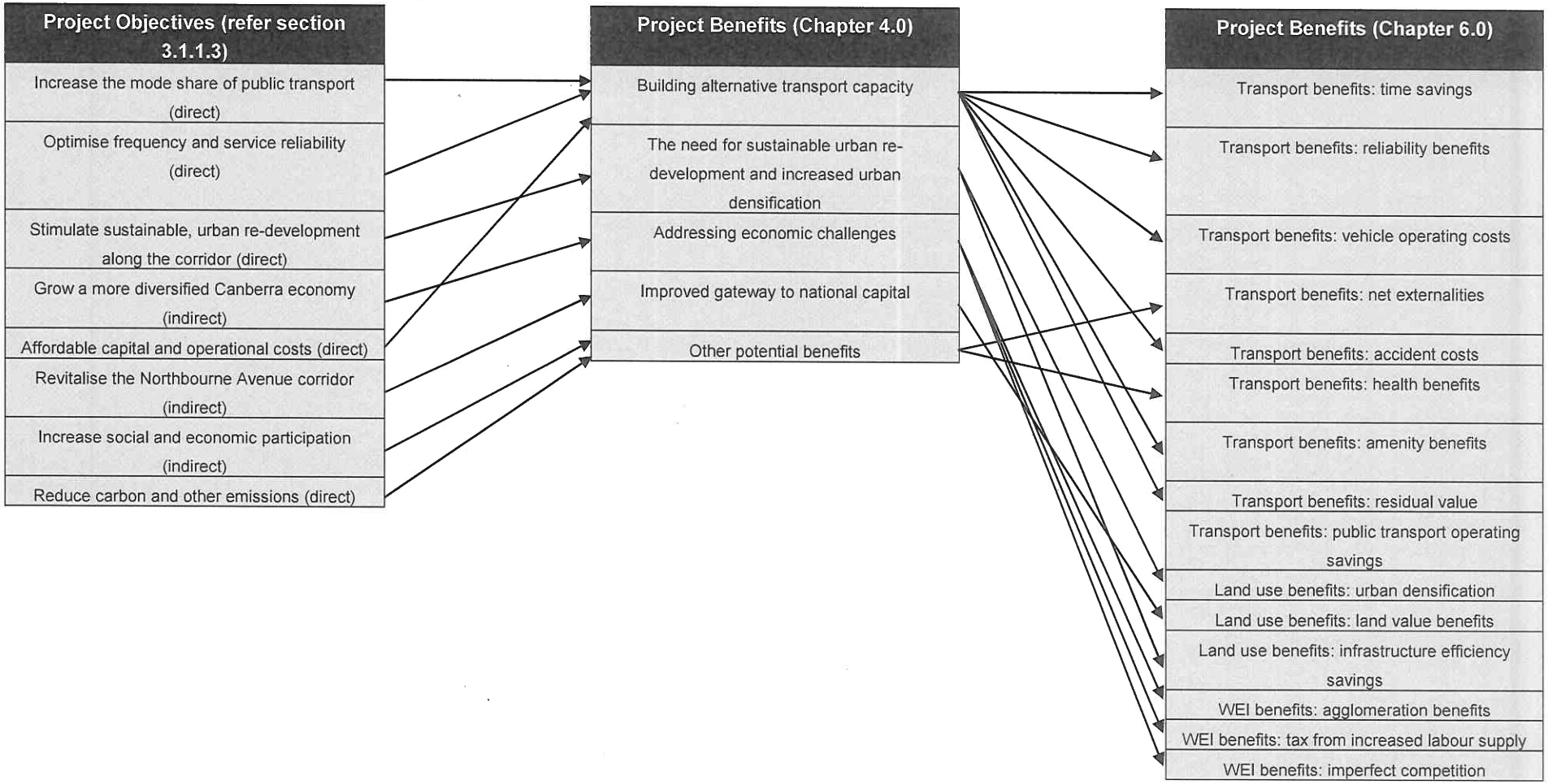
4.1 Overview – Linking Objectives and Benefits

This *Full Business Case* has been drafted with reference to *The Capital Framework*. As such, it discusses objectives and anticipated benefits associated with the project from a number of different perspectives. For example, this document discusses:

- Project objectives as previously agreed by Cabinet;
- Benefits in a qualitative sense in this Chapter 4.0; and
- Benefits in an economic sense in Chapter 6.0. These benefits are described according to industry accepted methodologies. It is noted that economic analysis does not incorporate certain potential social benefits, as described in section 6.1.1.

The diagram below attempts to provide an indication as to how the project's objectives and benefits, as described throughout this document, are linked:

Figure 11 Linking objectives and benefits, as described in this document



4.2 Key problems addressed by this project

4.2.1 Overview

Canberra is a vibrant and growing city. Capital Metro is the first stage of a potentially broader light rail network that will have a transformative effect on Canberra. It will also substantially enhance other city transformation activities which are planned or underway. Capital Metro both addresses current issues and future-proofs against others likely to arise. The project builds upon Griffin's vision for light rail within Canberra.

As with any city transformation activity, the project should not be viewed in isolation. Instead, it should be viewed as also improving outcomes from other urban renewal activities planned or underway in Canberra. For example, Capital Metro and the ACT Government's *City to the Lake* program may together have a compounding transformational effect on Canberra's city centre.

The Capital Framework requires key problems to be identified in this business case. The primary problems to be addressed by the project are as follows:

- The need to build future transport capacity in the ACT. Canberra experiences a high and growing level of car dependency and usage, with attendant traffic congestion and other problems (particularly along the Northbourne Avenue – Federal Highway corridor); and
- The need for enhanced sustainable urban re-development and densification in the ACT (as outlined in the *ACT Planning Strategy*). Potential constraints exist to the future supply of developable greenfield land in the ACT.

Other problems facing the ACT Government which may be addressed in part by the project include:

- Economic challenges faced by the ACT; and
- Elements of the Federal Highway – Northbourne Avenue corridor may be regarded as an aesthetically sub-optimal gateway to the nation's capital.

These problems are discussed in more detail below.

4.2.2 Problem 1: the need to build future alternative transport capacity

4.2.2.1 What is the problem?

The high and growing level of car dependency and usage in Canberra has a number of negative impacts including:

- Traffic congestion and slow travel times, in particular along the Northbourne Avenue and Federal Highway corridor. Congestion is expected to worsen in coming years with the rapid growth of Gungahlin and other areas in northern Canberra;
- Reduced accessibility by individuals who do not own a car, which in turn carries with it social equity issues. For Canberrans who do not own a car, living in a city with limited public transportation alternatives may restrict their access to services, employment, shops, social and other activities. Under the Australian Government's Liveable Cities program, a key goal is to improve accessibility and reduce

dependence on private vehicles through improving transport options. An Australia-wide ABS survey performed in 2010 suggested that nearly half (48%) of adults without access to a passenger vehicle felt they sometimes or often had difficulty getting to places, compared to only 10% for those who had access to a passenger vehicle; and

- Lost economic productivity together with adverse health, environmental and other outcomes. Economic matters are discussed in Chapter 6.0.

As the need for future transport capacity increases, such capacity may only be met through substantial further investment in roads or public transport. The ACT Government has a stated preference to increase the proportional level of usage of public transport within the ACT Government.

"Canberra at the moment has the highest per capita car use of any city in Australia – not the kind of leadership role we want. Building Canberra's light rail will help transform the national capital for a more sustainable future. Investing in smart infrastructure to better connect the City to the newest town centre signals a refreshing approach to planning rather than just providing for yet more cars. It revives the vision of Walter Burley Griffin.

Retrofitting a car-oriented city with a light rail network, initially connecting the City to Gungahlin, combined with well-designed and located transit-oriented development, will bring a wide range of benefits for Canberra communities. These include economic, health, social and environmental benefits, which must be included in any triple bottom line cost benefit analysis.

Rail is booming across the world as cities everywhere are finding that car and bus access is not working well for their congested urban economies."

Barbara Norman, Tony McMichael, Peter Newman and Will Steffen, Canberra light rail has benefits for all in a sustainable 21st century, The Canberra Times, 4 August 2014 http://www.canberratimes.com.au/comment/canberra-light-rail-has-benefits-for-all-in-a-sustainable-21st-century-20140803-zzxzf.html (accessed 4 August 2014)

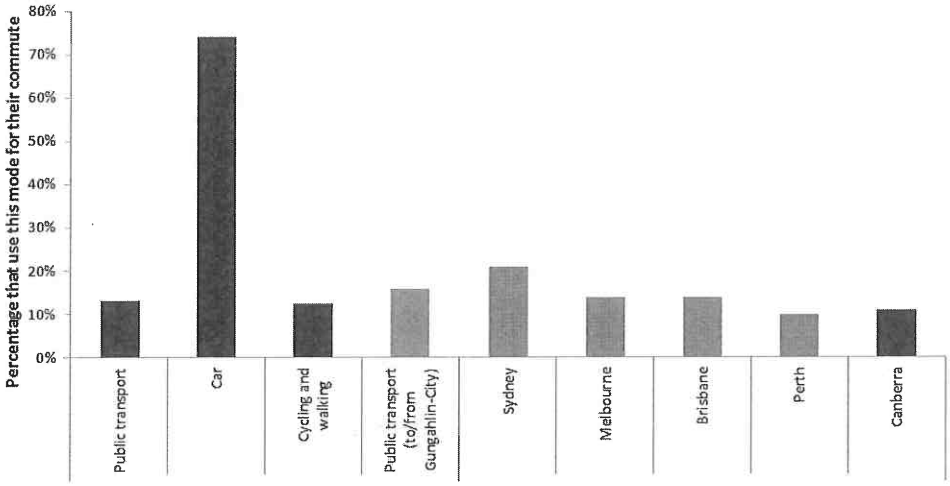
4.2.2.2 Evidence of the problem

Level of car dependency evidence:

There are around 13,400 workers who live and work along the Capital Metro corridor. Of those who leave Gungahlin each morning for work, over 70% are heading to the City (between Macarthur Avenue and the City).

The public transport commuter mode share across the whole of Canberra is low at 11%, while car dependency is high. Figure 12 below shows Canberra compared to other Australian cities. Sydney has the highest public transport mode share of the Australian cities, at 21%.

Figure 12 Public transport mode share for those who live and also work on the Stage 1 corridor compared to Australian cities (AM and PM commuter peaks), based on 2011 census



Canberra's low density and dispersed pattern of land development encourages inefficient use of urban infrastructure. Combined with limited public transportation options, Canberra may presently be categorised as a highly car-dependent city.

Road congestion evidence – total travel time:

At present, there are a number of arterial roads in or near the proposed light rail corridor which experience material capacity and congestion issues during peak times. Those roads include Northbourne Avenue and sections of Flemington Road, Gungahlin Drive, Barton Highway, Horse Park Drive and Gundaroo Drive. The total length of road sections which experience significant congestion is estimated to be about 16 kilometres across a light rail catchment area.

As a consequence of the aforementioned capacity and congestion issues, the total car travel time from Gungahlin to the City during morning peak averages approximately 35 minutes. However, travel time along this corridor is highly unreliable. Travel time currently escalates to more than 45 minutes at peak congestion times.

Based upon micro simulation modelling performed in 2013[1], the current average Gungahlin to City morning peak travel time of approximately 35 minutes compares to an anticipated average car travel time in 2031 of:

- **Without Capital Metro:** 57 minutes assuming Capital Metro is *not* constructed and no other remedial actions are taken; or
- **With Capital Metro:** 42 minutes assuming Capital Metro *is* constructed (with a travel time of approximately 25 minutes for those using Capital Metro).

[1] *It is noted that the micro simulation modelling has been based upon the proposed rail corridor and Roads ACT travel time surveys. This modelling has not been used to calculate economic benefits, as these have been derived via strategic (macro) modelling. Micro simulation modelling has been based on highly detailed analysis of traffic flow on specific roads and intersections likely to be affected by the light rail route, whereas strategic modelling considers land-use models to predict the volume of demand and travel patterns.*

Road congestion evidence – travel time delays:

Based on advisor analysis of estimated current average vehicle delays and car travel to work patterns, Table 9 shows the current average delay per trip (in minutes) in the morning peak. The figures in bold represent the delay on individual links, while the figures not in bold represent a combination of these links. Population increases and other road projects will likely lead to increased levels of congestion in the future.

Table 9 Minutes lost per vehicle due to congestion between points along the route in peak (compared to free flow conditions)

		To		
		Gungahlin	EPIC	City
From	Gungahlin		**3.0**	7.8
	EPIC	**2.2**		**4.8**
	City	6.1	**3.9**	

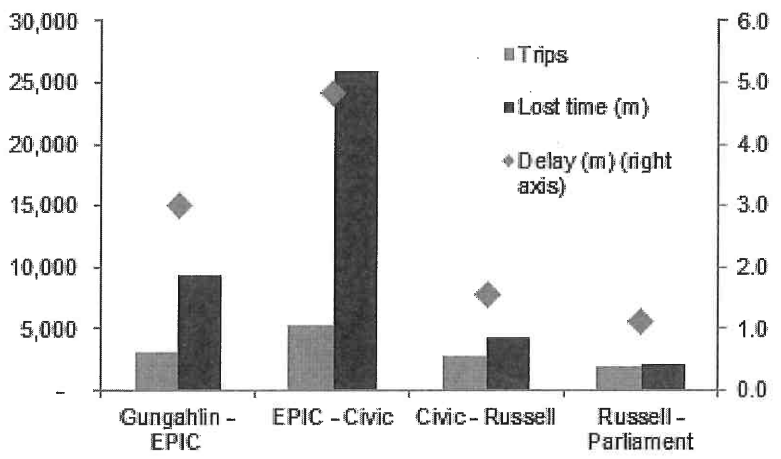
The link with most lost time per vehicle is EPIC to the City, where each vehicle loses nearly five minutes compared to free flow conditions. From Gungahlin to EPIC the delay amounts to 3 minutes.

Figure 13 shows that there are around 3,000 car trips using the stretch of road between Gungahlin and EPIC as part of a southbound journey to work that is fully within the corridor (i.e. both place of residence and place of work fall within the corridor). These trips result in a loss of nearly 10,000 minutes per day to congestion (refer to figure below).

More than 5,000 car trips use the section between EPIC and the City (this includes all those who use that stretch as part of a longer journey) and these trips lose more than 25,000 minutes per day (refer to figure below).

With Gungahlin's population predicted to grow from its current population levels of around 50,000 to about 70,000 in 2021 and about 85,000 by 2031, the travel time is estimated to escalate to around 57 minutes in 2031 without light rail investment.

Figure 13 Delay per trip (in minutes) for southbound movements along the corridor.



There are hidden costs of car-dependency such as health costs, greenhouse emissions, and restricted access for those who do not own a car. It also results in increased cost of car ownership to households. Capital Metro provides an opportunity to slow the worsening of such costs.

4.2.2.3 Does the problem need to be addressed now?

Traffic congestion in Canberra is not presently as severe as in other major Australian cities such as Sydney and Melbourne. This is not to suggest, however, that Canberra does not already suffer from congestion (particularly in the rail corridor during peak periods) or that Canberra should persist with worsening levels of motor vehicle congestion until the issue reaches an untenable point. Instead, Canberra has an opportunity to address existing issues of car dependency and congestion whilst limiting the anticipated future degradation of transport levels of service. In this regards:

- The car dependency and congestion problems outlined above will only become more acute over time without investment in transportation infrastructure, with attendant adverse impacts on economic activity in the ACT. This is in the context of continued population growth anticipated in Gungahlin, North Canberra, and regional centres to Canberra's north. A 2007 Bureau of Transport and Regional Economics report into the costs of congestion estimated that the social costs of congestion could rise from $0.11bn to $0.2bn per annum for Canberra by 2020, based on 'business as usual' projections of transport activity;

- Taking into account light rail procurement and construction periods, car dependency and congestion problems are expected to continue to worsen in the period to the commencement of light rail operations;

- There is also an environmental impact of increasing levels of congestion. According to the aforementioned Bureau of Transport and Regional Economics report, traffic interruptions due to road congestion account for around 15 to 35 per cent of the emissions generated by urban motor vehicles (depending on the emission species);

- Allowing such car dominance to continue in the ACT would be contrary to Government policy. *Transport for Canberra* includes a target to achieve 30% mode share of all journey to work trips by active or public transport by 2026. This target is also intended to increase the efficiency of travel by decreasing the emissions intensity of the ACT passenger vehicle fleet; and

- One may anticipate that the practical difficulties and costs associated with constructing congestion-relieving transportation infrastructure will increase over time as congestion and road dependency worsens.

In order to reduce high car dependency in the ACT, an attractive public transport solution for commuters should be implemented with travel times and costs which are acceptable when compared with private vehicles. Previous studies undertaken by the ACT Government, together with a variety of international studies, indicate light rail is a preferable mode in which to move public transport users within an inner city environment. As such, Capital Metro is likely to increase public transport use in Canberra.

4.2.3 Problem 2: a need for sustainable urban re-development and increased urban densification

4.2.3.1 What is the problem?

There is a need for enhanced sustainable urban re-development and densification the ACT. Much work has already been undertaken within ACT Government (and in particular by the Environment and Planning Directorate) in establishing the existence of this need. As set forth in the 2012 *ACT Planning Strategy*:

- "...our social equity, convenient access and liveability is threatened by the environmental and economic costs associated with continued expansion of our urban area, congestion from our continued reliance on the car, as well as constructing and running our homes."
- "...it is important to diversify our economy, thus attracting and retaining more people in our workforce. It is particularly important to attract young families to live in Canberra, where they will spend and support new business and services. To entice these families from larger cities, we must offer good employment and good, affordable living. While the landscape setting and environmental quality of our city is a drawcard, the lack of vibrancy in our urban environment, the limited range in housing and the cost of living can be discouraging."
- "Extending Canberra's suburbs means extending and building more roads, utilities and social infrastructure. This expense could compromise our capacity to invest in improving services, such as public transport and refurbishing and making more efficient use of existing infrastructure. With a substantial proportion of our city developed in the 1960s and 1970s, including the planting of our parks and street trees, the maintenance and replacement of these assets is a significant issue. Greenfield expansion requires more land, which presents economic and environmental costs. The ACT is reaching a point where the land that is most cost effective to develop is already subdivided or is planned to be. Most remaining 'urban capable' land presents significant financial and environmental costs because of its location, terrain and areas of endangered habitats."

The development of remaining greenfield land development generally becomes more expensive over time as the supply of more easily developed land is exhausted. It is more costly to provide services to greenfield developments than it is to provide services to infill developments. Such development presents significant environmental as well as financial costs, driving a need for sustainable urban re-development and densification.

Low density land use causes issues which include:

- Increased risk of social exclusion due to accessibility issues; and
- A higher per capita cost of services and utilities including public transport, water, sewerage, roads, electricity and communications.

A constrained supply of suitable greenfield developable land causes:

- Increased pressure to release land that is currently reserved for environmental purposes, which risks damaging endangered habitats and species;
- Higher costs for the remaining available greenfield land; and

- A leakage of demand for new detached housing into bordering NSW regions, leading to lower ACT Government revenues from 'greenfield' land sales and land taxes.

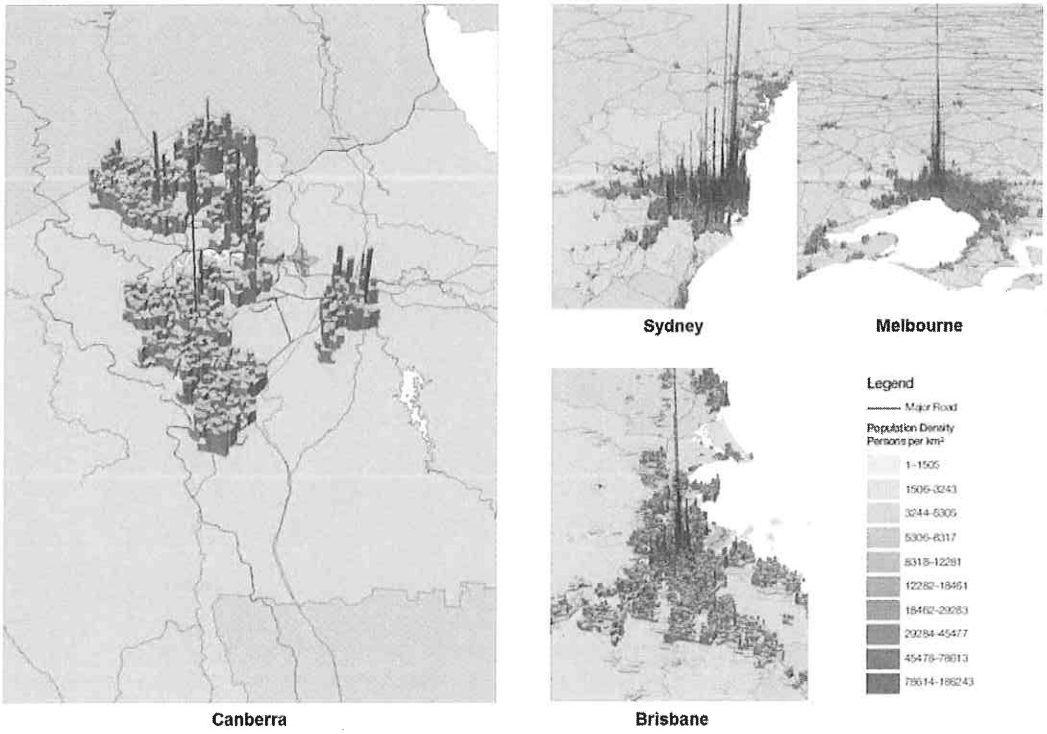
4.2.3.2 Evidence of the problem

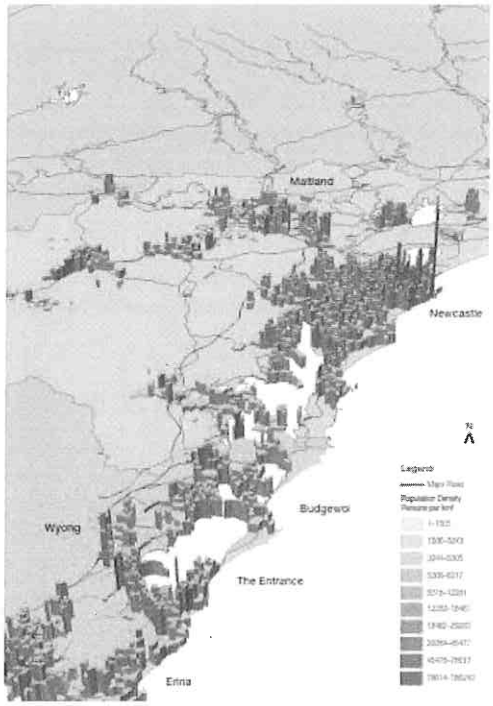
The ACT Government's *ACT Planning Strategy* contains much information evidencing the problem outlined above. This *Full Business Case* does not seek to replicate that document in its entirety. Nevertheless, key items evidencing the aforementioned problem are outlined below.

Low levels of urban densification:

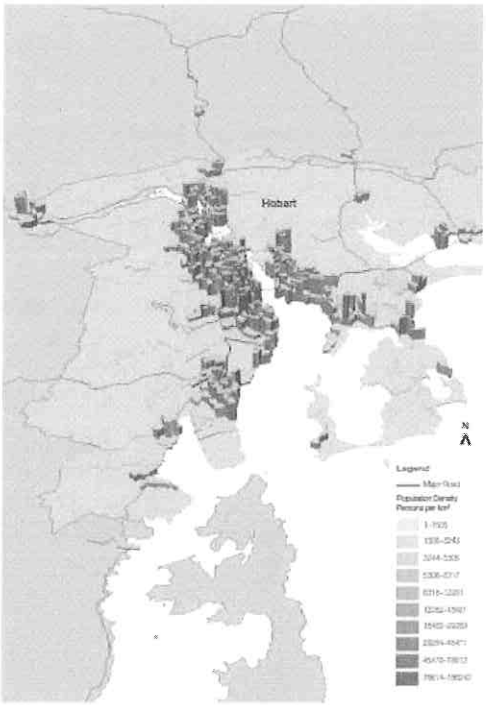
The metropolitan area of Canberra has a gross population density which is low in comparison to many other Australian cities, as seen in Figure 14 (from the Commonwealth Department of Infrastructure and Transport – Major Cities Unit):

Figure 14 Population densities in Canberra compared to other cities





Newcastle



Hobart

Finite supply of greenfield land:

The ACT Government could implement zoning decisions which extend the ACT Government's present stock of developable greenfield land, noting that demand will continue to exist for detached housing in greenfield developments into the future. Nevertheless, it is apparent that the ACT has a finite supply of developable greenfield land available to it within Canberra's constrained boundaries. In this regards:

- As noted above, development of remaining greenfield land development generally becomes more expensive over time as the supply of more easily developed land is exhausted;
- There are approximately 26,000 greenfield dwelling sites remaining in the ACT zoned for urban development. At an average population growth rate of 1.6 per cent and an annual greenfield demand of 1,600 dwellings, the existing supply of developable greenfield land within Canberra may be depleted within as little as 17 years if no action is taken;
- Developments are already planned or underway on the ACT's borders (such as outside West Belconnen, Googong and South Tralee); and
- According to the ACT Planning Strategy Background Paper 3, the ACT is approximately 2,352 km in area, but only one quarter is suitable for urban development and most of this is already developed.

Population growth:

The need for sustainable urban development is reinforced when population growth is considered.

Over the past decade Gungahlin and North Canberra have experienced fast population growth. More than 50 per cent of Canberrans now call the north side home. North side suburbs of Bonner, Casey, Harrison and Crace (all within the Gungahlin region) experienced the biggest population gain between 2001 and

2011. Gungahlin's annual population growth rate appears likely to continue to be strong in the future, as shown in the table below (according to 2011 EPD population projections):

Table 10 Approximate historical and projected population growth by district

Population	2001	2011	Annual Growth Rate (2001-2011)	2021	Annual Growth Rate (2011-2021)	2031	Annual Growth Rate (2021-2031)
Gungahlin	24,400	49,700	7.4%	71,900	3.8%	84,800	1.7%
Belconnen	85,600	94,700	1.0%	97,400	0.3%	97,000	0.0%
North Canberra	38,600	49,900	2.6%	55,000	1.0%	62,800	1.3%
South Canberra	23,300	25,100	0.7%	29,100	1.5%	35,800	2.1%
Woden and Weston Creek	56,200	57,200	0.2%	59,300	0.4%	60,200	0.1%
Tuggeranong	90,900	89,100	-0.2%	85,700	-0.4%	84,800	-0.1%
Molonglo	0	100	-	14,000	64%	30,000	7.9%
Rest of ACT	400	400	0.0%	400	0.0%	400	0.0%
Total	319,400	366,200	1.4%	412,800	1.2%	455,800	1.0%

Canberra's population reached 381,500 in mid-2013. Canberra's population growth is forecast to continue in the long term, putting demand on urban infrastructure and increasing demand for residential and commercial properties.

4.2.3.3 Does the problem need to be addressed now?

Again, the ACT Government's *ACT Planning Strategy* contains much information which evidences the need to address the aforementioned problem now. Representing a policy position already adopted by the ACT Government, that document states:

> "Like many cities, Canberra is facing the global challenges posed by population growth, climate change, energy, and food security. To ensure our long-term environmental, economic and social security, we need to make difficult decisions *and take action now*."

Problems associated with urban sprawl exist now, reinforcing the need to address the problem now. For example, and again with reference to the *ACT Planning Strategy*:

- "Our sedentary lifestyles, exacerbated by the extensive use of cars, are a key contributor to our increasing obesity levels."
- "Where we decide to put extra housing [now] will affect our ability to achieve the community's preferred outcome for a more compact, sustainable Canberra."

Furthermore, it is noted that the ACT Government is already committed to a 40 per cent reduction on 1990 greenhouse gas emission (GHG) levels by 2020 and a goal of zero net GHG for the ACT by the year 2060. This commitment is underpinned by the *Climate Change and Greenhouse Gas Reduction Act* 2010, which was passed by the Legislative Assembly in October 2010.

Given lead times involved in achieving meaningful urban densification and infill development, it is imperative the ACT Government take action now which seeks to transform Canberra into a compact, sustainable city. The Capital Metro light rail project facilitates such densification and infill development in Canberra.

4.2.4 Problem 3: economic challenges

4.2.4.1 What is the problem?

As per the economic outlook statement contained within the ACT 2014-2015 Budget:

> "The ACT economy is facing a major challenge right now with the compounding effects of the Commonwealth Government's reduction in spending and jobs".

Consistent with the ACT Budget, the 2014-15 Federal Budget also predicts significantly slower economic growth for the ACT over the coming years.

4.2.4.2 Evidence of the problem

Near term outlook

Challenges facing the ACT economy are due to factors which include the following:

- Below trend growth in the national economy, with real GDP estimated to grow by 2.5% in 2014-15 and with unemployment forecast at 6.25% in 2014-15 (per the 2014-15 Federal budget);
- 16,500 Federal government public service job losses. These and anticipated future public sector job losses (anticipated by the ACT Government to be 2,000 in 2015 in Canberra) lead to an easing jobs growth rate and increasing overall unemployment in the ACT;
- The impact of the Federal Government's 2014-15 Budget. According to the ACT 2014-15 budget papers "[m]assive cuts in general Commonwealth Government spending, and in payments to the ACT, will cause job losses and challenging economic circumstances for us"; and
- Forecast decreasing levels of commercial and residential construction.

ACT Government is projecting economic growth in the ACT to grow by 1.75% next financial year. This represents growth below the forecast national average.

Economic diversification

Canberra's largest economic sectors are government administration and defence, representing between one quarter and one third of jobs and gross ACT Government product. In June 2011 for example, public sector (public service) jobs represented 51% of all employment in the ACT; 77% of this public sector employment was in the Commonwealth public service and 23% in ACT Government.

This proportion of public sector employment means overall employment is highly influenced by governments' decisions. Shifts in Federal Government administration policy can result in significant fluctuations in the workforce and consequential negative impacts on the ACT economy.

4.2.4.3 Does the problem need to be addressed now?

The current economic environment indicates benefits may be had by the ACT economy should it further diversify its economic base, reduce reliance on Federal Government employment and expenditure, and attract more private investment and employment opportunities in Canberra.

Investment in local capital works like Capital Metro - which provide transport solutions as well as urban renewal benefits - can assist in the adaptation and repositioning of the ACT economy over the long-term. The project will contribute to making Canberra a more attractive place to work and live, which in turn will enhance the economic and community vibrancy of the city.

ACT Government's stated measures of sustainable economic growth include job growth, business formation, visitor numbers, contribution of land revenue to total ACT Government revenue, and return on investment of key assets. Undertaking an investment in Capital Metro, as demonstrated later in section 4.3, is anticipated to positively contribute to all of these markers of a sustainable economy at a time when the ACT economy is facing economic challenges.

4.2.5 Problem 4: sub-optimal gateway to the Capital

4.2.5.1 What is the problem?

Northbourne Avenue is the main gateway to Canberra for residents and interstate visitors entering the City from the north of the ACT, including those driving from all other major mainland Australian cities. Elements of Northbourne Avenue may represent a sub-optimal entrance to our nation's capital. Components of the original development that have taken place along Northbourne Avenue during the post-war years are visually unappealing, adversely impacting first impressions of the city.

The sub-optimal gateway to the capital:

- Provides a generally undesirable impression of the city, making it less attractive for occupants and visitors;
- Creates a utilisation problem, as Northbourne Avenue's density of development is low compared to other parts of inner-urban Canberra and other cities in Australia and overseas; and
- May contribute to lower property value growth along Northbourne Avenue.

4.2.5.2 Evidence of the problem

Elements of the existing development within the Northbourne Avenue corridor may be regarded as visually unappealing. Examples of such sub-optimal development are shown in Figure 15. In turn, this may provide undesirable impressions of the city for both occupants and visitors alike.

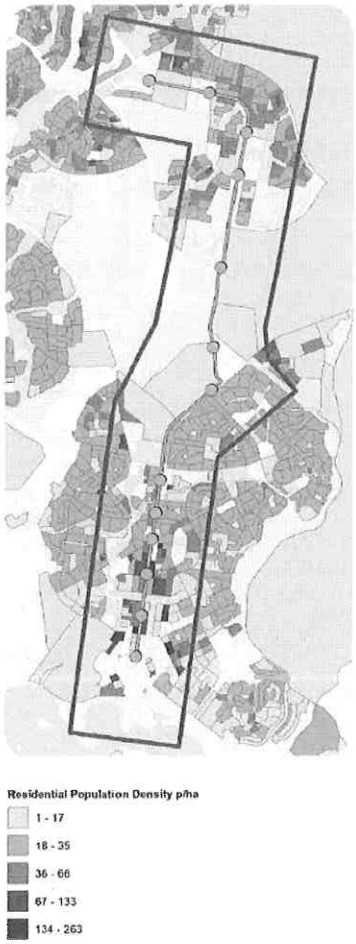
Figure 15 Image of Northbourne Avenue

The *Strategic Initiatives of the Griffin Legacy* (2004) support the argument that the corridor has not realised its full potential. Its position as an entry point to Canberra, coupled with the use of boulevard design principles, point to a vision of grandeur that has been compromised by low densities and slow rates of development.

In line with zoning controls outlined in the ACT Government Plan, the ACT Government has previously stated there will be room for at least another 45,000 residents along the light rail corridor. This highlights an existing opportunity for densification and the potential for significant change to the corridor.

Light rail has a strong record of supporting associated corridor revitalisation. For example, the Dallas Area Rapid Transit (DART) light rail generated developments worth $4.26 billion in around 10 years of operation, while in Dublin research suggests homes near light rail attract a premium of 10-20 per cent. Portland's Westside MAX has served as a magnet for US$825 million worth of residential and commercial development, allowing for density that accommodates an additional 8,500 housing units. In other cities too, homes near light rail have risen in value (refer to Table 13 in section 4.3.5 below). While at face value average property growth along Northbourne Avenue compares well to the Canberra Metropolitan Area, closer examination highlights a lack of consistency: during the same period 2009 to 2013, house prices grew 130% in O'Connor/Dickson/Lyneham, but 0% in Braddon/Turner. This helps to highlight the potential a structured and strategically staged approach to the corridor's development could realise if geared around a high capacity transit system.

Figure 16 Population density on the corridor in 2011



4.2.5.3 Does the problem need to be addressed now?

Viewed in isolation, it is possible for the ACT to continue with land strategies along the rail corridor which results in urban revitalisation occurring at its present pace. In combination with other problems of low land densification, car dependency and challenging economic outlook, however, it is desirable to address this problem now so as to facilitate an improvement in Canberra's long term economic and community prospects.

The Capital Metro project will greatly assist the ACT Government in achieving urban revitalisation and densification along the corridor. This, in turn, will create a more formal grand boulevard to the city, as envisaged by Walter Burley Griffin.

4.3 Key benefits to be realised from the project

4.3.1 Overview

An economic analysis of the project is contained in Chapter 6.0. Please note that benefits listed in this section have not necessarily been directly incorporated into the cost benefit analysis contained in Chapter 6.0 in accordance with the calculation methodology adopted in that chapter.

The table below summarises some of the benefits the project is expected to realise. These benefits have been derived from works undertaken by Capital Metro Agency's advisors and / or other studies undertaken by ACT Government.

Table 11 The value of expected benefits resulting from the Capital Metro project

Benefit	Commentary	Possible Key Performance Indicator
Problem 1: Building alternative transport capacity		
Light rail is anticipated to increase public transport mode share	• Public transport + active transport mode share for journey to work trips (to 2031) anticipated to be 30.2% of such journeys by 2031 Canberra-wide (this meets *Transport for Canberra* objectives). This is driven in large part by Capital Metro.	• 30% mode share of all journeys to work trips by active or public transport
Light rail will reduce traffic congestion and associated costs	• Light rail will lead to travel time savings: up to $222m million in present value terms ($842 million nominal) over 30 years.	• For further consideration by ACT Government
Light rail will improve the health of Canberrans	• The project has the potential to influence health outcomes for the people that change their travel behaviour to more active forms (e.g. walking or cycling to a light rail station). Benefits estimated to be $5 million in present value terms over the economic review period.	• For further consideration by ACT Government
Light rail reduces the ACT's carbon emissions per capita	• Transport contributed 988kt CO_2e to the ACTs emissions during 2009-10. It has been estimated that the ACT needs to reduce its greenhouse gas emissions by around 2,200kt CO_2e, roughly half of its current level of emission, to achieve the ACT's 2020 target. • Light rail is a lower emitter of carbon dioxide than automobiles and bus per passenger. • Increased density of housing and reduced private vehicle use can also reduce Canberra's greenhouse gas emissions per capita, which are high in comparison to other Australian cities.	• Reduction in transport emissions per capita
Light rail improves customer experience for locals and visitors	• Travel time on light rail will be approximately 23 - 25 minutes from Gungahlin to the City in the AM peak, with signalling priority, better than the existing red rapid bus travel time. • It is proposed that light rail will run at a minimum service frequency of 10 minutes on weekdays between the core hours of 7am and 6pm (and more frequently during peak times). On Saturdays and Sundays and outside core hours it is proposed light rail will run at least every 20 minutes. These frequencies will be subject to ongoing assessment over the life of the project.	• Light rail average running time and reliability
Light rail improves accessibility	• Light rail will benefit those without ready access to private transport (either by choice or circumstance). Compared to an average ACT resident, retirees for instance are 17% more likely to live close to	• For further consideration by ACT Government

Benefit	Commentary	Possible Key Performance Indicator
	Canberra's city centre, and also more likely to catch public transport.	
Problem 2: The need for sustainable urban re-development and increased urban densification.		
Light rail facilitates densification which helps to support a higher population with attendant economic benefits	• Capital Metro is anticipated to facilitate densification within the rail corridor. Benefits of densification are described in Chapter 6.0.	• Population within corridor
Urban densification facilitates the cost efficient delivery of public infrastructure and services to households	• There is a forecast $72 million in present value terms of urban densification savings over the economic review period. Refer Chapter 6.2.11 and 6.2.10.2.	• Utilities cost per square metre in rail corridor
Urban densification resulting from light rail increases Government revenue	• The ACT Government receives ongoing revenues associated with property development in the ACT. Urban densification prolongs the source of such profits, and can increase revenue if property values rise. • Also refer section 6.2.13.	• For further consideration by ACT Government
Light rail increases productivity through agglomeration and wider economic benefits	• Wider economic impacts of the project are estimated to be $198 million (in present value terms) over the economic review period. • Increasing both employment and economic density and reducing travel time as a result of light rail has been shown to have productivity benefits. Refer Chapter 6.2.13.	• For further consideration by ACT Government
Light rail facilitates accelerated densification which helps to protect conservation areas into the future	• Densification of the corridor facilitated by light rail operation will prolong the availability of developable land throughout the ACT.	• For further consideration by ACT Government
Problem 3: Canberra faces substantial economic challenges which have the potential to increase social and economic dislocations.		
Light rail contributes to economic growth for the ACT	• Additional floor space as a result of corridor development is anticipated to contribute very substantially to gross regional product by 2031. • Refer to Chapter 6.0 for a discussion of agglomeration and other economic benefits.	• Additional floor space in rail corridor • For future consideration by ACT Government

Light rail creates jobs	• Capital Metro Agency has previously publicly released a *Jobs Analysis* prepared by its commercial advisor. That *Jobs Analysis* notes:
	  • Light rail construction is expected to support 3,560 jobs (1450 direct, 2110 indirect) spread over the project's construction period.
	  • At the assumed peak year of light rail construction, Capital Metro is anticipated to support around 1,780 jobs.
	  • Corridor development associated with Capital
		• For further consideration by ACT Government

Benefit	Commentary	Possible Key Performance Indicator
	Metro is anticipated to deliver additional floor space to accommodate further direct and indirect jobs. • Note: job figures noted above are not an input into the economic analysis contained in Chapter 6.0.	
Light rail contributes to a more sustainable and diverse economy	• As per employment and economic growth data described elsewhere in this document, Capital Metro will help the ACT economy to diversify its economic base, reduce reliance on Federal Government employment and expenditure, and attract more private investment and employment opportunities into Canberra.	• For further consideration by ACT Government
Light rail increases government revenue as any increases in land values increase the tax base	• Even in the absence of any active value capture strategy, increased land values, increased land utilisation, increased economic activity and a higher ACT population will contribute to ACT Government revenues.	• Rail corridor government revenues
Problem 4: The Federal Highway – Northbourne Avenue corridor is a sub-optimal gateway to the Nation's capital.		
Light rail contributes to higher values for land along the corridor	• Land value increases can typically be attributable to rail and light rail. For example, very recent analysis of rail transit in a car dependent city (Perth) found that land market increases of up to 40% can be achieved.	• Rail corridor land values
Light rail aligns with and helps to achieve the Burley Griffin vision for the corridor	• Achievement of Griffin's original plan of a formal boulevard down Northbourne Avenue and his concept of keeping the city in unity with its natural setting will not only be in keeping with the historical objectives of the city, but is anticipated to be visually pleasing.	• For further consideration by ACT Government
Light rail and the anticipated resulting urban renewal will create a more grand entrance to the City befitting its status as the Nation's Capital	• Revitalisation of this corridor, facilitated by an operational light rail system, would make it a more active and socially connected precinct for all types of Canberrans and a more fitting gateway to Canberra, increasing activity, amenity, productive land use, and boosting the image of the City.	• For further consideration by ACT Government

4.3.2 Benefits of addressing problem 1: building alternative transport capacity

The benefits of addressing Canberra's high level of car dependency through the construction and operation of light rail include:

- Increased public transport mode share and capacity;
- Reduced traffic congestion and associated costs, including avoided cost of building alternative future transport capacity (e.g. additional lanes on Northbourne Avenue);
- Health benefits;
- Reduced carbon and other emissions;

- Improved customer experience for locals and visitors through provision of a transport option which is frequent and reliable;
- Improved accessibility for the transport disadvantaged, increasing social and economic participation within the ACT Government; and
- Facilitation of the other benefits outlined in this paper.

The benefits of addressing Canberra's high level of car dependency are of high value to the ACT Government.

Community consultation as part of *Transport for Canberra 2030* identified that Canberrans have a general preference for ease of access, lack of congestion, clean air, and a shift to more sustainable transport options. Canberra's quality of living will likely be eroded unless a convenient alternative to private vehicles is provided.

It is noted that the market for housing in Australia continues to undergo a significant shift away from large footprints towards smaller more densely populated communities. This is potentially reflective of an increasing desire to feel connected to communities and to the other inhabitants of a city. Without adequate mass transit linkages and planning arrangements, Canberra will find it difficult to break the cycle of car dependence and sparsely populated suburbs. This will increasingly reduce Canberra's competitiveness as a place to live and work in Australia.

The project also has the potential to influence health outcomes for the people that change their travel behaviour to more active forms (for instance, by walking or cycling to light rail stops). This change in active transport movements is likely to be achieved through an increase in the number of people living within the city centre (i.e. being able to walk to more destinations) and to access/egress from public transport modes. Greater levels of walking and cycling in turn can influence an individual's health outcomes and the wider cost burden this outcome places on the health system. Furthermore, investing in a better public transport system for Canberra will facilitate population growth and increase accessibility around Canberra for tourists, making the city a more attractive place to visit.

It is also noted that Canberrans are prepared to leave their car at home where there is a convenient alternative. For example, according to the ACT Planning Strategy, when more people moved into Turner between 2001 and 2006, the incidence of residents walking to work increased from 6% to 24%.

The primary measurement mechanism (KPI) to provide evidence the benefits have been delivered is Transport for Canberra's target to achieve 30 percent mode share of all journey to work trips by active or public transport by 2026.

4.3.2.1 Patronage

With the establishment of Capital Metro, estimated daily light rail patronage is as follows:

Time	2021	2031
AM Peak	3,946	5,193
Inter-Peak	4,848	6,587
PM Peak	3,607	5,012
Off Peak	2,718	3,414
TOTAL	**15,120**	**20,207**

4.3.3 Benefits of addressing problem 2: sustainable urban development and urban densification

Capital Metro will attract an accelerated rate of urban densification in the rail corridor (refer to Chapter 6.0). The benefits of addressing Canberra's desire for enhanced sustainable urban development include:

- More cost efficient delivery of public infrastructure and services where property densification occurs;
- Government revenue benefits of urban densification;
- Increased productivity through agglomeration and wider economic benefits; and
- Protection of greenfield conservation areas into the future and environmental benefits of urban densification.

The benefits of addressing Canberra's finite supply of developable greenfield land are of potentially high value to the ACT Government. The ACT Government receives significant ongoing revenues associated with property development in the ACT. Prolonging the source of such profits may be in the Government's long term fiscal interests (although it is noted such benefits have not been included in the project's cost benefit analysis).

Canberra may expect to achieve economic benefits of a type experienced by other Australian cities that have pursued light rail and rail projects. Examples are described in Table 12 as supported by various research.

Table 12 Economic benefits of increased urban density resulting from light rail

Circumstances	Economic benefits / disbenefits
Increased densification in Sydney Base case = 70% infill / 30% greenfield	

Measure	Low density scenario (50% infill / 50% greenfield)	High density scenario (90% infill / 10% greenfield)
Net benefit/cost	Net cost of $5 billion relative to the base case.	Net benefit of $800 million relative to the base case.
Per dwelling cost	$7,300 higher per dwelling than the base case.	$4,800 per dwelling lower than the base case.

Note: benefits/costs estimated over 2011 to 2036. From Centre for International Economics, The Benefits and Costs of Alternative Growth Paths for Sydney, 2010

<table>
<tr><th>Circumstances</th><th>Economic benefits / disbenefits</th></tr>
<tr><td>Development costs for 1,000 dwellings: 'Inner redevelopment' versus 'fringe development' in Perth</td><td>
<table>
<tr><th>Item</th><th>Inner redevelopment</th><th>Fringe development</th><th>Percentage over, fringe v inner</th></tr>
<tr><td>Infrastructure[2]</td><td>$50.5 million</td><td>$136 million</td><td>269%</td></tr>
<tr><td>Transport[3]</td><td>$256 million</td><td>$507 million</td><td>198%</td></tr>
<tr><td>Greenhouse gas</td><td>$17.4 million</td><td>$37 million</td><td>211%</td></tr>
<tr><td>Health[4]</td><td></td><td>$4 million</td><td></td></tr>
<tr><td>Total</td><td>$324.1 million</td><td>$684 million</td><td>211%</td></tr>
</table>
Trubka, Newman and Bilborough, Assessing the Costs of Alternative Development Paths in Australian Cities, 2009.
</td></tr>
<tr><td>Doubling of economic density[5]</td><td>Increases productivity by labour productivity (output per worker) by 6 per cent.
Cited in Coulibaly et al for the World Bank, Reshaping economic geography, 2009</td></tr>
<tr><td>Doubling of employment density[6]</td><td>Increases productivity by 4.5 – 5 per cent.
Cited in SGS for the Council of Australian Governments, Productivity and Agglomeration Benefits in Australian Capital Cities, June 2012</td></tr>
<tr><td>Increase distance from the city centre by 1 per cent</td><td>Decreases productivity by 0.13 per cent.
Cited in SGS for the Council of Australian Governments, Productivity and Agglomeration Benefits in Australian Capital Cities, June 2012</td></tr>
<tr><td>Doubling travel time to the city centre</td><td>Decreases productivity by 15 per cent.
Cited in SGS for the Council of Australian Governments, Productivity and Agglomeration Benefits in Australian Capital Cities, June 2012</td></tr>
</table>

It is noted that the ACT Planning Strategy has set a target for the proportion of new housing delivered through urban intensification to be 50 per cent or more. This target attempts to support greater urban sustainability and increase the focus for development on Canberra's town centres and along the major public transport corridors, particularly the Capital Metro light rail corridor. The correlation between the project's route and potential areas for urban intensification, as identified by the ACT Planning Strategy, may be discerned from Figure 17 (sourced from the *2012 ACT Planning Strategy*).

[2] Includes infrastructure development costs for roads, water and sewerage, telecommunications, electricity, gas, fire and ambulance, police, education, and health (hospitals, etc.).

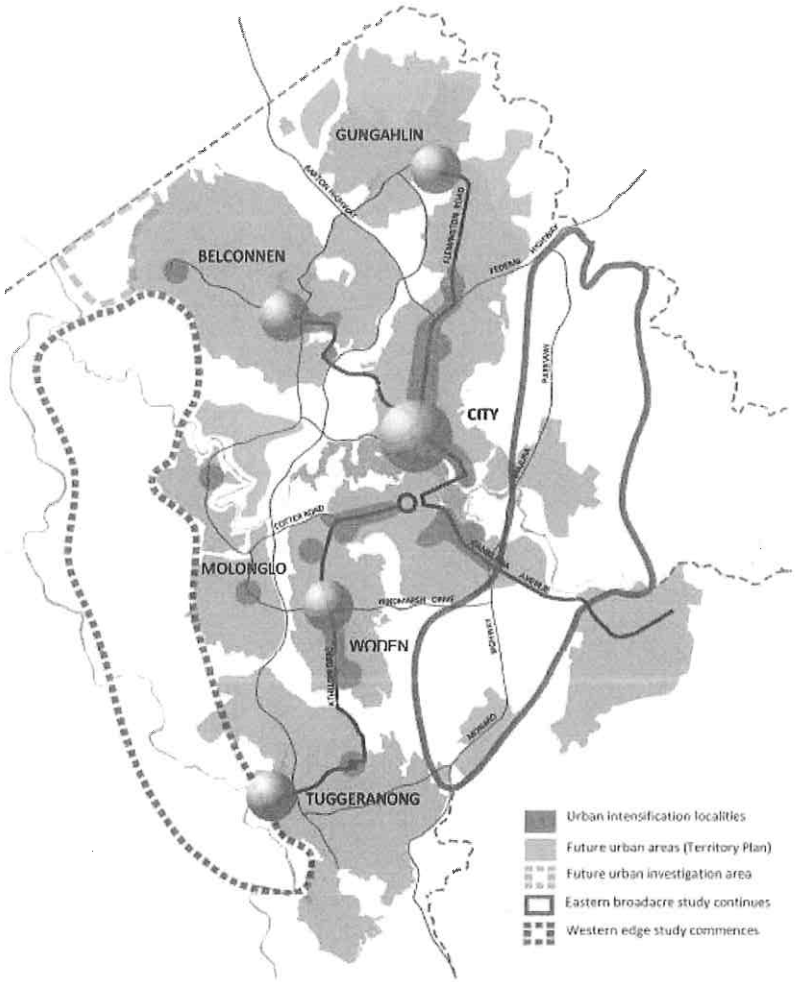
[3] Includes transport and travel time, roads and parking, and externalities.

[4] From activity.

[5] Economic density is production in relation to population density for a given area.

[6] Employment density is a measure of jobs within a given area.

Figure 17 Potential areas for urban intensification



The transformational impact of light rail has been seen worldwide. Of the top ten cities listed on the 2013 Economic Intelligence Unit's global liveability index, eight have light rail systems. Integrated transport is not just about fuels but about the urban fabric associated with walking, (light rail/bus) transit systems and minimising car-based land uses. Importantly, land use change and urban renewal induced by an integrated transport system underpinned by light rail will enable greater access to jobs as well as better services and facilities for the people of Canberra.

Examples of light rail acting as a catalyst for urban renewal come from across the world: the Centre for Economic Development and Research at the University of North Texas has suggested that the Dallas Area Rapid Transit (DART) light rail generated developments worth $4.26 billion in around 10 years of operation. Professor Carmen Hass-Klau has suggested that in Dublin, homes near light rail attract a premium of 10-20 per cent. In other cities too, homes near light rail have risen in value. Quality transit is clearly vital if Canberra is to achieve vibrant and compact neighbourhoods with improved connections to amenity.

It is noted that agglomeration benefits are included in the economic analysis set forth in Chapter 6.0.

4.3.4 Benefits of addressing problem 3: economic challenges

The benefits of addressing Canberra's economic challenges, facilitated through the Capital Metro project, include:

- Facilitating economic growth for the ACT;
- Job creation;
- A more sustainable and diverse economy; and
- Increased revenue for Government as the tax base widens and increases (i.e. natural revenue increase even in the absence of new or increased taxes).

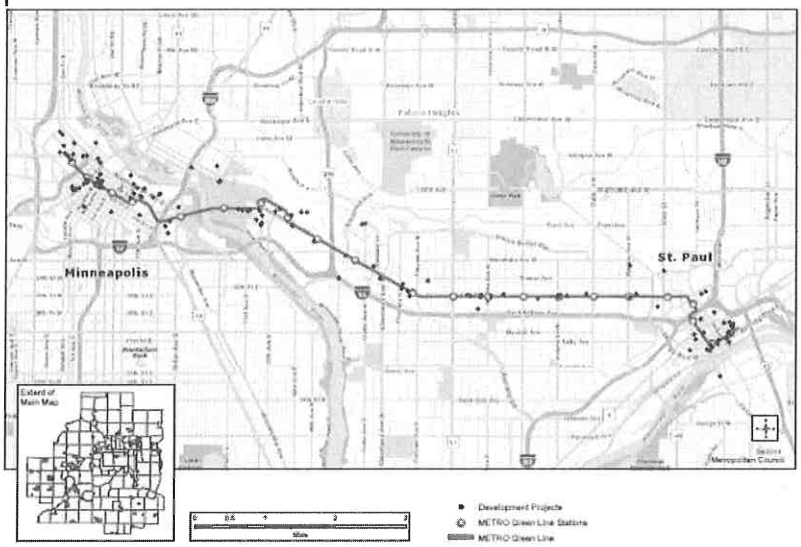
The benefits of addressing Canberra's economic challenges are of high value to the ACT Government. The improvements in the transport network offered by the project will help to drive economic growth, create more jobs and increase the diversity and sustainability of Canberra's economy. Economic success is critical to the ACT. Please refer to Chapter 6.0 for a discussion of anticipated economic benefits.

The project will also expand the productive capacity of Canberra's economy by helping to increase employment concentration and intensity of land use. Capital Metro will enable greater capacity to bring workers along Northbourne Avenue and into the City during morning peak hour. This greater access to workers encourages demand for property in these locations, greater feasibility for large scale developments, and more intensive use of existing floor space. This in turn provides agglomeration benefits to those firms locating in areas which have a higher density of economic activity, as it enables those firms to achieve economies of scale via a potentially larger customer base and opportunities for economies of scope. Canberra currently has a limited area where agglomeration benefits for firms are experienced in comparison with other Australian cities.

A number of international examples demonstrate that light rail can have a positive, material, transformational impact upon cities. A case study of Minneapolis St Paul is briefly considered below.

Figure 18 Case study: Minneapolis St Paul

Case Study: Minneapolis St Paul



- The 17 km light rail line opened in June 2014. It contains 18 new stations.
- The Green Line light rail project has been a major investment drawcard for both residential and commercial development.
- From 2009 to 2014 more than $2.5 billion was invested in 121 projects (all non-publicly funded) along the route.
- 43 further major projects have been announced.
- More than 5,445 construction, engineering and general workers have been directly employed on the project.

4.3.5 Benefits of addressing problem 4: Sub-optimal gateway to the Capital

The benefits of addressing the sub-optimal gateway to the nation's capital include:

- Higher values for land along the corridor;
- Achievement of the Walter Burley Griffin vision for the corridor; and
- A more grand entrance to the city befitting its status as the nation's capital.

Revitalisation of this corridor will make it a more active and socially connected precinct for all types of Canberrans and a more fitting gateway to the nation's capital, increasing activity, amenity, productive land use, and boosting the image of the city. The project will act as a catalyst for such urban revitalisation.

These benefits are of high value to the ACT Government. The unique tenure arrangements in the ACT, coupled with the sizeable quantity of land along Northbourne Avenue controlled by the ACT Government, represent a unique opportunity for land value capture. The positive impact on property values along light rail corridors are well documented (as outlined in Table 13), noting that property value uplift may occur during construction and following commencement of operations.

Table 13 Impact of light rail on property values

Location	Impact of light rail	Variable used
Newcastle (United Kingdom)	20 per cent	House prices
Freiburg	15 - 20 per cent	Office rents
Strasbourg	10 - 15 per cent	Office rents
Portland	10 per cent	House prices
Rouen	10 per cent	Residential rents and house prices
Route 96 (Inner North of Melbourne)	9 per cent	Residual land value
Portland Gresham	5 per cent	Residential rents

The positive impact on property values as a result of light rail is due to factors which include:

- The permanently fixed nature of light rail tracks which provide certainty for residents and investors. A quantifiable increase in residential and commercial property values has been demonstrated in areas in close proximity to light rail alignments. The same increase in land value does not occur from new bus routes. This is partly because of the permanence of light rail systems versus the relative flexibility of changing bus routes, which is an impetus for long-term location decisions of users and landowners and shows strong Government commitment to the potential of a particular area.

- Light rail is timely, reliable, less likely to be constrained in traffic and provides a smoother more comfortable ride for passengers. It has the ability to move large numbers of people quickly and easily between activity centres. Commuters see benefit in residing in proximity to light rail.

- Proximity to public transport is an important factor for employers in staff attraction and retention. As such, there is likely to be a positive effect of light rail transit stations on commercial development and property values in the rail corridor. As seen with South Perth (refer to the below case study), rail transit may signal a focus of future investment dollars by the city as well as private landowners. This targeted development may attract commercial services to the rail corridor neighbourhood and encourage the development of new apartments and commercial / retail projects.

The following case study illustrates the impact of transport projects in influencing major commercial land use changes.

Figure 19 Case study: Commercial land use changes in Perth

$9.9m to smash Perth site

Sales wrap

Will Glasgow

A large development site in South Perth has sold for $9.9 million to local developer Derwest Group, setting a new benchmark in the tightly held precinct.

The units on the 2298 square metre site on the corner of Richardson Street and Melville Parade will be demolished and replaced with a mixed-use office and apartment complex.

Located directly opposite the proposed South Perth train station, the site forms part of the design area within the Scott Richardson Street precinct. It allows for residential or mixed-use development of up to 13 storeys.

A local developer recently purchased a development site in South Perth setting a new benchmark in the tightly held precinct. The site is located adjacent to the proposed South Perth Train Station which was one of the main drivers in value for the site. The site was purchased on a rate of $4,300 per sq m of site area.

The Developer is proposing to construct a $60m mixed use office and residential project on the site with the office component nearing pre commitment.

The area had stagnated for over 20 years due to local development constraints, however new zoning changes and the proposed station have injected renewed confidence in the precinct. The area now allows for residential and mixed use developments of up to 13 levels with a preference for commercial and retail development.

This case provides a clear example of where a proposed train station has brought about a change in economic activity which has a direct impact on property prices and business activity in the area to be serviced by the station.

4.3.6 Other potential benefits

Other potential benefits from the project include:

- **Wider economic impacts:** The transformational benefits for Canberra of pursuing this project are greater than the sum of the project's urban renewal and public transportation benefits. Each of those benefits enhances the impact of the other. The recognition of wider economic impacts within the economic analysis (refer Chapter 6.0) is one way in which these synergistic benefits are recognised.

  Wider economic impacts include benefits induced by the increase in people and businesses locating within closer proximity to one another along the proposed rail corridor. This is as a result of both land use changes as well as improved transport connectivity between places. Health benefits have also been noted above.

  This provides agglomeration benefits to those firms locating in areas which have a higher density of economic activity, as it enables those firms to achieve economies of scale via a potentially larger customer base and provides opportunities for economies of scope. Canberra currently has a limited area where agglomeration benefits for firms are experienced in comparison to other Australian capital cities.

Wider economic impacts also include job productivity (labour market) benefits. Quantification of the wider economic impacts of Capital Metro is provided in the Economic Analysis Chapter 6.0.

- **Road level of service benefits**: It is proposed that light rail will be given priority over other road users. Notwithstanding this, there are likely to be net benefits (though modest) to car users as a result of light rail. Given the significant level of current private vehicle usage (as discussed above in section 4.2.2.2), any reduction in congestion will benefit remaining road users.

  One key road benefit to be achieved by Capital Metro is the removal of buses from Northbourne Avenue. This will effectively open another lane to free flowing traffic in peak hour. It will also improve the amenity of cycling lanes on that avenue. Northbourne Avenue is currently the most congested section of the light rail corridor.

  Aligning light rail with the main through movement along Flemington Road, the Federal Highway and Northbourne Avenue will have the consequence that the heaviest movement of traffic will also have green signal time in conjunction with the signal priority given to light rail. New traffic signals (which shall also provide signal priority to light rail) are proposed at approximately ten locations along the entirety of the route (primarily on Flemington Road) to maintain safe pedestrian access to stations and to enable light rail operations to achieve desired trip durations.

  The impact of the light rail on the adjacent road network varies along the route but can be divided into five broad sections in terms of the impact on the existing road infrastructure:

  - It is proposed that Hibberson Street from Gungahlin Place East to Hinder Street becomes a pedestrianised zone. Accordingly, this section will be closed to general traffic. The section between Hinder Street and Kate Crace Street will be designed to allow future pedestrianisation.

  - On Flemington Road between Kate Crace Street and Well Station Drive, the route generally has a median which is wide enough to accommodate light rail. In this section the works required are mainly limited to the intersections.

  - Flemington Road between Well Station Drive and Lysaght Street is mostly a single carriageway. Through this section it is proposed to provide one lane plus a wide shoulder in each direction but, with the limited width available, construction of a new outbound lane and shoulder will be required to the west of the light rail.

  - Flemington Road between Lysaght Street and the Federal Highway is mostly dual carriageway but with a narrow median about 6m wide. Light rail can, however, generally be accommodated within the median. It is proposed to provide one road lane plus a wide shoulder in each direction, involving the removal of car lanes of traffic (refer section 3.1.2.6). Sections of the existing inbound bus lane will be removed.

  - On the Federal Highway and Northbourne Avenue through to the City the route generally has a median which is wide enough to accommodate the light rail system, although it is noted that the median is relatively narrow from Barton Highway to Antill Street. In this section the works required are mainly at the intersections.

  The economic benefits calculated in section 6.2.8 also include transport benefits associated with non-light rail users.

- **Overall transportation levels of service**: As a result of the light rail service, likely integration and interchange with bus services, and associated road improvements, the net overall level of transportation service in the ACT is anticipated to increase.

  Travel time savings to public transport is estimated to be 4,033 hours per day across the whole network as a result of the light rail operation (in 2031). It is expected there will be over 3,000 additional public transport boardings each day across the network by 2031.

4.3.7 Importance of benefits for Government

The importance of the project benefits for Government, include:

- **Economic, urban revitalisation and transportation benefits**: The economic, urban revitalisation and transportation benefits of the project shall be of material impact to the ACT Government. These are described throughout this paper; and

- **Alignment with broader ACT Government objectives**: The Capital Metro project aligns with and supports ACT and Commonwealth Government strategic land use and transport plans, including Transport for Canberra, the ACT Planning Strategy, the National Capital Plan, the City Plan and the City to the Lake project. These are discussed below in Table 14.

Table 14 Government plans and alignment with the Capital Metro project

Government document	ACT Government objective / target	Alignment with Capital Metro project
Transport for Canberra	• *Transport for Canberra* is the foundation for transport planning for the next 20 years, and has been developed to support and help deliver the *ACT Strategic Plan* and the *City Plan*. • *Transport for Canberra*'s vision for a smarter transport system is one that is: • Safe • Integrated with land use planning • Active • Efficient and cost effective • Accessible and socially inclusive • Sustainable • *Transport for Canberra* does not provide a view on a suitable technology or technologies, but identifies Canberra's key public transport corridors as important to get right, including Northbourne Avenue.	• Capital Metro supports *Transport for Canberra*'s policy aims of creating an efficient transport system that is integrated with land use planning, encourages more active travel, provides sustainable travel options that will have an impact on managing travel demand, reduces transport greenhouse gas emissions, is safe, accessible and cost effective. • *Transport for Canberra*'s policies build on the 2004 *Sustainable Transport Plan* and aligns with the *ACT Planning Strategy*. These include further reduction in traffic congestion and greenhouse gas emissions, and continuing to increase the use of active and public transport to 23% in 2016 and 30% in 2026.
ACT Planning Strategy	• The *Planning Strategy* was adopted by the ACT Government on 26 June 2012. It replaces the *Canberra Spatial Plan*. • The *Planning Strategy* encourages land use development along key public transport corridors and highlights opportunities to increase density and mobility by locating more people and employment around town centres and along the rapid transit corridors.	• The key target of the Strategy is to achieve 50% new housing to be established within the urban area of Canberra, so as to support other ACT Government outcomes. • Capital Metro aligns with the Strategy as it will facilitate land use development along the key Northbourne Avenue corridor.
The National Capital Plan	• This is a Commonwealth plan which aims to ensure that Canberra is planned and developed in accordance with its national significance. The plan identifies Northbourne Avenue as a 'Main Avenue' and 'National Approach Route'. The plan seeks to establish and enhance the identity of such approaches. It also recognises it as a corridor for a possible future inter-town public transport system.	• According to the National Capital Plan Northbourne Avenue is intended to become progressively formal towards the city end and the section between Antill/Mouat Streets and Barry Drive/Cooyong Street is classified as a Main Avenue under the Plan. • Capital Metro aligns with the Plan, as it recognises Northbourne Avenue as a significant corridor with a defined landscape that provides a first perception of the city's character. Capital Metro shall further increase the importance, attractiveness and urban renewal of this corridor.

City Plan	• The *City Plan* sets out a strategic framework to grow and develop the 'heart' of Canberra to create a sociable, liveable city precinct with a clear identity and presence. The City centre will house 10 per cent of the ACT's population growth over the next 20 years. To accommodate this growth it needs, housing, community and recreation facilities together with the services that a local community seeks. • The *City Plan's* transport and movement objectives also prioritise public and active transport modes, and the reduction of traffic in the city centre	• Capital Metro has the potential to make a significant contribution to achieving the vision of the *City Plan*, by improving accessibility to the City centre and encouraging redevelopment and regeneration along the Northbourne Avenue corridor. • Urban renewal and transformation along the corridor is also expected to drive new employment and investment opportunities to revitalise and improve the amenity and vibrancy of Dickson, the City and Gungahlin due to increased ease of access. In doing so, Capital Metro supports the ACT Government's *City Plan* to create a sociable, liveable City precinct.
City to the Lake	• *City to the Lake* is one of Australia's largest urban renewal projects and seeks to position new cultural and sporting facilities in the City, as well as creating greater walking access from the City to the Lake. • To realise the City's full potential as a vibrant, lively and attractive place to visit, work and live, and to increase social and economic participation, the City needs to be better connected to population growth areas, particularly in the north, via effective and efficient public transport solutions. • The project is being undertaken by the ACT Land and Development Agency, within the *City Plan* project.	• Plans for the City to the Lake Project are consistent with maximising the future use of light rail in Canberra. In this environment, residents and tourists may make more trips on the Capital Metro outside of peak hours, with evening and weekend events providing motivation for the use of public transport. In turn, this is anticipated to enhance the prospects for development of short-term accommodation along the light rail route.

4.4 Options analysis

4.4.1 Strategic solutions analysis and recommended strategic solution

This *Full Business Case* has been prepared with reference to *The Capital Framework* and the *Single Assessment Framework Business Case Tier 3 Template*. As outlined above, the fundamental problem to be addressed is essentially a combination of high car dependency and the desirability of enhancing sustainable urban development in the ACT.

It is noted that the project is unique in that it has followed a conception path which is different to that contemplated by *The Capital Framework* (indeed, the 2012 Parliamentary Agreement pre-dates *The Capital Framework*). In this case, and prior to the adoption of *The Capital Framework* by the ACT Government, the establishment of a light rail system has already been identified and confirmed as the desired strategic solution for the ACT Government. Capital Metro Agency was established with a focus upon delivering a City

to Gungahlin light rail route. Consequently, this business case does not re-consider the already determined strategic solution or possible alternatives, such as bus rapid transit. This paper does note, however, the substantial strategic analysis previously conducted by ACT Government in this regard (refer to section 3.1.1.4).

4.4.2 Project solutions analysis

As noted above, the project has followed a conception path which is different to that contemplated by *The Capital Framework*. In this regards:

- Capital Metro Agency was established with a mandate to deliver upon a City to Gungahlin light rail route; and
- Consideration of alternative routes is not within Capital Metro Agency's purview (noting (i) that light rail master planning works are presently being conducted within ACT Government with preliminary analysis again confirming City to Gungahlin as the most appropriate first leg of a Canberra light rail network, and (ii) investigations are underway regarding potential augmentation of the proposed route to Russell or an intermediate location).

Consequently, this business case does not re-consider the already determined project solution, nor does it re-analyse possible alternatives. Once more, however, the work previously conducted by ACT Government around potential routes is acknowledged and noted as supporting the project.

It is also noted that works are currently underway by the Major Projects and Transport area within the Environment and Planning Directorate towards the development of a *Preliminary Light Rail Master Plan Report*. Although not yet complete, Capital Metro Agency understands that those works have found that the majority of passenger trips on public transport each weekday are to Canberra's various centres, with the City and South Canberra being predominant. Based upon that analysis, Gungahlin to City is confirmed as a corridor with high patronage demand and high land uplift/growth potential compared to other potential corridors. Other corridors are to be investigated in further detail as part of phase 2 of the master planning study underway within ACT Government.

It is further noted:

- A detailed discussion of the costs, risks, timeframe, and value for money features of the project is contained in the remainder of this business case;
- Within the project, various options will exist from time to time regarding its specific physical characteristics. Certain such physical options are discussed in Chapter 3.0. It is emphasised, however, that a key advantage of the PPP delivery model is that it provides scope for private industry to recommend innovative solutions to best enable the ACT Government to meet desired cost, customer service level and urban design outcomes. As such, consideration of certain physical project options will continue throughout the procurement process, subject to approval by relevant stakeholders and Cabinet;
- A 'base case' (do nothing) project option has been analysed to the extent it informs the economic analysis supporting this paper. The base case scenario represents the likely situation if the project does not proceed. It assumes that only already approved and planned changes to road and bus networks occur. The base case also assumes that land development activity is concentrated on sites currently controlled or owned by the ACT Government, with no effort to acquire other sites in order to aggregate into precincts or zones. Under a 'do nothing' scenario, it is noted that corridor development

would occur at a slower pace than would be the case were light rail to exist. This is consistent with commercial discussions underway within the corridor of which Capital Metro Agency is aware; and

- As part of previous analysis already undertaken, the *Rapid Business Case* also recommended a coordinated approach to land development within the corridor to ensure the benefits of the Capital Metro Project are realised and maximised. It is recommended there should be a focus on development of commercial and retail land uses in key activity areas of the corridor. This approach aims to broaden the mix of land uses along the corridor through deliberate actions to attract developers and other participants in a way that is mutually beneficial. Separate analysis is being undertaken with regards to developing an appropriate corridor development strategy.

4.5 Review 2 (CMTEDD): Needs Analysis

Chief Minister, Treasury and Economic Development Directorate to sign off that sufficient needs analysis has been undertaken.	
Review 2 (Chief Minister, Treasury and Economic Development) Officer Name:	_____
Signature:	[signed] _____
Date:	[dated] _____

5.0 Cost and contingency

Key messages

- Estimated total project capital delivery costs are $783m ($nominal).
- Operating expenditure (including ongoing operations, maintenance and lifecycle costs) associated with the project is anticipated to amount, in nominal terms, to approximately $23m per annum in the first full financial year of operations (i.e. 2019-20). This figure includes contingencies.
- When calculated on a consistent basis, Capital Metro Agency's current capital delivery cost estimate is in the order of an earlier $614m estimate for a City to Gungahlin light rail route.
- The cost estimations contained in this chapter do not represent a project budget.

5.1 Cost estimate

5.1.1 Overview notes

The following important points are noted:

- The cost estimate contained within this business case is an *estimate only*, and is not based upon final project design (which will only occur following the project's procurement process). It is the market – not Capital Metro Agency – which will ultimately determine the cost of the project. The ultimate cost associated with the project will be a function of many factors, including:
  - Competitive tension within the bidding process;
  - ACT Government's project requirements as communicated to bidders during the procurement process; and
  - The ultimate allocation of risk between parties and the realisation (or otherwise) of such risks.
- Please refer to Chapter 9.0 for a discussion of the interrelation of costs, affordability and the recommended delivery model for the project.

5.1.2 Capex delivery cost estimate

The estimated capital cost in delivering the light rail project was calculated in two stages:

- Capital Metro Agency engaged an expert and well regarded cost estimation firm with deep, recent Australian light rail experience to calculate a non-risk-adjusted base cost estimate. (This firm also produced the opex / whole of life costs noted in this paper). That cost estimation firm calculated its estimate based upon (i) concept design generated by Capital Metro Agency's technical advisors, (ii) discussions with Capital Metro Agency and its technical advisors regarding proposed features of the light rail system, and (iii) its market knowledge regarding rates and other costs; and

- A risk (contingency) figure was generated by Capital Metro Agency's commercial advisors following (i) risk identification, allocation and quantification workshops conducted in conjunction with Capital Metro Agency and its advisors, and (ii) Monte Carlo analysis conducted on risk figures generated during the foregoing workshops (refer to section 9.2.4).

Based upon those cost and risk estimation processes, the anticipated capital delivery cost for the project is as follows:

Table 15 Project capital delivery cost estimates ($m, nominal, P75)

Cost Area	$m Nominal
Stops and Precincts	11
Roads and Utilities Infrastructure	118
Rail Alignment	96
Signalling, Rail Systems and Power	137
Depot and Stabling	59
Contractor's Cost	59
Total Construction Cost	**479**
Rolling Stock	65
Total Alignment Costs	**545**
Escalation	65
Sub Total	**610**
Contingency	173
Total Project Outturn Cost	**783**

5.1.3 Capex delivery cost estimate notes

The following is noted regarding the capex delivery cost estimate contained in section 5.1.2 above:

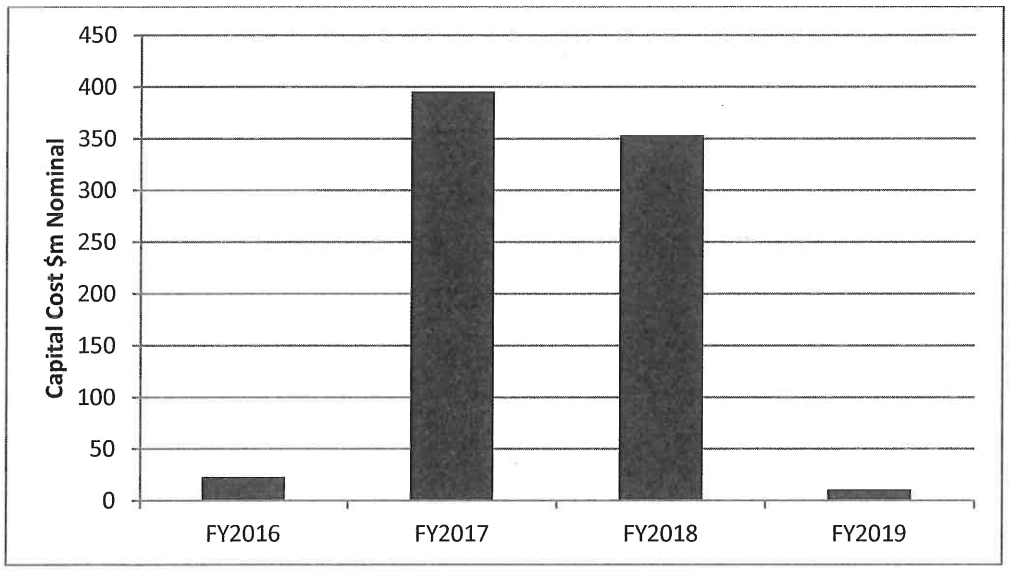
- The table above does not represent a project budget. It represents an estimate of capital delivery costs only. A project budget shall only be finalised following completion of the project's procurement process;
- The estimate is based upon the project's concept design;
- Any apparent errors in summation are due to rounding;
- There exist a number of risks and mitigation strategies associated with the project which may impact upon the ultimate project cost. These are discussed in section 8.2 below;
- The expected project capital delivery cost incorporates a P75 risk adjustment. This has regard to substantial works undertaken on the project to date, including various concept design iterations, together with a qualitative assessment of what the private sector might be anticipated to bid during a competitive procurement process. P75 versus P90 is discussed in section 5.2.1 below. The full anticipated risk profile associated with the project is summarised below in section 5.2;

- The estimate assumes the relocation of utilities occurs within the main scope of works;
- Excluded from the cost estimate are works outside the project's current scope, including park and ride facilities already contemplated by ACT Government, and bus interchange works or other road works which may be beneficial to the project, but which are not essential to the project's delivery. Capital Metro Agency costs are separately discussed in Chapter 9; and
- Escalation allowance has been calculated by the cost estimator, based on a mix of materials' indices.

5.1.4 Profile of capex

Construction is assumed to commence in April 2016, and operations to commence in 2019. As per the breakdown of capex provided by Capital Metro Agency's cost estimator, the following chart shows the anticipated profile of the capital expenditure:

Figure 20 Profile of capital expenditure ($m, nominal, year ended 30 June)



5.1.5 Benchmarking

Capex benchmarking light rail projects is an especially challenging task, as:

- There is comparatively little cost information publicly available at a detailed level. This makes it difficult to determine whether projects are being compared on a like-for-like basis. For example, it is not always apparent whether items such as rolling stock, depots and utilities movement have been included in publicly available figures;
- Projects may have very different physical characteristics (e.g. bridges, tunnelling) which substantially impact the cost per kilometre of the system;
- Some costs may be included in other light rail projects which are not strictly a direct component of the light rail project; and
- Light rail projects may involve route extensions or conversion of heavy rail lines, further complicating the ability to make like-for-like cost comparisons.

Nevertheless, in determining the cost estimate contained above, Capital Metro Agency's cost estimator has had regard to confidential benchmarking data.

5.1.5.1 Gold Coast Light Rail

Gold Coast light rail is a 13km light rail line which became operational in July 2014. Various cost figures have been associated with the project, including $949 million (*City of Gold Coast Annual Report 2012-13*), $1bn (*Daily Telegraph*, July 14, 2014) and $1.2bn (*Brisbane Times*, 27 August 2012). Assuming a $949m figure, this equates to a price per kilometre of $73 million. This compares to a price per kilometre for Capital Metro of $65 million, based upon a cost estimate of $783 million and 12km of line (i.e. a $122 million difference over a 12km line).

As a breakdown of Gold Coast light rail capital costs is not publicly available, it is difficult to be definitive regarding the reasons for differences in per kilometre capital costs between that project and Capital Metro. Based upon other public information and advisor thoughts, however:

- Gold Coast had significant heavy construction costs which will not be required in Canberra. For example, Gold Coast light rail required the construction of a bridge over the Nerang River and a street viaduct. Capital Metro will not require viaducts or major bridges;
- Press reports suggest Gold Coast light rail required $170 million of property resumptions. Land acquisition costs in Canberra will not approach that figure;
- According to publicly available information, Gold Coast light rail included a 'cutting edge' maintenance depot. Capital Metro has assumed a modest depot facility;
- Gold Coast includes 16 stations, compared to 13 anticipated in Canberra; and
- Capital Metro Agency understands that the Gold Coast route presented greater construction challenges than may be anticipated in Canberra. Canberra has the advantage of wide medians in parts of the proposed alignment.

5.1.5.2 Opex benchmarking

It is noted that opex benchmarks are even less readily available than capex benchmarks. This is particularly so where operating costs are incurred by a private operating partner under a PPP arrangement. Although an opex benchmarking exercise is not set forth in this *Full Business Case*, Capital Metro Agency's cost estimating advisor calculated operating cost estimates having regard to recent light rail experience of which it is aware elsewhere in Australia.

5.1.6 Comparison to previous capex estimate

A figure of $614m has previously been publicly quoted regarding the expected cost of a City to Gungahlin light rail route. This figure was contained within a 'City to Gungahlin Transit Corridor' Infrastructure Australia Submission dated 2012.

The two primary differences between the estimate contained within this paper ($783m) and the earlier $614m estimate are:

- The $614m estimate did not include a separately identified contingency amount. Instead, it was stated to be a "mean cost" (not a "base cost") with an upper probability of +50% and a lower probability of -30% (i.e. a range of $430m to $922m); and

- The $614m estimate did not include any costs escalation (it is in $2011).

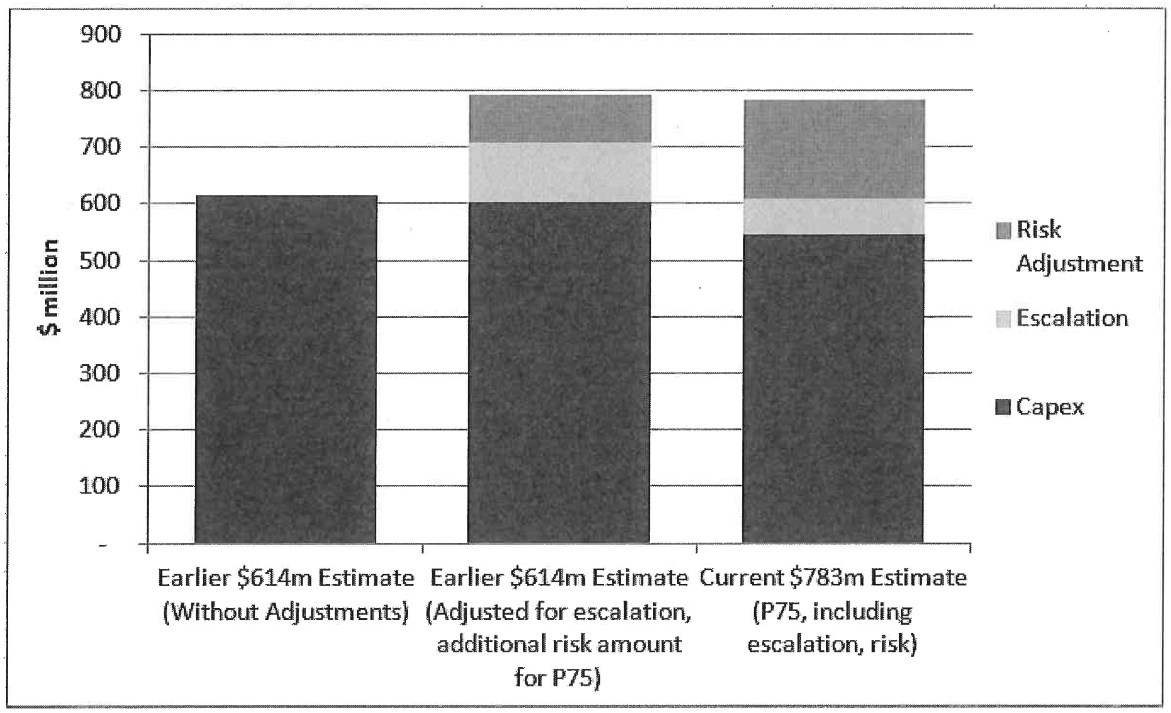
To make an approximate like for like comparison between the estimate contained in this *Full Business Case* ($783m) and the earlier $614m estimate, adjustments have included:

- Escalating costs from $2011 to the assumed construction period from 2015-16 to 2018-19. A simple 2.75% annual escalation rate has been assumed for present purposes; and

- Applying a risk adjustment to approximate the $614m figure as a P75 rather than a "mean cost" figure. As the earlier $614m estimate did not include a separately identified risk profile at different probability levels, assumptions have been made regarding the risk profile associated with that figure in determining an approximate risk adjustment for illustrative purposes.

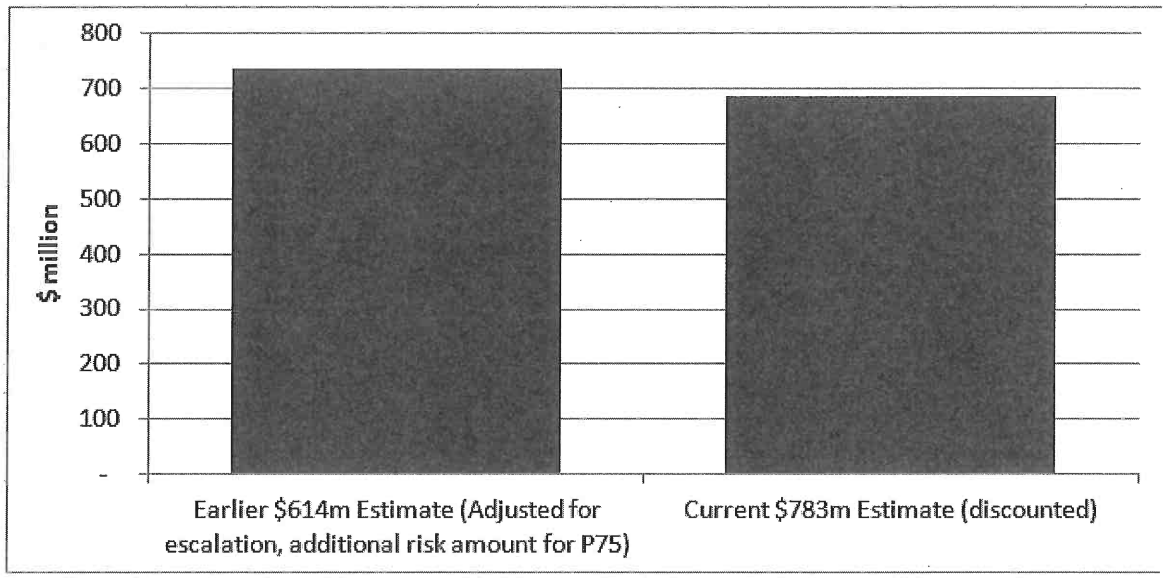
Doing this produces the graph below. On an approximate like for like basis, the earlier $614m quote becomes approximately $793m, which is slightly higher than the current cost estimate.

Figure 21 Comparison of cost estimates (adjusted to show in comparable $m nominal terms)



Alternatively, one might compare the earlier $614m estimate to the current estimate in $2014-15. Doing so produces the following approximate result (a discount rate of 5.52% has been applied to future figures and an escalation rate of 2.75% to earlier figures for illustrative purposes):

Figure 22 Comparison of cost estimates (adjusted to show in $m, $2014-15)



In the graph above, the earlier $614m estimate is adjusted for escalation and risk to $737m, whilst the current estimate has been discounted to $686m, producing a difference of $50m.

5.1.7 Opex and whole of life expenditures

'Whole of life' (extending 30 years from the anticipated commencement of operations) expenditure analysis is contained in Chapter 9.0. Operating and whole of life expenditures relating to operation of the light rail line are anticipated to be as follows ($ millions, including escalation), based upon cost advisor estimates:

Table 16 Operating, maintenance and lifecycle costs ($m, nominal)

Financial Year Ended 30 June	2019 (1)	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039 (2)	2039 (3)	2040	2041	2042	2043	2044	2045	2046	2047	2048
	PPP Operating Period																					ACT Government – Post Concession (Note 4)									
Sub Total Operating Costs	4	15	18	19	19	20	21	21	22	23	24	25	25	26	27	28	29	30	31	32	25	8	34	36	37	38	39	41	42	44	45
Sub Total Maintenance Costs	1	4	4	4	4	4	4	4	4	5	5	5	5	5	5	5	5	6	6	6	5	2	6	6	7	7	7	7	7	8	8
Lifecycle costs	0	0	0	1	0	0	1	3	1	10	0	1	0	2	7	7	0	1	0	13	1	0	0	0	5	0	0	1	2	0	27
Risk Adjustment (P75) (Note 5)	1	4	4	4	4	5	5	6	5	7	5	6	6	6	7	7	6	7	7	9	5	2	7	7	9	8	8	8	9	9	14
Total Risk Adjusted O&M Costs	**5**	**23**	**26**	**27**	**28**	**29**	**30**	**35**	**32**	**44**	**33**	**36**	**36**	**39**	**46**	**48**	**41**	**43**	**43**	**61**	**36**	**12**	**48**	**49**	**57**	**53**	**54**	**57**	**60**	**60**	**94**

Note 1: Part year from April 2019 - June 2019
Note 2: Part year from July 2038 - March 2039
Note 3: Part year for remainder of 2039 (i.e. April 2039 – June 2039) which falls outside of the PPP Concession Period.
Note 4: The cost estimator has provided a full thirty year period of operational costs (i.e. from June 2018 to June 2048), which has been split into the twenty year operating term, and a remaining ten year post PPP contract end. These have been presented here for indicative purposes only.
Note 5: Risk adjustment estimate on a P75 basis has been calculated as 20% of the operating, maintenance and lifecycle costs (based upon guidance as provided by the Cost Estimator).
Note 6: Operations and General Costs include depot/ stabling costs, operations and general costs and revenue collection costs
Note 7: Infrastructure Maintenance Costs include ticketing system maintenance costs

5.1.8 Capital Metro Agency costs

Capital Metro Agency costs and accounting matters are discussed in section 9.10.

Capital Metro Agency will incur costs during the procurement, construction and operational phases of the project. If one were to assume project-related agency expenditure during the approximately three year construction period of $15m per annum (average, real), such agency costs during construction would amount to approximately $45m. Actual Capital Metro Agency costs will be (i) in part influenced by commercial principles adopted during the procurement process, (ii) subject to the realisation or otherwise of risk events during the procurement and delivery process, and (iii) a function of ordinary budget discussions from year to year. The apportionment of costs as either capital or operating expenditure is subject to future assessment.

5.2 Contingency

5.2.1 Project contingency

During July 2014, Capital Metro Agency hosted a series of risk allocation and quantification meetings.

The first, a risk identification and allocation workshop, was chaired by Capital Metro Agency's commercial advisor and attended by various other advisors to the project. The purpose of this workshop was to identify and then notionally allocate project risks between the ACT Government and the private sector (assuming a PPP delivery model for the project). This work was designed to inform this *Full Business Case*, including the development of the project's public sector comparator (refer section 9.2).

Subsequently, risk quantification workshops chaired by Capital Metro Agency's commercial advisors were held. Those meetings sought attendee input into:

- The likelihood of a risk event occurring;
- The likely cost and programme impact of a risk event occurring; and
- The likely distribution around anticipated cost and programme impacts.

The risk quantification workshops resulted in the identification and costing, in real terms, of the project's key construction risks. Following those workshops, the project's commercial advisors performed Monte Carlo simulations to estimate the uncertainty levels and probability distributions associated with the project. Refinement of calculations was then undertaken with further input from Capital Metro Agency.

The aforementioned process resulted in the determination of the project's P50, P75 and P90 construction risk estimates. This produced the following P50, P75 and P90 capital delivery cost estimates:

Table 17 Capital cost estimate (P50, P75, P90), $m, nominal

Assumption	P50	P75	P90
Capital Delivery Cost (ex contingency, inc escalation)	610	610	610
Contingency	149	173	196
Total Project Outturn Cost	**759**	**783**	**806**

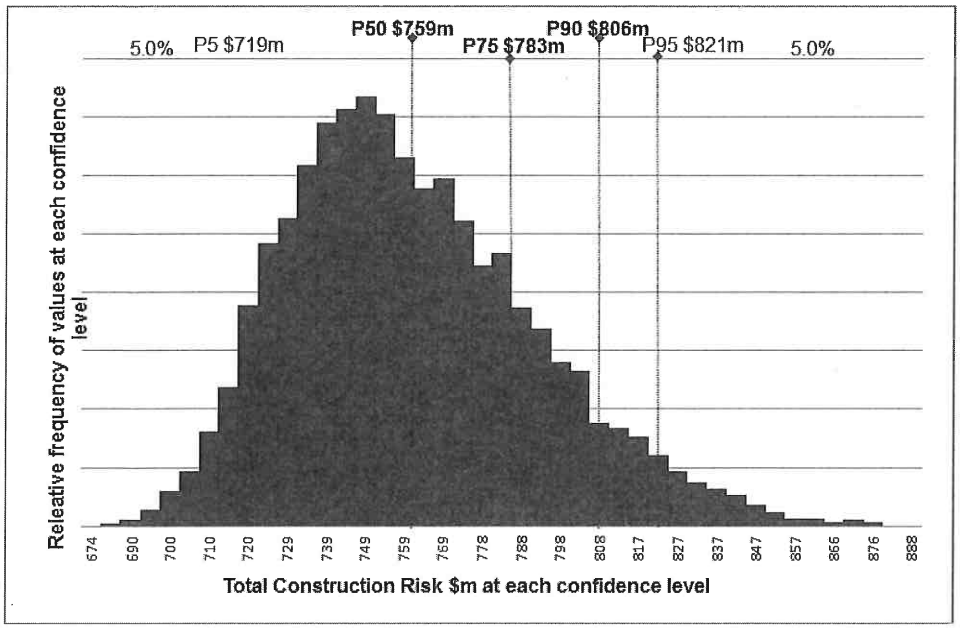
The presentation of the P75 figure at section 5.1 (as opposed to a P50, P90 or another figure) followed consideration of a range of factors, including works performed to date in developing this business case, an assessment of the anticipated approach of bidders to the procurement process, and industry business case norms.

The overall risk-adjusted capital expenditure distribution profile is shown below. This histogram represents the distribution of potential risk outcomes (from a capital expenditure point of view) which may impact on the project. In this regards:

- P50 is a mid-point estimate. It represents the project cost with sufficient risk provisions to provide a 50% level of confidence in the outcome i.e. that there is a 50% likelihood that the project cost will not be exceeded;
- P75 represents the project cost with sufficient risk provisions to provide a 75% level of confidence in the outcome i.e. that there is a 75% likelihood that the project cost will not be exceeded. In other words, it represents an estimate that has a 25% chance of being exceeded;
- P90 represents the project cost with sufficient risk provisions to provide a 90% level of confidence in the outcome i.e. that there is a 90% likelihood that the project cost will not be exceeded. In other words, it represents a conservative position, one that has an anticipated 10% chance of being exceeded; and
- Overall, this distribution profile shows a reasonably broad spread across confidence levels reflecting the stage of the project's development.

In accordance with *The Capital Framework*, additional delivery model contingency has not been added to current project cost estimates due to the recommendation of an Availability PPP delivery model.

Figure 23 Total Risk-adjusted Capex Distribution Profile (in nominal terms $m)



6.0 Economic analysis

Key messages

- Capital Metro is anticipated to deliver benefits to the community of around $3.587b over 30 years from commencement of operations in nominal terms, or approximately $1bn in present value terms (inclusive of wider economic impacts).
- This results in the project delivering an anticipated benefit cost ratio (BCR) of 1.2, comprising a transportation and land use value BCR of 1.0 and the remainder representing wider economic impacts. As the total BCR is greater than one, the economic analysis anticipates the project will deliver a net benefit to the ACT community. This does not take into account further potential social benefits which have not been quantified, as discussed in section 6.1.1.

6.1 Summary

Please refer to section 4.1 for a discussion of the linkages between the project's objectives, the benefits described in Chapter 4.0, and the benefits described in this chapter.

Table 18 summarises the range of economic costs and benefits to the community from the project. The benefits to be drawn from the project are wide and varied. They include transport benefits, land use benefits and wider economic impacts – all inherent to the project and each described in more detail below. Note that the economic cost figures shown below are different to the $nominal project delivery capex figures of $783m, as explained further below.

Note: The economic benefits set forth in this chapter are benefits arising from the project, and are in addition to general economic advancement which may occur without the project. In other words, they represent the incremental benefits to be derived from proceeding with the project. Any apparent summation errors are due to rounding.

Table 18 Cost benefit analysis (present values, $m)

Cost Scenario	Value $m PV
Project Benefits	
Transport Benefits (*of which:*)	406
Time Savings	*222*
Public transport operating savings	*54*
Other transport benefits	*129*
Land Use Benefits	381
Wider Economic Impacts	198
Total Project Benefits	**984**
Project Costs	
Capex	619
Opex	204
Total project Costs	**823**
Project Economic Indicators	
BCR (transport and land use)	**1.0**
Net Present Value (transport, land use & WEIs)	161
BCR (transport, land use & WEIs)	**1.2**

In addition to transport benefits totalling $406m in present value terms, the project is also anticipated to deliver significant land use benefits by unlocking higher density developments along the light rail corridor. These are the values of additional land use changes over and above what is expected by 2031 and that are unlikely to occur in the absence of light rail. The present value of these land use benefits is anticipated to be $381m. Finally, wider economic impacts delivered through improving connectivity between firms and to workers are anticipated to provide another $198m in benefits in present value terms.

The present value of project costs for economic analysis purposes, including capital, operating, maintenance and lifecycle costs, are anticipated to amount to $823m. Please note that these figures should not be confused with the anticipated $783m project delivery capital costs contained in Chapter 5.0, though the present value of project cost is consistent with those amounts. The calculation of the present value of project costs for economic analysis purposes is contained below. In summary, the difference between the figures is due to:

- The estimate includes opex and whole of life amounts over 30 years from commissioning;
- The figures are stated in real present value, rather than in nominal, terms;
- Economic analysis is conducted on a P50 cost basis; and

- Economic benefits are discounted at 7%, in accordance with ATC National Guidelines (in contrast to PSC or PPP Proxy discount rates).

Contained in section 6.2.5 below is a reconciliation between the financial and economic capital costs of the project.

Taking into account the total project benefits and project costs, the net present value of the project is therefore anticipated to amount to $161m, leading to an anticipated benefit cost ratio (BCR) of 1.2 (1.0 excluding WEIs).

6.1.1 Important Notes

It is important to note the following:

- A BCR is not a guarantee of project success. It represents the sum of the best evidence at this point in time on the costs and benefits of the project;
- The cost component of the BCR represents an estimate of the economic resource costs. Ultimately the outturn financial cost of the project will be determined in large part by (i) the private sector during a competitive procurement process, and (ii) the occurrence (or otherwise) and severity of risk events during the life of the project;
- The benefits component of the BCR may be influenced, both positively and negatively, by actions subsequently taken by ACT Government. This is discussed in Chapter 7.0;
- A BCR does not capture all benefits associated with a project, such as certain social benefits. Consequently, there may be a number of potential benefits to arise from the project that have not been captured by the BCR analysis contained herein. The following are potential social benefits which have not been quantified or monetized herein:
    - Light rail can provide a significant improvement to the mobility and access to opportunities for disadvantaged groups, including easy access to stops and vehicles for the mobility impaired and for families;
    - Light rail tends to have lower physical barriers and require fewer level changes compared to other public transport;
    - Light rail can offer quicker and more accessible links to jobs for people in the outer suburbs - in particular when connecting with urban centres; and
    - Light rail can also offer better quality access to community facilities and shopping opportunities and personal safety and comfort is high compared to other public transportation options;
- The benefits described in this chapter are quantified according to industry accepted methodologies, but they do not always reflect all impacts that one may perceive in practice. For example, a value that is attached to time travel savings from light rail may end up being reflected in higher property values along the rail corridor, as people value living in close proximity to Capital Metro. To avoid double counting of benefits, such impacts are only counted as a benefit once (in the above example they are captured as a travel time saving); and

- A BCR should not be regarded as the only tool which may appropriately be used by Government in making an investment decision. In making investment decisions, it is appropriate for Government to also have regard to a broad range of other factors, such as stakeholders' views and planning considerations.

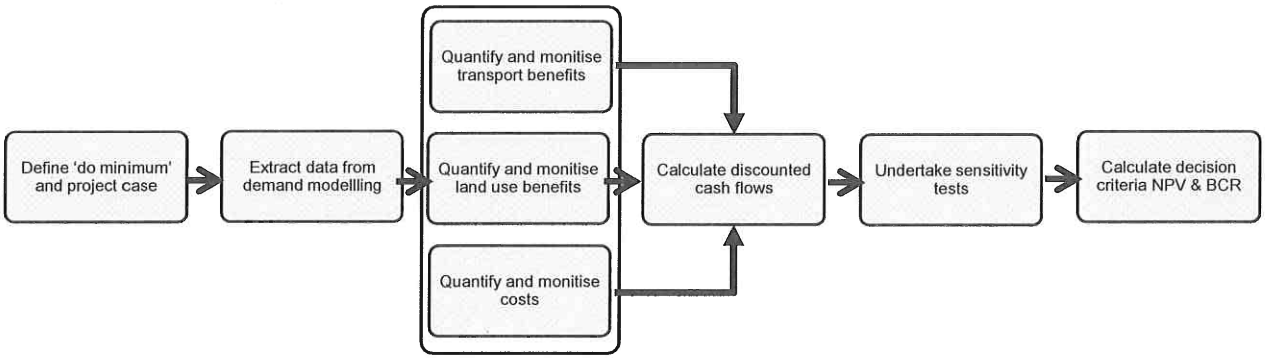
6.2 Cost Benefit Analysis (Economic efficiency analysis)

6.2.1 Overview of method

The assessment of the economic merits of the project, including the introduction of light rail from City to Gungahlin and consequent development along the light rail corridor, has been undertaken using a cost benefit analysis. This analysis has been undertaken by Capital Metro's commercial advisor. The table below summarises the source of a number of assumptions that have fed into this analysis.

A cost benefit analysis is a systematic means of analysing the financial, economic, environmental and social costs and benefits associated with a project. The analysis provides a decision-making framework that considers net impacts on society, both positive and negative. The process undertaken to complete the cost benefit analysis is shown in the diagram below.

Figure 24 General approach to cost benefit analysis



The cost benefit analysis assesses the incremental benefits and costs of the project. In undertaking the analysis the following key principles have been adopted:

- **Transport benefits:** Focus on delivering a high quality public transport cost benefit analysis that accounts for the range of impacts that are anticipated to be realised. This includes improvement to the journey experience of those who use light rail, other public transport and roads, as well as social, environmental and economic costs of transport on the general population;

- **Land use benefits:** Determine the economic benefits that would be associated with the change in land use as a result of this project (i.e. the incremental impacts of land use changes that will happen with the introduction of light rail). This assessment is consistent with best practice and uses best evidence on such impacts (see further discussion in box in section 6.2.10); and

- **Wider Economic Impacts:** Understand the wider economic impacts of the project, including both those of increasing the physical and effective density of the light rail corridor.

All these elements have been captured as part of the cost benefit analysis set out in this chapter.

6.2.2 Economic guidelines

This economic appraisal has been undertaken in accordance with established principles and guidelines, including the *Austroads Guide to Project Evaluation (2012)* and *ATC National Guidelines for Transport System Management in Australia*. However, there are no existing guidelines that adequately deal with all aspects of a multifaceted project such as the Capital Metro project. Where no specific Australian guidance exists, the analysis has been performed using adopted methodology which nevertheless follows generally accepted economic principles.

6.2.3 Economic assumptions

The right choice of underlying parameters and assumptions are important for a robust cost benefit analysis. A range of assumptions have been developed that reflect the specific characteristics of the project and that are in accordance with appraisal guidelines. This section outlines a number of general assumptions which have been incorporated in the analysis. Further details of assumptions used can be found in Appendix A.

Table 19 Economic assumptions

Assumption	Detail	Notes
Analysis time period	Construction: 2016-2019, then 30 years of operation 2019-2048 (Note: the economic analysis period reflects economic analysis guidelines, *not* the proposed operating term of 20 years).	In line with ATC national guidelines and reflects the long useful life of key components
Constant prices	All costs and benefits estimated in constant 2014-15 prices and discounted to the present year.	
Discount rate	7% real discount rate.	Sensitivity tests undertaken for 4% and 10%
Base case	Includes approved and planned road improvements and current bus network .	In the project case, light rail replaces bus services in the light rail corridor.
Values of time	$17.3 p/h for public transport users, $19.10 for car and $53.95 for commercial vehicles.	Estimated in line with ATC national guidelines
Value of time real escalation	1% per year.	In line with ATC national guidelines
Annualisation and extrapolation	Daily modelled outputs annualised using a factor of 345 for car and 315 for public transport. Values interpolated between modelled years (2021 and 2031). Post 2031, values assumed to grow by 2% per year.	In line with TfNSW guidelines and ACT bus patronage estimates

6.2.4 Source of inputs

Table 20 outlines the various sources for cost and benefits used in the economic evaluation.

Table 20 Sources of inputs to the cost benefit analysis

Benefit	Input data	Source
Cost inputs	Project capital costs	Capital Metro costs advisor
	Project operating costs	Capital Metro costs advisor
	Project life-cycle costs	Capital Metro costs advisor
Benefit inputs	Transport demand and journey times with and without light rail	Capital Metro patronage advisor
	Detailed transport model outputs for wider economic impacts	Capital Metro patronage advisor
	Land use inputs	Various, including Capital Metro and other ACT Government advisors
	Value of increased land use	Capital Metro commercial advisor

6.2.5 Project costs

The project costs that have been incorporated into the evaluation include:

- Construction costs;
- Operating and maintenance costs; and
- Periodic maintenance and renewal (life cycle) costs.

6.2.5.1 Construction costs

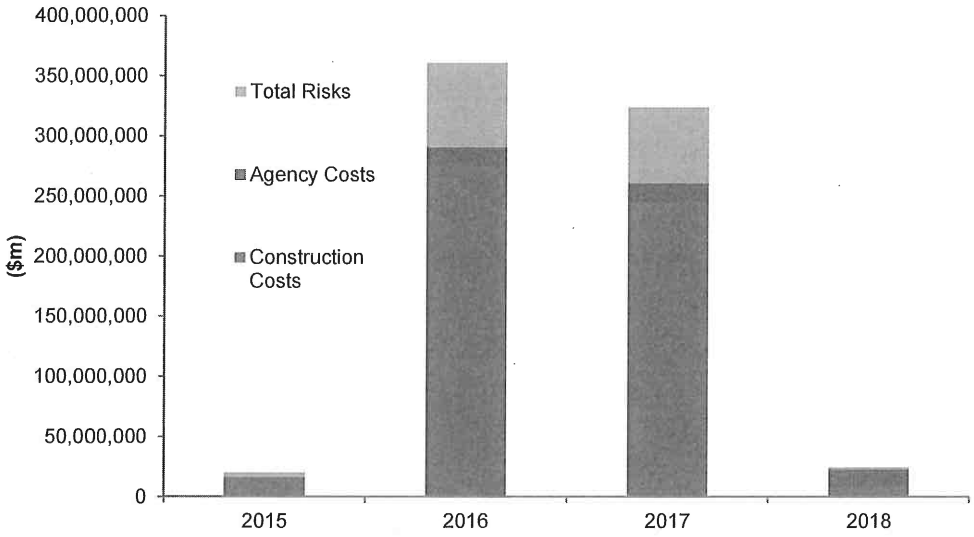
As outlined in Chapter 5.0, the capital cost associated with the Capital Metro project is anticipated to be $783m ($nominal), including escalation and a P75 contingency (risk adjustment). Excluding escalation (i.e. to express that range in $2014 prices), the anticipated real capital costs associated with delivering the project are set forth in Table 21.

Table 21 Summary of operating, maintenance and lifecycle costs (real $m, year ended 30 June)

Capital Cost Element	Cost
Total Project Outturn Cost ($nominal, P75)	783
Less: Difference between P75 and P50 contingency	(24)
Total Project Outturn Cost ($nominal, P50)	759
Less: Escalation on Alignment Cost	(65)
Less: Escalation on Contingency	(9)
Project Outturn Cost ($real)	**685**
Plus Agency Costs ($real)	45
Costs for Economic Analysis Purposes (P50, $real)	**730**

The assumed annual distribution of capital expenditure ($m real, P50) is shown below in Figure 25.

Figure 25 Capital expenditure distribution (undiscounted real $m, by year ended 30 June)



6.2.5.2 Operation, maintenance and life-cycle expenditure

Operation and maintenance costs include those from operating the light rail service as well as minor routine maintenance works (i.e. inspections, minor repairs, major service and overhaul and consumables). It does not include the impact of costs that would have already been incurred to provide services in the scenario without light rail (the base case).

Any savings regarding the avoided cost of services (such as bus routes that are no longer required) have been included as a benefit, refer below to section 6.2.8.2.

As set out below, annual real operating and maintenance costs are expected to amount to on average $22.2m per year ($ 2014), including life-cycle costs (renewals) required to maintain a sufficient level of operational performance. The table below summarises annual operating, maintenance and lifecycle costs at certain points in time over the assumed 30 year analysis period ($real).

Table 22 Summary of operating, maintenance and lifecycle costs (real $m, year ended 30 June)

Cost Category	Value (Real $m)						
	2019 (first year)	2020	2021	2026	2031	2048 (last year)	Total*
Operating Costs	16	16	18	18	18	18	**534**
Life-cycle Costs	0	0	0	3	0	11	**44**
Risk	2	2	3	3	3	4	**87**
Total	**18**	**18**	**21**	**24**	**21**	**33**	**665**

* Including years not displayed.

6.2.6 Summary of project costs

Total economic project costs amount to $823m in 2014 present value terms, as seen in Table 23. Approximately 25% of the total project cost consists of operating, maintenance and lifecycle expenditure. Again, these figures should not be confused with figures contained in Chapter 5.

Table 23 Summary of project costs (real $m from 2015 to 2048)

Project Costs	Value $m	
	Total	**Present Value**
Capital Expenditure	730	619
Operating, Maintenance and Renewal Expenditure	665	204
Total project Costs	**1,395**	**823**

Note: capital costs have been discounted at an assumed economic discount rate of 7%, in accordance with ATC guidelines.

For completeness, it is also noted that the project will attract financing costs. This is discussed in Chapter 9.0.

6.2.7 Project benefits

The project is expected to generate a range of economic impacts for transport users and the wider community, including:

- **Transport benefits**: Users, non-users and suppliers of transport will benefit from the light rail service;
- **Change in value associated with denser land use**: The economic benefits created from increasing the economic value of land use along the corridor and of urban densification, as well as efficiency gains in the provision of public services – resulting from the increased job and population densities that will happen as a consequence of the introduction of light rail; and
- **Wider Economic Impacts**: Benefits to the wider community as a result of higher density of jobs and residents, both resulting from improved transport connectivity and the increase in people and jobs located along the corridor. These include agglomeration economies and job productivity benefits.

The follow sections sets out each of these benefits in turn.

6.2.8 Transport benefits

Transport users, including those people who choose to travel by light rail, bus and roads, will benefit from the introduction of this project in a number of ways:

- Improvements in travel times, comfort and amenity of their journeys;
- Reductions in vehicle operating costs; and
- Health benefits from increases in walking and cycling (both as a means of transport as well as in accessing public transport).

In addition, the wider community will benefit as a result of changes to the transport network, through:

- Environmental benefits from lower vehicle emissions;
- Reductions in the number and severity of accidents;
- Other externality impacts such as reduced noise; and
- Savings in the provision of other public transportation services.

The calculation of transport benefits relies on many inputs and assumptions concerning the future, including assumptions concerning population, land use and employment. Assumptions concerning the future transport network are also important, including those relating to the future service patterns. In order to isolate the benefits and costs of the project solution, the results presented in this *Full Business Case* are also based on 2014 bus service patterns, accounting for the servicing of future new suburbs in Gungahlin and Molonglo. For the 'project case,' adjustments were made to remove duplication of light rail and bus services. Each of these transport related benefits are discussed in further detail below.

For completeness, it is also noted that future extensions to the light rail network would bring greater benefits to the proposed City to Gungahlin route, in part due to greater interchange opportunities, the reduction in interchange 'penalties,' and the potential to connect to new locations. Higher utilisation of existing assets may also reduce line costs. Such future benefits have not, however, been factored into this business case. Any such benefits will be factored instead into future network expansion business cases.

Note also that public transport fares are not explicitly captured in the analysis as they are merely transfers. That is, they represent both a negative impact on travellers and a positive impact on the public transport operator – and therefore cancel out. Such a treatment is consistent with best practice.

Benefits to transport users comprise monetary and non-monetary impacts. Non-monetary impacts, such as time savings and amenity benefits, are converted into monetary units using parameters established in guidelines. Appendix A contains further detail about the parameter values applied and their sources.

Travel time impacts

The principal transport benefits from a project are changes in the journey cost for journeys being made. Travellers' perceived cost of a journey incorporates attributes such as travel time, interchange, wait time, access and egress time.

For ***continuing users*** (i.e. those whose choice of travel mode does not change in response to the project) the benefits are simply the changes in perceived cost of their journeys.

For *changing users* (i.e. those whose choice of mode of travel does change in response to the project), the matter is more complicated. This is because individuals who change mode will tend to have a different value of time than the average. It is therefore entirely possible (and in fact quite common) that an improvement in public transport attracts users away from car even though the *'average'* journey cost of car remains substantially lower than for public transport. The reason is that the individuals changing mode have different preferences to the average non-changer.

Cost benefit analysis resolves this issue by assigning half of the change in generalised costs on the old mode and half of the change to the new mode for the changing users. This approach is referred to as the "rule of half". Continuing users receive the full change in travel time and are not subject to the "rule of half".

Amenity and reliability benefits

For users of public transport, the perceived journey costs reflect not only the different components of the journey time, but also the quality of the journey. To reflect the amenity value of the higher comfort of a light rail journey compared to that of a bus journey, an additional benefit is included for those travellers that switch from bus to light rail. This amenity benefit is assumed to be valued at 10% of the journey time of the average light rail trip. This is consistent with the evidence underlying the mode choice in the patronage model.

In addition to actual travel times, road users value the reliability of journey times. These benefits are captured as a separate reliability savings.

Vehicle operating costs

A reduction in the kilometres travelled on the network will also reduce vehicle operating costs. Vehicle operating costs are a function of the length of a journey, traffic volume, vehicle speed, and road conditions. Total vehicle operating costs comprise basic running costs of the vehicle (depreciation, fuel, repairs and maintenance) in resource cost terms (i.e. excluding taxes and duties).

Accident costs

The human and physical costs of accidents on the road network have been estimated as an average cost saving per reduction in vehicle km travelled on the network. Accident cost savings for public transport have not been quantified. Accident rates per passenger for public transport is significantly lower than for private vehicle travel and the benefits of replacing bus with light rail (with respect to accident costs) is likely to be very small (albeit positive).

Health benefits

The project has the potential to influence health outcomes for the people who change their travel behaviour to more active forms (walking and cycling). This change in active transport movements is likely to be achieved through an increase in the number of people living within the city centre (i.e. being able to walk to more destinations) and to access/egress from public transport modes. Greater levels of walking and cycling in turn can influence and individual's health outcomes and the wider cost burden this outcome places on the health system.

6.2.8.1 Non-transport user benefits

Externality benefits

Since different transport modes result in different production of environmental emissions, such as air pollution and greenhouse gas emissions, changes in travel patterns will cause changes in network-wide emissions. Externality impacts have been measured in using changes in vehicle kilometres travelled together with evidence on emissions per vehicle kilometre and damage cost per unit of emission.

Other externality benefits include reduction in noise and road wear and tear. These are also estimated using evidence on such externality costs per vehicle kilometre.

6.2.8.2 Supplier impacts

Public transport operating savings

The introduction of the proposed light rail system is anticipated to result in the reduction of costs of the provision of alternative public transport services, reflecting a change in bus kilometres travelled.

Such savings have been captured using changes in bus vehicle kilometres travelled and per kilometre values on operating and maintenance costs. Assumptions regarding bus operating costs are contained in Appendix A. Note that this economic analysis has not considered savings from avoided spend on alternative (not yet approved) transport infrastructure projects. Refer to section 9.8.1 for more detail regarding bus-related savings assumptions[7].

Residual value

The residual value of the benefits to be derived from light rail assets at the end of the evaluation period has been estimated as the discounted net economic benefits of extending the lifetime of the project beyond the 30 year horizon (note: the economic analysis period reflects economic analysis guidelines, not the proposed operating term). This assumes a continuing stream of project benefits, renewal of the rolling stock and ongoing operating, maintenance and replacement costs.

An alternative estimate of residual value would be the discounted value of the assets at the end of the evaluation period. However, given the practical value of the assets at the end of the evaluation period will be derived through their capacity for continued use rather than their scrap value, the extension of the evaluation period is considered the most appropriate approach.

6.2.9 Summary of transport benefits

The transport benefits are summarised in Table 24.

Table 24 Summary of transport benefits (total and present values, $m)

Transport benefits	Total	PV
Time savings	842	222
Vehicle Operating Costs (VOC)	43	10
Net externalities	54	13
Accident costs	29	7
Health benefits	17	5
Amenity and reliability benefits	57	14
Residual value	862	81
Public transport operating savings	181	54
Total Transport Benefits	**2,086**	**406**

[7] *Note that the benefits recognised in the economic analysis represent gross savings from avoided costs, and do not take into consideration the reduction in bus fare revenue. This is per the same rationale as explained in section 6.2.8with regards to recognition of rail fare revenue.*

The largest element of benefit is travel time savings, which is anticipated to amount to $222m in present value terms, while other journey specific benefits are smaller in comparison. The total present value of transport benefits is anticipated to amount to $406m.

6.2.10 Benefits from land use change

In combination with supportive government policies, light rail has the potential to drive significant land use changes. These will lead to additional benefits over and above those captured within transport benefits, both by realising higher and better use of existing land, reducing the cost of providing public services and delivering densification benefits such as agglomeration.

Note that changes in the value of existing property stock are not captured as benefits, as these are merely manifestations of gains captured elsewhere. The land use benefits captured below relate to the value of change in land use – that is, where the project unlocks additional development, employment and population along the corridor.

6.2.10.1 Benefits of realising higher density

Efforts to activate development along the light rail corridor will generate economic benefits by replacing existing land use with higher value use by improving quality and/or increasing density of developments. The analysis has been developed using a method for quantifying such impacts, consistent with established economic principles[8]. The approach is outlined in Table 25.

Table 25 Approach for value of change in land use

Benefit	Element	Method
Value of change in land use	Market value of new land use	Estimate of sales value of the properties, or present value of the stream of future rental values.
	less market value of existing land use	Estimate of sales value of existing properties, or present value of the stream of future rental values.
	less enabling and development costs	Developer's costing.
	less marketing and financing costs	Developer's costing.
	Taxes	All the above costs should be net of taxes and duties

6.2.10.2 Urban densification efficiency savings

The impact that would be realised by the wider community as a result of increased densification would be realised through:

- Reductions in the cost of provision of public infrastructure and services; and
- Benefits of urban densification.

[8] *Consistent with NSW guidelines on Strategic Impact Assessments and UK guidelines on the assessment of benefits of development contingent on transport improvements.*

Each of these benefits is summarised in Table 26 and discussed in more detail below.

Table 26 Benefits of urban densification efficiency savings

Benefit	Element	Method
Public infrastructure and service provision savings	Utilities (electricity, gas, water and sewerage)	Evidence on difference between cost of provision of infrastructure and services to dwellings in urban infill compared to in greenfield areas.
	Health	
	Education	
	Waste collection	
	Other	
Urban densification	Agglomeration	Estimation of productivity uplift from increasing density of urban areas.
	Job productivity	Estimation of increase in Gross Regional Product per worker from locating more jobs in productive urban locations.
	Energy efficiency	Estimation of reduction in environmental emissions from lower consumption per dwelling in urban infill compared to in greenfield area.

Public infrastructure and service provision savings

Future population growth will require the provision of additional public services and physical infrastructure in order to ensure that existing service standards are maintained.

The future spatial location of population and jobs can impact the future government costs of providing physical infrastructure such as roads, rail and other transport, water and sewerage, electricity, gas and telecommunications. It is well understood that the cost to provide these services to "greenfield" (i.e. outer suburban or fringe development) locations is much higher than to already well serviced "brownfield" (i.e. inner city) locations.

Urban densification benefits

A change in housing stock formation (from greenfield low density housing to brownfield medium density apartments) will affect the amount of electricity and water required to maintain a certain living standard. This foregone use of electricity and water has a corresponding decrease in environmental impacts when compared to what will otherwise be realised.

Furthermore, changes in land use will also deliver agglomeration and productivity gains similar to those captured as wider economic impacts by encouraging firms and workers to locate in closer physical proximity (see next section for an explanation of agglomeration benefits). These benefits capture both the positive impacts where jobs and workers move to, as well as the negative impacts where they otherwise would have located.

6.2.11 Summary of land use benefits

Table 27 summarises the total land use benefits from increasing the employment and population density of the light rail corridor.

Table 27 Summary of land use benefits (total and present values, $m)

Land use benefits	Total	PV
Urban densification benefits	231	72
Land value benefits	293	168
Infrastructure efficiency savings	241	140
Total land use benefits	**765**	**381**

The largest gain is an anticipated $168m increase in the value of the use of land along the light rail corridor. The reduction in the present value cost of public provision of infrastructure and services and urban densification benefits is anticipated to amount to $140m and $72m each, leading to total anticipated land use benefits of $381m in present value terms.

6.2.12 Wider economic impacts

Wider Economic Impacts (WEIs) are impacts from a project which are not adequately covered by a standard cost-benefit analysis model. The analysis of WEIs attempts to capture the broader productivity impacts of a project including the effects of connectivity, land development, and business logistics improvement. They capture the net additional benefits from the improvement in connectivity that the project delivers. The impacts are categorised in this study under Agglomeration Benefits, Imperfect Competition, and Additional Tax Revenue.

The existence of WEIs has been accepted in the countries where CBA practices are the most advanced, and form a part of the official guidelines in both the UK and New Zealand. Formal guidelines on WEIs have yet to be introduced in Australia, although Infrastructure Australia is requesting that project submissions include a WEIs assessment following UK methods. The evidence on the strength of WEIs in Australia is of reasonable quality and comparable in magnitude to the evidence underlying UK and NZ guidelines. WEIs are routinely assessed for major projects and are expected to form part of their cost-benefit analysis, albeit separately identified. They are accepted by decision makers as a legitimate and important part of the rationale for transport investments. The assessment of WEIs for this project has been conducted in accordance with the latest UK Guidelines, but using Australian evidence.

6.2.12.1 Agglomeration benefits

Agglomeration economies are the productivity benefits firms derive from being located in close proximity to each other and to workers. In general, research demonstrates these agglomeration economies are greater the closer firms are located to other firms with which they interact. Improvements to transport infrastructure that reduce travel times for workers and freight have the potential to increase the density of economic activity by effectively bringing existing firms and workers closer to each other (e.g. increasing the number of jobs and workers within a 30 minute journey time). Note that this is in addition to the agglomeration benefits from urban densification, which capture similar productivity gains from the increase in physical density.

6.2.12.2 Imperfect competition

Imperfect competition benefits represent additional economic benefits arising if output increases in sectors where competition is less than perfect, which enables firms to charge more for their products and services than what they cost to produce.

This benefit was valued in accordance with the latest UK Guidelines. It suggests that, for a typical developed economy, the missing elements of appraisal due to imperfect competition are in the order of 10 per cent of user benefits to in-work travel. In absolute terms, this benefit is an insignificant component of benefits to be derived from the project, but is mentioned here for completeness.

6.2.12.3 Additional tax revenue from increased labour supply

A transport project can encourage new workers into the labour force, either by reducing travel times or by physically causing jobs and workers to locate closer together. Conventional analyses of transport initiatives typically estimate the extent to which these travel time savings increase the welfare of the community by measuring the willingness of workers to pay for those travel time savings. That is, they typically only consider the extent to which transport initiatives increase the welfare of the workers who enjoy the travel time savings.

It is important to note, however, that the willingness of workers to pay for those time savings will underestimate the overall welfare gains that the community as a whole derives from those savings due to the imposition of taxes on any additional labour income those individuals derive (e.g. income tax and Medicare contributions). That is, the net return workers derive as a result of new entrants to the labour force (i.e. the increase in net wages as a result of the extra work effort) will be less than the gross value the community derives from that additional work effort (i.e. the increase in gross wages arising from that extra effort).

6.2.13 Summary wider economic impacts

Table 28 summarises the anticipated total wider economic impact benefits from increasing the employment and population density of the light rail corridor.

Table 28 Summary of wider economic impacts (total and present values, $m)

Wider Economic Impacts	Total	PV
Agglomeration benefits	614	165
Tax from increased labour supply	114	31
Imperfect Competition	8	2
Total wider economic impacts	**736**	**198**

Agglomeration benefits are the most significant of the WEIs, adding an anticipated $165m to benefits in present value terms. Overall, the present value of WEIs is anticipated to be $198m.

6.2.14 Summary cost benefit analysis

Table 29 summarises the range of anticipated costs and benefits from the project to the community.

Table 29 Cost benefit analysis by category (present values, $m)

Cost Scenario	Value ($m) PV
Project Benefits	
Transport Benefits	406
Land Use Benefits	381
Wider Economic Impacts	198
Total Project Benefits	**984**
Project Costs	
Capex	619
Opex	204
Total Project Costs	**823**
Project Economic Indicators	
BCR (transport and land use)	**1.0**
Net Present Value (transport, land use & WEIs)	161
BCR (transport, land use & WEIs)	**1.2**

Benefits from time savings and other transport system impacts are anticipated to reach a present value of around $406m. The project is also anticipated to deliver significant land use benefits by unlocking higher density developments along the light rail corridor, with the present value of these land use benefits anticipated to exceed $381m. Finally, including wider economic impacts delivered through improving connectivity between firms and to workers adds another anticipated $198m in present value terms.

This results in the project delivering an anticipated benefit cost ratio (BCR) of 1.2, comprising a transportation and land use value BCR of 1.0 and the remainder representing wider economic impacts. As the BCR is greater than one, the economic analysis anticipates the project will deliver a net benefit to the ACT community. This does not take into account further potential social benefits which have not been quantified, but which are discussed in section 6.1.1.

6.3 Sensitivity analysis

Table 30 shows the impact on the benefit cost ratio of variations to assumptions and key elements of costs and benefits.

Table 30 Sensitivity analysis of BCR to a range of assumptions and variations

		BCR
Base Scenario (including land use and wider economic impacts)		**1.2**
Capital costs	+20%	1.0
	-20%	1.4
Operating, maintenance and replacement costs	+20%	1.1
	-20%	1.3
Transport benefits	+20%	1.3
	-20%	1.1
Land use benefits	+20%	1.3
	-20%	1.1
Wider Economic Impacts	+20%	1.2
	-20%	1.1
Discount rate	4%	1.5
	10%	0.9
Value of time escalation	0.50%	1.2
	1.5%	1.1
UK Economic Evaluation Guidelines (see below)		1.7

The finding that Capital Metro provides a positive economic return is robust to changes in assumptions and impacts. It is also noted that as part of the development of the cost benefits analysis, the BCR has been tested for changes in a range of inputs – in particular different population and employment growth rates and different public transport network assumptions. While the balance of costs and benefits in the different categories vary in response to these tests, the overall BCR remains predominately at or above one.

In order to illustrate the impact of key assumptions, the last sensitivity test explores the impact of changing to the assumptions used in UK transport appraisal (i.e. it considers the BCR outcome through the use of this different BCR methodology) by changing the discount rate (3.5% rather than 7%) and value of time escalation (1.5% per year rather than 1%). This would bring the BCR to 1.7.

6.3.1 Caution in comparing previous BCR estimates

It is further noted that caution must be had in comparing the BCR estimate contained herein to previous BCR estimates associated with light rail in Canberra. Material variations in BCRs might be attributable to a range of factors, including:

- Discounting assumptions;

- Assumptions associated with project timings;
- Assumptions around parking charges (which influences patronage) and land usage; and
- Methodologies adopted in performing analysis.

7.0 Dependencies

The benefits anticipated in this business case are founded upon a number of assumptions. While such assumptions are realistic, actions shall be required by current and future Governments to ensure stated benefits are realised and maximised.

7.1 Land development

Land development decisions undertaken by the ACT Government will influence the realisation of benefits by the Capital Metro project.

A successful project will be one that supports a mix of land use along the corridor. This in turn should maximise the economic potential of the corridor and provide high and reasonably spread patronage across the light rail line.

Supply and demand for land development along the light rail corridor will be shaped by factors which include:

- ACT Government decisions regarding the timing, staging and nature of the release or re-development of ACT Government owned land in the corridor;
- The relative supply of land elsewhere in the ACT and the prioritisation of development activities ACT Government-wide;
- Planning rules relating to the corridor (noting current analysis does not assume changes to planning rules relating to building heights);
- General economic activity and population growth within the ACT;
- ACT Government decisions regarding the location of its own activities within the ACT;
- Value capture decisions made by the ACT Government; and
- The timing, staging and success of complementary city transformation activities to be undertaken by ACT Government.

If the project is approved, Capital Metro Agency recommends that future ACT Government land strategies give proper regard to recognising and maximising potential benefits associated with Capital Metro. The ACT Government may wish to give consideration to the establishment of both strategies and guiding bodies for the realisation of light-rail corridor land benefits, whilst giving due regard to (i) overall supply and housing market stability considerations in the Territory, and (ii) programmed land releases from other urban-infill districts in the ACT.

7.2 Other influencing factors

A non-exhaustive list of other factors wholly or partly within ACT Government's control which may influence the recognition or maximisation of light rail benefits are set forth in the table below.

Table 31 ACT Government policy considerations which may influence project benefits (non-exhaustive)

Influencing Factor	Commentary
Ticketing and Fare Setting	• Patronage and revenue risk shall be retained by the ACT Government. • A single ticketing system should be used between light rail and buses to facilitate ease of use. • Fare structures should be appropriate having regard to corresponding bus fares and network operating costs. The setting of fares shall influence light rail patronage. Current analysis assumes fares are set at a level consistent with ACTION fares.
Bus Integration	• Bus networks will need to be considered with a view to providing efficient but convenient integration with light rail. This will increase the attraction of public transportation in Canberra.
Park and Ride Integration	• The development of park and ride facilities with sufficient capacity in close proximity to light rail will impact demand for light rail. This is expected to be a continuing consideration for Government as use of light rail increases.
Parking Charges	• ACT Government decisions regarding parking charges in the City and elsewhere will impact demand for light rail versus car / parking modes of transport.
Value Capture	• The distribution of potential benefits will in part be influenced by value capture decisions undertaken by Government.
Economic Activities	• General demand for light rail shall be enhanced to the extent the ACT Government is able to attract increased and diversified industry participation in the ACT. • Attraction of industry to the light rail corridor in particular will be of benefit to the project.
ACT Government Staff	• The location (or otherwise) of ACT Government staff within the rail corridor – and the potential alternative use of land currently occupied by ACT Government offices - may influence the realisation or timing of project benefits.
Signal Priorities	• Signal priorities and consequent light rail journey times will shape the attractiveness of light rail as a transportation option.
Future Augmentation	• ACT Government decisions to augment the light rail network may have a synergistic uplift in benefits recognised by the City to Gungahlin route.

8.0 Delivery model analysis

Key messages

- The recommended delivery model is an availability payment public-private partnership (PPP). The primary drivers behind this are to provide heightened price certainty, achieve optimal risk transfer and to drive innovation in providing a light rail system which meets customer, urban design and affordability requirements.
- It is recommended that all major light rail project elements, including design, construction, operations, financing, maintenance and rolling stock selection, in addition to utilities relocation / protection, be packaged together under a single light rail PPP.
- It is recommended that any significant land or building development alongside the route not be included within the light rail PPP.

8.1 Background and approach

The delivery model recommended herein was selected after an extensive process which included:

- **Expert analysis**: The receipt of expert analysis from Capital Metro Agency's commercial advisor;
- **Market sounding**: The conduct of a formal market sounding exercise involving 16 light rail industry participants representing construction, operation and maintenance, finance and rolling stock supplier segments of the market;
- **Risk analysis**: Risk identification, allocation and quantification works undertaken by Capital Metro Agency and its advisors; and
- **Stakeholder consultation**: Ongoing consultation with other Capital Metro Agency advisors and stakeholders, including the Capital Metro Agency Project Board.

The methodology applied to determine a recommended procurement and delivery strategy for the project is consistent with Infrastructure Australia Guidelines and *The Capital Framework*. The fundamental approach taken in assessing delivery models has been:

- Assessing on a 'best for project' basis with no preconceived bias in favour of one model over another – including whether a PPP should be adopted or not;
- Undertaking a bottom up analysis based on the needs of the project; and
- Being cognisant of the nature of the inherent project risks.

The delivery model analysis undertaken by Capital Metro Agency in conjunction with its commercial advisor addressed two core questions:

- How should the various project components be packaged to deliver best-value-for-money outcomes?

- Which contracting models are preferred for delivery of the proposed project?

8.1.1 Important note

At the outset, it is important to note the following:

- **Balanced assessment**: No single delivery model option perfectly addresses all aspects of the project. The delivery model recommendation contained herein is based upon a balancing of the advantages and disadvantages of potential delivery models for the project;
- **Differing opinions**: Some market participants may have differing opinions as to the optimal delivery model to be utilised for the project, and as to the numerous ways in which a particular delivery model may be structured and implemented. Those views have been taken into account in recommending availability PPP for the project; and
- **Not free money**: An availability PPP does not represent a "free" method by which to deliver the project, but instead involves private sector financing of the project upfront and then government payments across the concession term. However, an *availability PPP* does provide a potentially higher degree of cost certainty, risk allocation and private sector efficiency than other delivery models. This is discussed throughout this chapter.

8.2 Outline of key risks

8.2.1 Risk management process

Consideration of risk has been a key element of works undertaken by Capital Metro Agency to date. The risk assessment process has involved interactions with stakeholders and advisors both before and during the development of this document.

Capital Metro Agency has undertaken risk assessment and quantification analysis in developing this *Full Business Case*. This process of risk assessment and risk quantification analysis has included:

- Considering risks encountered by other light rail projects;
- Conducting internal risk assessment (including risk allocation and quantification) workshops with input from expert advisors;
- Discussing key risks during the market sounding process; and
- Discussion of risks with various project stakeholders.

With specific regard to risks associated with the capital delivery estimate contained within this document, the risk management process has included the calculation of a capital contingency amount. This is discussed in section 9.2.4.

8.2.2 Key risks

Table 32 provides a selection of key potential project risks with a brief description (in no particular order). Mitigation strategies are being separately developed with regards to (i) the party best able to manage and control risks, and (ii) limiting potentially adverse cost and time outcomes for the project from the realisation of risks.

Table 32 Key potential project risks

Risk	Description
Procurement risks	
Capability	A risk of not having necessary experience and capability to deliver and operate a light rail network.
Patronage	Risk of light rail patronage numbers differing from assumptions.
Associated Development	Risk that anticipated land development associated with light rail is not realised.
Market	Risk that the project will not attract enough bidders to the project, either in a particular project segment or as consortia due to other infrastructure projects on the market / horizon.
Bidder/Proposal	Risk that shortlisted bidders will not submit proposals.
Project risks	
Planning Approvals - NCA	Risk that planning approvals required from the National Capital Authority –will not be obtained within anticipated timeframes, or which will require unanticipated design changes. NCA development approval under the *Australian Capital Territory (Planning and Land Management) Act* 1988 will be required for proposed works in a designated area (works on the 'Main Avenue and Approach Road' of Northbourne Avenue from the junction of Flemington Road / Federal Highway down to Civic).
Planning Approvals - ACT	Risk that project does not receive all other approvals required for the project, beyond NCA approvals (e.g. EIS, EPBC, ACT planning approvals), therefore implying delays in anticipated timeframes. This risk is also related to potential delay caused by appeal processes, and / or additional costs introduced through planning decisions regarding the physical form of the project.
Site conditions (including contamination)	The risk of dealing with unexpected environmental issues, including contamination, heritage site, geotechnical conditions and risk of flooding.
Safety	Overall safety risks of passengers and workers during construction, along with the risk of not obtaining accreditation from the Rail Safety regulator.
Enabling works (including relocation of utilities)	Risk of facing delays and / or cost overrun as a result of not relocating or protecting existing utilities in the anticipated timeframe.
Design	Risk associated with detailed design not meeting the requirements of delivery phase and / or operations phase.
Interface	Risk related to the overall management of design and construction interfaces, causing issues during the delivery stage, or disruption in service once operational.
Performance	Risk of needing additional tramways to meet an increased level of service (due to increased patronage).

Risk	Description
Commissioning and start of service	Risk of late delivery and commencement of project operations related to not successfully testing and commissioning (for reasons other than delays caused by the ACT Government).
Forex	Risk of foreign exchange movements, as the portion of overall cost subject to foreign exchange movement may be material.
Cost	Risk of exceeding budgeted contingency resulting from unforeseen costs, or cost overrun during delivery. This risk is considered as well as a market risk resulting from potentially different views from bidders with respect to the project's budget and its relevance to the contemplated scope.
Scope Creep	Risk that incremental design demands drive project costs upwards.
Interest Rate	Risk of higher interest rates when project finance is rolled over beyond first financing periods.
Technology	Risk of using obsolete or unproven technology that will hamper efficient operations and/or future extension plans.
Force majeure	Events beyond the control of parties involved and governments that prevents fulfilment of contractual obligations.

8.3 Delivery model assessment

8.3.1 General principles – delivery model assessment

The five general principles as set forth in *The Capital Framework* have guided Capital Metro Agency's assessment of potential delivery models. They are:

- Time to market;
- Flexibility;
- Price certainty;
- Innovation and incentive; and
- Risk transfer.

It is noted that in addition to the foregoing, customer outcomes, urban design, affordability and community matters are very important Capital Metro Agency considerations.

The table below provides key project considerations in relation to each of the aforementioned *Capital Framework* principles. None of the principles listed above have been given any greater priority than the others, with the potential exception of 'time to market' and 'flexibility.'

Table 33 Key project considerations

Commercial Principle	Key project Considerations
Time to Market	• Certainty on project commencement time is of importance, but accelerating time to financial close is not a procurement driver. Capital Metro Agency is proceeding upon the basis of achieving realistic timeframes. • Presently anticipated timeframe is considered to be achievable, albeit not expansive. • Time to market will be informed by price and value for money.
Flexibility	• The primary requirement for flexibility is with respect to potential future project extensions. Flexibility will be required in the context of future possible extensions of the network. Potential need for future wireless running in sections of any expansion will also be a consideration. • Flexibility to direct specifics of design and construction process is not a primary procurement driver. • Required specifications can be provided through output specifications (rather than proscriptive design) • Some additional flexibility to manage the operator after completion of construction is preferable (such as changes in operating frequencies or including additional rolling stock depending on demand).
Price Certainty	• Price certainty is a major procurement driver: the project size means proportionally small cost overruns may equate to material dollar amounts. Previous experience with other high profile projects raises the importance of providing greater cost certainty (i.e. transferring price risk)
Innovation and Incentive	• The project size and complexity suggests there is some scope for gains through innovation. • Efficient design, use of technology in driving whole of life cost reductions, and efficiency in delivery may result in reduced final whole of life costs. • Innovation and incentive is a moderate procurement driver.
Risk Transfer	• The project is large and complex, with interfaces between major project elements (such as rolling stock, depots, utilities, ICT, and rail infrastructure), creating many potential critical risks which need to be solved in order to deliver the project seamlessly. • The ACT Government has little prior experience with rail operations or construction, which raises the risk of internal delivery during either construction or operations. • The project is also large in comparison with previously delivered projects in the ACT, which could stretch existing major project delivery resources • There are some residual risks which cannot be transferred (planning, patronage). • Risk transfer is a major procurement driver. Sharing of risks with another party with greater experience may lead to reduced total costs for the project during construction and operation.

8.3.2 Data gathering

Significant data has been collated for the purposes of assessing delivery model alternatives. This includes:

- Project objectives;
- Project requirements (scope of works and services);
- Project risk assessment;
- Project cost estimates; and
- Other information as contained throughout this business case.

8.3.3 Shortlisted delivery models

Capital Metro Agency's shortlisting of delivery models first involved an assessment of the extent to which elements of the project could be packaged or 'bundled' together.

During Q1 2014, a workshop was held with key stakeholders across ACT Government directorates to start discussion on major issues which would influence procurement analysis. This included discussion and analysis to:

- Identify the scope of works to be procured;
- Identify packaging options; and
- Introduce delivery model evaluation criteria.

This full spectrum of models was canvassed and discussed in the workshop and the key packaging considerations identified through that workshop for the Capital Metro project were identified as:

- Commercial land development opportunities: should these be bundled with the operations and / or civil infrastructure works?
- "Scope": should site establishment, civil infrastructure, operations and rolling stock be procured as a package or in some combination? Unbundling may provide increased ability to undertake early works and/or implement effective staging of the project. However, if the scope of works is unbundled and procured separately, interface and timing risks would emerge that would need to be managed.
- Geography: should there be stand-alone smaller scale stages? For example splitting elements of the project works between Dickson to the City, or Gungahlin to Dickson, may enable the involvement of a greater number of smaller contractors.

The packaging decisions with respect to each of the commercial land development, scope and geographic separation were tested with the Capital Metro Project Board in Q2 2014. These are discussed in more detail below.

8.3.3.1 Packaging consideration: bundle infrastructure and services with urban development?

The *Rapid Business Case* established that targeted property development in the rail corridor may accelerate achievement of the project's potential benefits beyond what has been contemplated herein.

Analysis on this point, however, indicates that bundling the project with urban development activities for procurement purposes is not a recommended approach to facilitate such rail corridor development. Table 34 provides a summary of that analysis.

Table 34 Packaging strategy considerations: infrastructure and services with urban development

	Packaging Strategy
Why procure stand alone?	• Different marketplaces and contractors for property development compared to infrastructure civil works and light rail operations and maintenance. Enables a range of developers (including smaller and local groups) to be involved in individual developments. • Packaging land development with the light rail project may require an alignment of interests between ACT Government and a property development/light rail delivery consortium. Could constrain ACT Government's flexibility and control over the light rail solution and may inhibit certain urban renewal opportunities. • Lack of competitive market if bundled with infrastructure works. Light rail market may not be comfortable with the risk (e.g. Capital Metro Agency understands that in Sydney Light Rail there was limited appetite from the market for bundling). If there is insufficient interest, packaged commercialisation assets may be priced below expectations. • Transport service outcomes may be compromised where light rail operations form only an exceptionally minor part of overall works. • May require provision of a very significant parcel of ACT land to a single developer, increasing land development risks. • Packaging land development with the light rail project will potentially substantially increase the scope and size of risks associated with the project.
Why package?	• Provides incentives to align land use changes and urban development with construction/delivery of the project. May better align the timing of land use changes and developments with the project compared with ACT Government land development and planning processes • The market appetite and perceived upside in the urban development and commercialisation opportunities will be a major factor in the market interest. However successful examples (e.g. Chatswood interchange, Spencer Street station, Convention Centres, Barangaroo) are those projects where there is a clear infrastructure delivery synergy of commercial hotel/F&B with infrastructure attracting large patronage at stations and convention facilities.

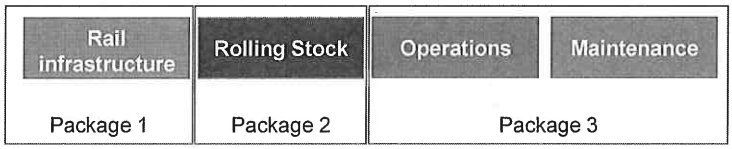
8.3.3.2 Packaging options: scope – vertical integration versus separation

Following a workshop with stakeholders in early 2014 and a review of domestic and international projects, four combinations of contractor integration were identified as most often used and relevant for the project, as outlined in Figure 26.

Figure 26 Contractor integration options

Key characteristics

Option 1: Bundle operations and maintenance



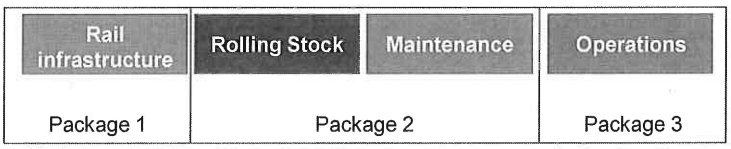
Key considerations

- Provides flexibility over control on operations

Key characteristics

- Creates interfaces between bundles
- Client holds integration risk between infrastructure and rolling stock
- Operations has no influence over rolling stock

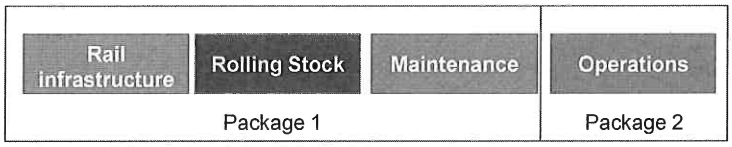
Option 2: Bundle rolling stock and maintenance



Key considerations

- Separates operator, providing greatest flexibility on strict operational issues
- Client holds integration risk between infrastructure and rolling stock
- Creates interface risks between bundles
- Eliminates potential for whole of life considerations in operations
- May result in small operations package with limited market appeal
- Difficulties in attracting 'best of breed' operators

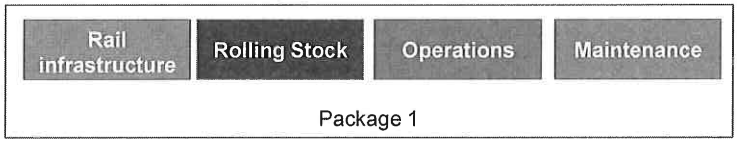
Option 3: Bundle infrastructure, rolling stock and maintenance



Key considerations

- Similar to previous option, but resolves potential interface issues between infrastructure and rolling stock purchase and maintenance
- High degree of flexibility in operations, but small operations contract size

Option 4: Single vertically integrated package



Key considerations

- Resolves the interface risks between elements (only one bundle)
- Largest package size, likely to appeal to the market
- Lowest ability to control during operations phase
- Inability to disaggregate to pick 'best of breed' solution

Packaging option 4 (a single vertically integrated package) is identified as the preferred option. This packaging strategy:

- Provides optimal risk transfer.

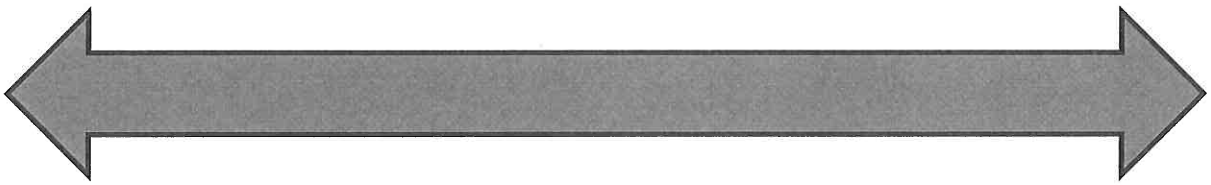
Vertical integration of the contract packages mitigates interface risks. This is seen as important and relevant for the ACT which does not have existing light rail operations or large construction markets (unlike Melbourne and Adelaide where packages have been procured separately). Integration is also seen to best drive outcomes in relation to cost, time and management of community impacts:

- Allows the market to identify and attract the best suppliers and avoids the requirement for a large project management office to contract in procurement and contractor integration;
- Appears sufficient to generate market interest given the size of the integrated project; and
- Can address future flexibility contractually: e.g. the potential inclusion of break points in the operating contract to change operator; competitively bid pricing on changes to frequency/ route extensions.

8.3.3.3 Delivery Models

The Capital Framework identifies nine delivery models which exhibit differing degrees of integration and flexibility, as outlined in Figure 27.

Figure 27 Nine delivery models



Project Management Agreement	**Construct Only**	**Design Construction Maintain Operation (DCMO)**
Alliance	**Design and Construct**	**PPP (BOOT)**
Managing Contractor	**Design Construct Maintain**	**PPP (Availability)**

The models can also be categorised into those which are traditional unbundled forms and those bundled models which bring together service delivery and whole of life responsibilities with construction, as outlined in Table 35.

Table 35 Unbundled versus bundled models

Traditional Unbundled Models	Bundled Models
The Unbundled approach is centred on construction based procurement models: • Project Management Agreement • Construct Only • Design and Construct • Managing Contractor • Alliance	Bundled approach include the following procurement models: • PPP (Availability) • PPP (Build-own-operate-transfer – BOOT) • Design Construct Maintain (DCM) • Design Construct Maintain Operate (DCMO) • Alliance

As discussed above, the primary drivers for the decision on procurement model were price certainty, risk transfer, innovation and incentive. Time to market and flexibility were considered potentially lesser drivers for this project. This immediately suggests a model which tends away from models typically chosen for their flexibility and timing advantages (such as project management agreements, alliances or managing contractor) and which generally provide lower cost certainty and lower risk transfer.

The innovation and incentive potential in the project also suggests that a model which promotes whole of life considerations being made by potential light rail partners will drive greater value for money for the ACT Government.

Finally, the bundling analysis noted that a single vertically integrated package was the preferred approach. This negates the use of separated contracted frameworks (such as D&C with a separate O&M contract, construct only, or DCM).

On the basis of the factors noted above, the delivery models shortlisted for further analysis were as outlined in Table 36.

Table 36 Shortlisted delivery models

Delivery Model	Commentary
Shortlisted	
PPP (Availability)	Availability PPP involves private sector finance and ownership of the project over the concession term. An Availability PPP transfers the risk of providing the infrastructure and required services over the term but does not include transfer of patronage risk (i.e. how many people use the infrastructure). Availability PPP provides the greatest level of price certainty and risk transfer (excluding patronage), while also providing whole of life incentives for innovations in design and operations. An Availability PPP also provides greater certainty and a reduction in time to delivery when compared with alternative delivery models. Whilst this form of contracting structure may take longer to negotiate, the incentive for the PPP Co to receive availability payments as soon as possible drives them to deliver the project as quickly as possible (as these are not received until operations commences).
Design, Construct, Maintain and Operate (DCMO)	DCMO involves a consortium of a Designer, Constructor, Maintainer, and Operator (and potentially rolling stock and other contractors) entering into a long term contract to provide the infrastructure services, where the risk of delivery is jointly held by all parties over the contract term. DCMO has the potential to provide a similar level of price certainty, risk transfer and whole of life incentives as an availability PPP, but generally depends on the degree of risk the operator and other parties are willing to take post construction.
Not Shortlisted	
Project Management Agreement, Construct Only, Managing Contractor,	Not shortlisted due to lack of price certainty and risk transfer.

Delivery Model	Commentary
Alliance	Not shortlisted due to lack of price certainty.
Design Construct and Maintain, PPP (BOOT)	Not shortlisted due to inability to procure in a vertically integrated whole (no bundled operations with a DCM model) PPP BOOT was not considered because this model precludes potential for innovation through the lack of inclusion of the design with the package. It is also clear from market sounding activities that there is little appetite in the Australian market for acceptance of patronage risk in transportation projects. This is particularly so for rail and projects (such as Capital Metro) which are conducted to facilitate future property densification.

8.3.4 Delivery model option analysis

To arrive at the preferred delivery model, it is important to consider the differences between a PPP and DCMO delivery model.

Value for money drivers for a DCMO option are similar to that for a PPP, noting their different treatment of financing. Both models are whole of life and are often categorised as PPP type options. The key differences between the contracting forms which need to be considered (outlined below) are:

- PPP procurement options are generally led by financiers and/or contractors providing equity into the project, as opposed to DCMO options which may be led by a builder or engineering firm. This changes the incentives and the interface between the project sponsor and the bidder. Additional cost minimisation drivers may exist within a PPP model.

- DCMO contracting options, given they are generally led by engineering based companies, are frequently applied in technically complex engineering projects (the most recent example of this are desalination plants).

- DCMO models tend to be used where there is a single company that operates the plant that also installs proprietary property, such as process engineering, during the construction phase. The water sector has used this model extensively. Interfaces between the operator and the procuring entity tend to be contractual, e.g. the water company is often the off-taker, but is not involved in jointly operating the facility. There is often a significant civil engineering component to the project, which is characterised as high capital spend, long life and relatively low maintenance compared to the process engineering components. The proprietary characteristics of the projects combined with capital intensive and low operating cost civil engineering components lend themselves to the DCMO model.

The preferred delivery model with respect to each decision driver is presented in the table below.

Table 37 Summary evaluation of PPP and DCMO delivery options

Decision driver	PPP	DCMO
Cost	✓✓✓	✓✓
Time	✓✓✓	✓✓
Optimal risk transfer	✓✓✓	✓✓
Quality and innovation	✓✓✓	✓✓
Procurement efficiency	✓✓✓	✓✓✓
Flexibility and control / Network effects (operational interfaces)	✓✓	✓✓✓

A PPP offers advantages over DCMO in relation to certainty over cost and time outcomes, optimal risk transfer and scope for innovation. Financiers are the 'glue' that holds the risk transfer and interface management together. Financiers are a significant driver of cost minimisation within PPP consortia, and exercise significant risk management activities within bid teams. Under a DCMO the CMA would need to establish a well-resourced project management office. Additionally, there are precedent Australian light rail PPP contract documents that can be leveraged for Capital Metro. DCMO has not been adopted in the light rail sector.

The analysis suggests that a PPP is the preferred model to deliver the vertically integrated package.

It is noted the analysis in this chapter is mainly qualitative as opposed to quantitative in nature. This delivery model analysis should be read in conjunction with section 9.0.

8.3.5 Market sounding validation

Formal market sounding occurred during May and June 2014 with a cross section of light rail industry participants representing operators, financial sponsors, D&C contractors and rolling stock suppliers. Attendees included Capital Metro Agency, CMTEDD and advisor representatives.

The market sounding process revealed some divergence of opinion between some participants on some topics. Nevertheless, the following key findings were generally provided through the market sounding process on the delivery model, procurement process, key risks and commercial principles:

8.3.5.1 Delivery model:

- General support for an Availability PPP (including D&C contractors, at least one operator and multiple vehicle suppliers, and all financial sponsors);
- Participants noted that the participation of private finance in a PPP provides a substantial additional layer of scrutiny, risk management and driver for cost reduction;
- Of the minority of total participants that did not prefer the PPP model, their preferred model was generally for government to procure elements of the project separately, with the ACT Government retaining key interface risks associated with the project;
- No participants preferred the alternative model of a DCMO as compared to a PPP;
- A minimum project size of around $500m is necessary to attract larger financial market participants to the project. All participants believed the project would be of sufficient size;

- Financial participants had the view that government contributions were not necessary to enable the project to proceed from a market liquidity perspective, but could be accepted by the PPP (if structured appropriately) should ACT Government see benefit in taking such a course of action;
- Any Government investment should take the form of a contribution rather than a debt or equity stake owing to inter-creditor and conflict of interest issues;
- Participants accepted the ACT Government's potential desire for termination options which sought to provide flexibility for route extensions, however they suggested considering a negotiated solution with the incumbent operator (e.g. via an open book approach); and
- Participants noted that by not 'recreating the wheel' and by leveraging / mirroring commercial principles from recent light rail PPPs, costs will be minimised.

8.3.5.2 Key risks, costs and commercial principles:

- Participants generally assumed a relative lack of complexity for the project in comparison to other light rail projects in the market (noting Canberra has a flat alignment in a dedicated corridor) and that this should result in lower costs;
- All participants argued that a better value for money outcome will be achieved by the ACT Government providing an output specification focused on the outcomes required rather than an input specification that has a high level of specification and reduces innovation. All participants argued this was the best way to reduce and optimise cost of delivery. All participants supported a highly interactive RFP process with strong guidance to be provided by the ACT Government around its actual project desires;
- A minimum concession term of 15 years (plus construction) is required to attract operators (particularly with respect to recovering their bid costs). Both operators and equity providers prefer a longer term of 20-30 years more closely matched to the economic life of the assets. Utilities risk was one of the most commonly cited risks that the ACT Government should contemplate. The private sector is capable of taking services relocation risk, though a mature discussion is required between the ACT Government and the private sector on potentially sharing elements of that risk. Feedback from participants indicates that the ACT Government may assist in de-risking this task, and thereby potentially lowering cost, by undertaking preparatory tasks such as utilities surveys and mapping;
- There are advantages and disadvantages of having an early works package to relocate utilities with some participants having strong views one way or the other way:
  - Key advantages of the ACT Government undertaking early works are reduced risk that needs to be priced by the PPP, and reduced percentage scope of civil works in the PPP (providing a better balance of cost elements between operations, rolling stock and civil works).
  - Key disadvantages of the ACT Government undertaking early works include losing the possibility that the PPP may optimise what service relocations actually need to occur, and increased cost if there is a separate early works package which results in duplication of construction preliminaries, procurement costs and other construction features. The ACT Government would also bear the cost and risk of project delays caused due to the non-completion of early works.
- Urban amenity: In order to achieve an innovative solution with respect to urban amenity as opposed to a low cost dominated solution the ACT Government might consider one or all of;

- Providing greater clarity on evaluation criteria including weightings for urban amenity
- Including a highly interactive process with bidders during the procurement process
- Potential inclusion of a separate urban design review board
- Including a budget for urban amenity and getting bidders to compete on the maximum they could deliver within that budget.

- The main technical risks discussed were whether there were any key risks associated with providing a wire-free solution. Battery / super capacitor light rail vehicles over long distances was the main risk cited as being relevant to the project if a wire-free solution was provided. While participants suggested that a wire-free solution is likely to be more expensive, it is possible to procure light rail vehicles which provide for a future wire-free solution (without a significant cost impact) as long as the general features (e.g. potential distance that may be wire-free) of a future wire-free solution are specified;
- Participants noted that the private sector is comfortable accepting refinance risk; and
- No participant was willing to accept patronage risk on the project.

8.3.5.3 <u>On Procurement:</u>

- All participants expressed a general willingness and interest to participate in the project;
- The timing of this project is good for the following reasons;
  - It follows shortly after preferred bidders are chosen for Sydney Light Rail and North West Rail Link.
  - It provides a 'bridge' before other light rail and rail projects in Australia such as Newcastle Light Rail, Perth Light Rail, and the rail projects currently put up for business case development in Victoria.
  - It comes before the next wave of major infrastructure and privatisation transactions are likely to hit the market.
- Participants indicated that it was likely Capital Metro would attract a strong bidding field for the project, with similar participants to the Gold Coast Rapid Transit, Sydney Light Rail and North West Rail Link processes (albeit in potentially differing consortia formations);
- A potential limiting factor is the small number of light rail operators that have actively bid for light rail projects in Australia;
- Key potential approaches which were suggested by market participants to attract the market and in particular operators are;
  - Shortlisting only two bidders for the RFP.
  - Providing some contribution to bid costs (for the losing bidder).
  - Providing for bid cost reimbursement upon termination for convenience of the process by the ACT Government (Sydney Metro was noted on several occasions). Note all financial sponsors indicated that the presence or otherwise of bid cost reimbursement wouldn't limit their participation in the bidding process. Many of the other participants also indicated that they were more interested in

ensuring that only two parties were shortlisted to progress through to EOI than receiving bid cost reimbursement.

- All participants stated that a greater degree of open interaction with the ACT Government and sufficient time for the RFP, are both key factors in ensuring success. The approach that Sydney Light Rail has taken in providing 1 day per week for interaction with the bidders having the flexibility to choose how little or how much interaction they then require was stated as a positive initiative;
- Sufficient time needs to be provided from the Industry Briefing to EOI to allow the formation of consortiums – approximately 6-8 weeks was preferred; and
- In order to achieve cost outcomes sought by the ACT Government, participants recommended the ACT Government provide an affordability signal to market during the RFP stage (or earlier) of the procurement process if indeed the ACT Government has formulated an affordability threshold. It was noted that methods for achieving affordability might be to:
  - Explicitly note an availability payment affordability threshold (after shortlisting or potentially during the EOI) above which the project may not proceed. It was noted that experience shows such an approach does not inhibit price competition, but provides an upper cap on submitted project costs; or
  - Apply a scope ladder approach that requires the market to bid on what scope could be delivered for a fixed budget. This approach has both advantages and disadvantages and at this stage is neither recommended nor dismissed by Capital Metro Agency. Such approach would require Cabinet support. It was suggested such an approach may best be suited to potential 'add-on' features to the project such as urban design features.

8.4 Recommended delivery model

Based upon the analysis performed above, the recommended delivery model proposed for the project is:

- An availability PPP;
- With bundled design, construction, operations, maintenance and financing; and
- Not inclusive of land development activities.

This recommendation should be read in conjunction with section 9.0. It is noted that the project is of such size and complexity that any attempt by the ACT Government to undertake the project outside a PPP model would be fraught with acute cost and timing risks.

8.5 Commercial principles – procurement strategy

Guidance will be sought from Cabinet on key commercial principles throughout the procurement process. These will be the subject of separate Cabinet papers from time to time.

8.6 Review 3 (CMTEDD): Delivery Model Selection

CMTED (previously CWD) Directorate to sign off that the delivery model selected is suited to the project requirements and level of risk. If not it is returned to the Directorate.

Review 3 (CMTEDD) Officer Name: _____

Signature: _____[signed] _____

Date: _____[dated] _____

9.0 Financial analysis

Key messages:

- A comparison of the project's Public Sector Comparator (PSC) and PPP proxy supports the use of an Availability PPP model for the project.
- The financial analysis in this chapter does not represent a project budget.

9.1 Methodology and assumptions

In accordance with *The Capital Framework*, the financial analysis of a PPP project typically involves the development of a Public Sector Comparator (PSC) and a PPP Proxy. The sub-sections below provide a summary outline of each of these, key assumptions used, and their respective purpose.

9.1.1 Introduction

The PSC and PPP Proxy are described in further detail throughout this chapter. In summary:

Public Sector Comparator: The PSC represents an estimate of the hypothetical, risk-adjusted whole-of-life cost of a public infrastructure project that is assumed for comparison purposes to be delivered by the government. The PSC will generally include risk-adjusted net present costs for capital delivery, lifecycle maintenance, and the provision of ongoing operations / services. This is then used to determine the likely funding requirements under that hypothetical scenario. The PSC should provide the government with an approximate measure of the likely outcome that the government would face in delivering a project under traditional public sector procurement methods.

PPP Proxy: The PPP Proxy represents an estimate of the hypothetical, risk-adjusted whole-of-life cost of a public infrastructure project that is assumed for comparison purposes to be delivered by the private sector. The PPP Proxy will generally include risk-adjusted net present costs for capital delivery, lifecycle maintenance, the provision of ongoing operations / services, financing, and private sector value drivers. The ACT Government requires the calculation of a PPP proxy model to estimate the potential service payments that would be required to meet construction, financing and lifecycle costs over the period of the operating term.

9.1.2 Rounding

Note that values presented in the tables have been subject to rounding. For clarity this can result in apparent arithmetic errors within this document.

9.1.3 Cost estimates

The following table outlines the nominal and discounted 'raw' (without any risk contingency) estimated capex, operating and maintenance, and lifecycle costs for the project (consistent with data provided in section 5.1.2).

Table 38 Raw Cost Estimates ($million, nominal and NPC)

Assumption	Total Raw Cost $m	
	Nominal	NPC
Capital Cost	610	507
Operations	483	209
Maintenance	95	42
Lifecycle Costs	47	18
Total Costs	**1,234**	**775**

In calculating the PSC, raw costs are used as the basis upon which a risk adjustment (using a 'bottom up' risk assessment approach), plus a competitive neutrality adjustment (if required), are added to create hypothetical P50, P75 and P90 estimates. This adjustment is then checked for consistency against cost estimates generated by Capital Metro Agency's cost advisors using a 'top down' approach (i.e. through applying a % contingency to key line items). This reconciliation is performed in section 9.2.4.

In calculating the PPP Proxy, a P75 cost estimate has been used, for the project cost. It is worth noting, however, that these are only estimates. Ultimately the procurement process will involve price competition between bidding consortia. This could result in a lower overall project price, but equally there is the chance that the risk adjustments quantified in this analysis are insufficient and the market prices transferred risk within the project at a level which is higher than expected.

9.1.4 PSC and PPP Proxy assumptions

The table below outlines the key timing assumptions for the PSC and PPP Proxy model. General economic assumptions such as escalation rates have been outlined in Appendix A.

Table 39 Timing assumptions (PSC and PPP Proxy)

Assumption	Value
Construction start date	Apr 2016
Operations start date	Apr 2019
Operations end date	Mar 2039
Operational period	20 years
Total contract duration	23 years

Based on the understanding of both Capital Metro Agency and its commercial advisors of the current market conditions for *availability PPP* projects, certain financing assumptions specific to the PPP proxy model have been adopted. General economic assumptions such as escalation rates have been outlined in Appendix A. The outputs of the PPP proxy model are indicative and subject to a number of factors, including:

- Possible further refinement throughout the procurement process with regards to the identification, quantification and allocation of capital and operating risks for the project;
- Assumptions for private sector financing and bid costs; and

- Adjustment to the PPP Proxy discount rate to reflect the systematic risk premium.

A discount rate is used to calculate the present value of future cash flows for a project. It is based on the time value of money and a risk premium imposed by investors. The risk premium reflects systematic risks, also known as market-wide risks, which affect all asset classes and cannot be reduced by way of diversification (e.g. interest rates).

The discount rate is utilised for discounted cash flow analysis. This allows for a consistent comparison of different cash flow streams between the PSC and private sector bids to determine whether the Government can obtain value for money from an alternative procurement mechanism.

The discount rate separately calculated for the PSC and the PPP will depend on the amount of systematic risk borne by the public sector or private sector. Per the Infrastructure Australia Discount Rate Methodology guidelines, the Capital Asset Pricing Model (CAPM) is used to determine the amount of systematic risk in the project. This is then modified to reflect the value to the public sector of transferring some of this risk.

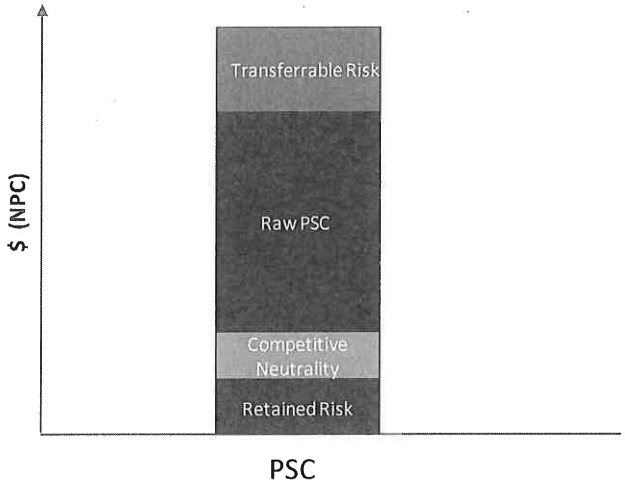
Capital Metro Agency has made PSC and PPP discount rate assumptions, including systematic risk premium assumptions, in the PSC and PPP Proxy comparison contained in this business case.

9.2 Public sector comparator

9.2.1 Overview

The PSC is a financial model which estimates the hypothetical whole of life costs to Government of developing and operating the proposed project under a traditional delivery model. This estimate is based upon the same project output specification that describes the range of services to be delivered, and the performance requirements of, the private partner in a PPP. This is often described as the 'Reference Project.' The whole-of-life costs are based on the risk adjusted cost associated with the ACT Government owning and implementing the Reference Project. These costs are expressed in terms of the net present cost to Government of delivering the project over the proposed contract period. The PSC also includes an assessment and valuation of competitive neutrality, transferred risk and retained risk. As a result, the PSC incorporates the following key items:

Figure 28 Components of the PSC (for indicative purposes only)



The PSC is to be used as a benchmark against which the ACT Government can evaluate whether or not there is potential quantitative value for money savings in delivering the Reference Project through the use of a PPP model compared to traditional delivery.

Volume 4 "Public Sector Comparator Guidance" of Infrastructure Australia's *National PPP Guidelines* provides comprehensive guidance for practitioners when developing a PSC for a PPP. It details the process that should be undertaken and common issues that may be encountered in the development of a PSC. The PSC herein has been developed in accordance with this policy framework.

As the ACT Government is responsible for setting and collecting fares, and revenue risk is not transferred to the private sector, revenue estimates from light rail operations have been excluded from the PSC. This is to enable comparison with the PPP Proxy, given potential bidders under a PPP structure will not be pricing revenue receipts into their service payments. The same decision has been taken in relation to third-party revenues associated with commercial opportunities, or cost savings from a reduction in the level of bus services. Fare revenue and bus savings are discussed below in section 9.8.1.

Commonwealth income tax and Goods and Service Tax (GST) have been excluded from the PSC.

The PSC is provided for illustrative purposes. Changes in assumptions across a range of factors would affect the estimated PSC, including interest rate movements, the final apportionment of project risks, ongoing risk mitigation efforts, project scope, and capital delivery and ongoing operational cost assumptions.

9.2.2 Raw PSC

The Raw PSC represents the base raw cost to the ACT Government to deliver the Reference Project. The major elements include the capital, operating, maintenance and lifecycle costs to deliver the output specification to the same level required of the private sector. The term 'raw' refers to the estimate of cost to Government of delivering the Reference Project before taking into account adjustments for competitive neutrality and risk.

The raw costs have been outlined in section 9.1.3 above, and total $1,234 million (nominal) over the life of the project.

9.2.3 Competitive Neutrality

The competitive neutrality adjustment removes the net competitive advantages to the Government in the delivery of the project that arise under traditional delivery model. These adjustments need to be included to allow a like-for-like comparison between the PSC and the private sector bidder models. The adjustments can usually be categorised as:

- ACT Government taxation and charges incurred by the private sector; and
- Other regulatory costs incurred by the private sector.

In determining the adjustment, only differences that arise because they are not equally available to the private sector should be included. Differences in performance and efficiencies due to a competitive market should be excluded.

In the present financial analysis, no competitive advantage has been assumed by Government. Consequently, there has been no competitive neutrality adjustment made in the Reference Project's PSC analysis.

9.2.4 Risk Adjustments

Both the PSC and PPP Proxy incorporate an estimated financial impact of risks on the costs associated with the delivery of the Reference Project over the contract life. Risk is defined as variability, meaning that an actual future outcome could vary across a range of known probable outcomes.

The PSC incorporates the value of both transferred and retained risks, whereas the PPP Proxy specifically only considers the value of transferred risks (although the overall cost to Government should include a contingency for retained risks).

In determining the value of risks which shape estimated capital costs, a risk assessment has been conducted which comprises:

- Identification of all material risks associated with the delivery of the Reference Project;
- Allocation of each risk on the basis of it likely being retained by Government, transferred to the private sector, or shared under a PPP model. In the latter, an assessment is made as to the portion of the risk transferred / retained;
- Quantification of the potential impact and timing of each identified risk;
- Estimation of the probability of the risk arising; and
- Monte Carlo simulation using @Risk has been performed for the purpose of valuing the risks for the PSC, to produce a risk adjustment on a P50, P75 and P90 basis.

For risks associated with the operations and maintenance costs and lifecycle costs in the hypothetical PSC project, a straightforward contingency amount has been applied on a P50, P75 and P90 basis.

The total cost estimate for the PSC has been considered on a P75 basis. For convenience, a P50 and P90 estimate have also been included for comparison. The total cost estimate for the PPP Proxy has been presented on a P75 basis.

As outlined in section 5.2.1, the broad distribution of risk demonstrates the stage of development of the project. It is possible that project costs could fall outside of these estimates. Project affordability is discussed separately in section 9.9.2.

The risk allocation between 'transferred' (to the private sector) and 'retained' (by ACT Government) risk has been based on the outputs from the aforementioned risk identification, allocation and quantification exercises. It also takes into account advisor experiences on other projects. It is summarised as follows:

Table 40 Risk Allocation Summary

Cost element	Retained risk %	Transferrable risk %	Basis for allocation
Capital Expenditure	45.5%	54.5%	As a result of risk identification, allocation and quantification exercises performed in relation to key project risks. The 45.5% of retained risk contains risks that the ACT Government may not seek to transfer, such as certain planning approvals (refer to section 8.2.2 for more detail on key risks).
Operating (recurrent) costs	10%	90%	It is assumed that the significant majority of operational risks are transferred to the private sector.

Note that further refinement of the risk allocation will be conducted during the procurement process, and therefore the values of transferred and retained risk are liable to change.

The risk allocation % refers to the proportion of the total risk adjustment to be allocated as retained or transferrable.

It is noted the 'retained risk' figure contained above is reflective of a number of potential retained or shared risks, including an allowance made for potential retained planning risks associated with the project.

9.2.5 Risk Adjusted PSC

The tables below summarise the risk-adjusted capital delivery and O&M cost estimates for the Reference Project, discounted and using a base date of May 2016.

Table 41 Risk-adjusted PSC Capital Cost Estimate on a P50, P75 and P90 basis

Assumption	P50 Estimate ($m)		P75 Estimate ($m)		P90 Estimate ($m)	
	Nominal	NPC	Nominal	NPC	Nominal	NPC
Raw Capital Cost	610	507	610	507	610	507
Transferrable risk	81	68	95	79	107	89
Retained risk	68	56	79	66	89	74
Total Capital Costs	**759**	**631**	**783**	**651**	**806**	**670**
Risk proportion of total Capital Costs						
Transferrable risk	13%	13%	16%	16%	18%	18%
Retained risk	11%	11%	13%	13%	15%	15%
Total risk	**25%**	**25%**	**28%**	**28%**	**32%**	**32%**

Table 42 Risk-adjusted PSC O&M Cost Estimate on a P50, P75 and P90 basis

Assumption	P50 Estimate ($m)		P75 Estimate ($m)		P90 Estimate ($m)	
	Nominal	NPC	Nominal	NPC	Nominal	NPC
Raw O&M (including lifecycle) Cost	625	269	625	269	625	269
Contingency applied (annually) (1)	15%		20%		25%	
Transferrable risk	78	34	104	45	130	56
Retained risk	9	4	12	5	14	6
Total O&M Costs	**712**	**306**	**740**	**319**	**769**	**331**
Risk proportion of total O&M Costs						
Transferrable risk	12%	13%	17%	17%	21%	21%
Retained risk	1%	1%	2%	2%	2%	2%
Total risk	**14%**	**14%**	**19%**	**19%**	**23%**	**23%**

Note 1: Contingency has been applied to the O&M Costs in real terms.

9.2.6 PSC Results

The overall results of the hypothetical risk adjusted PSC are presented in the table below.

Table 43 Total Risk-adjusted PSC Cost Estimate on a P50, P75 and P90 basis

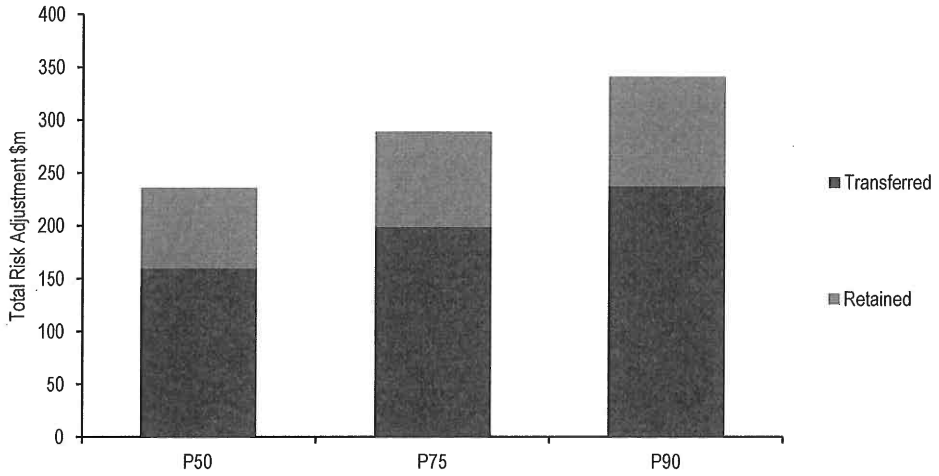
Assumption	P50 Estimate ($m)		P75 Estimate ($m)		P90 Estimate ($m)	
	Nominal	NPC	Nominal	NPC	Nominal	NPC
Raw Capital Cost	610	507	610	507	610	507
Raw Operations Cost	483	209	483	209	483	209
Raw Maintenance Cost	95	42	95	42	95	42
Raw Lifecycle Costs	47	18	47	18	47	18
Total Raw PSC	**1,234**	**775**	**1,234**	**775**	**1,234**	**775**
Competitive Neutrality	-	-	-	-	-	-
Transferrable risk	160	102	199	124	237	145
Retained risk	77	60	91	71	104	80
Total risk adjusted PSC	**1,470**	**937**	**1,523**	**970**	**1,575**	**1,001**

Note that the construction cash flows are over 3 years and the operation cash flows are over 20 years.

9.2.7 Important notes regarding retained risks

The figure below demonstrates an approximate split of risks (at a P50, P75 and P90 level) between risks anticipated to be transferred to the private sector under a PPP model, and those anticipated to be retained by the ACT Government. It includes both capital cost (capex) contingency and operation, maintenance and lifecycle cost (opex) contingency.

Figure 29 Total PSC transferred and retained risk adjustment estimates on a P50, P75 and P90 basis ($m nominal) (including capex and opex risk adjustment)



Two important points to note:

1. Although an availability PPP affords a high degree of risk transfer from Government to the private sector, it does not involve the transfer of *all* risks to the private sector. Capital expenditure 'retained

risk' amounts contained within the above figure are reflective, to a material extent, of allowance made for potential retained planning risks associated with the project; and

2. The ACT Government may, to some extent, be in a position to partially mitigate retained risks (such as relating to planning risks).

9.3 PPP Proxy

The PPP Proxy model is intended to represent an estimate of the whole-of-life cost of the project as procured under a PPP contract (i.e. over the proposed concession term). The PPP Proxy model therefore incorporates the following key elements:

- Capital and operational expenditures (including ongoing operations, maintenance and lifecycle costs, plus escalation), including any value driver assumptions and pricing for transferred risk;
- Bid costs and financing costs (including capitalised interest during construction, and debt interest during operations); and
- Equity distributions.

The above components are combined in the overall Annual Service Payment (paid by the Government to the successful bidding consortia, referred to as 'PPP Co'), which commences with the start of operations. With a PPP structure, the cashflows are typically evenly spread across the operating term. The stream of payments therefore consists of:

- Payments of principal and interest, for construction phase expenditures; and
- Payments for bundled services and lifecycle costs.

The PPP Proxy is provided for illustrative purposes. Actual private sector bids may differ materially from the PPP Proxy. It is the market – not Capital Metro Agency – which will ultimately determine the cost of the project. Differences between actual private sector bids and the PPP Proxy may be caused by a range of factors, including interest rate movements, potential ACT Government contributions, the final apportionment of project risks, ongoing risk mitigation efforts, innovation contained within private sector bids, and capital delivery and ongoing operational cost assumptions.

9.3.1 Base case PPP Proxy

The key cost assumptions included within the PPP Proxy model are shown in the table below, and incorporate the value of transferred risks, as calculated above in section 9.2.5. The key financial assumptions have already been outlined above in section 9.1.

Table 44 Base Case P75 Cost Estimates ($million)

Assumption	P75 Cost $m	
	Nominal	NPC [3]
Capital Cost	610	475
Operations	483	160
Maintenance	95	32
Lifecycle Costs	47	13
Total raw costs	**1,234**	**680**
Transferred risk	199	108
Retained risk [1]	-	-
Applied value drivers [2]	(63)	(36)
Total Costs	**1,370**	**752 [4]**

Note 1: Retained risk is not included in the base calculation of the PPP Proxy, as such costs are not incurred by PPP Project Co.
Note 2: Value driver assumptions have also been applied to the capex and opex components of transferrable risk.
Note 3: The PPP Proxy is discounted using a PPP discount rate.
Note 4: NPC of total raw costs, transferred risk and applied value drivers

Value driver assumptions have been applied to the costs within the PPP Proxy model. These value driver assumptions have been recommended by Capital Metro Agency's commercial advisor having regard to studies and relevant project experience.

9.4 Financial impact of a government capital contribution

The Partnerships Framework contemplates that the ACT Government may, in its unfettered discretion, provide a form of capital contribution to a PPP to offset private sector debt. There are a variety of reasons why Government may adopt such a course of action, primary among them being to reduce the ongoing costs of financing where the benefits from the reduction in such costs exceed any project risks the Government may indirectly assume through making such a contribution.

The elements of any potential government contribution will be detailed in a future submission to Cabinet prior to the project's RFP phase. At present, it is anticipated that Capital Metro Agency will recommend ACT Government retain the *option* of making a contribution equal to 50% of project debt either at the conclusion of the construction period or at a refinancing point 5 to 7 years from project commencement (i.e. at a point 2 to 4 years after the expected completion of construction). This anticipated recommendation has been indicatively formulated on the following basis:

- An option rather than commitment to make a contribution provides ACT Government with flexibility to consider the benefits or otherwise of making such contribution at the time, having regard to both market conditions and the performance of PPP Co. In this regards, it is worth bearing in mind that the time elapsed from the GFC to the date of this paper is less than the expected duration between today and the first project debt refinancing point. Market conditions today might conceivably change markedly in the intervening period;

- Making a contribution at the first re-financing point is consistent with general guidance provided in *The Partnerships Framework*. At that point, significant risks associated with the delivery and initial

operations of the system shall have passed (and conceptual rationale for proceeding with a PPP in the first instance remains valid). Alternatively, a contribution at the conclusion of the construction period may allow ACT Government to recognise financing efficiencies at an earlier point in time, though with construction risk having passed;

- The pay down of debt, rather than equity, is consistent with *The Partnerships Framework* and market sounding feedback (discussed elsewhere in this document); and
- A 50% pay down leaves sufficient debt in the project to attract competitive finance, while making any benefits accruing to the ACT Government of a meaningful size.

9.5 Comparison between the PSC & PPP Proxy Model

After taking into consideration the risk adjustment, overall the PPP Proxy demonstrates value for money to the Government in procuring this project through a PPP. This supports the recommendation that the project be procured via an Availability PPP. The total risk adjusted PSC amounts to $970m (NPC) whereas the PPP Proxy totals $874m (NPC) including retained risk (as it will be borne by the ACT Government under both scenarios). This equates to a saving of approximately 11%.

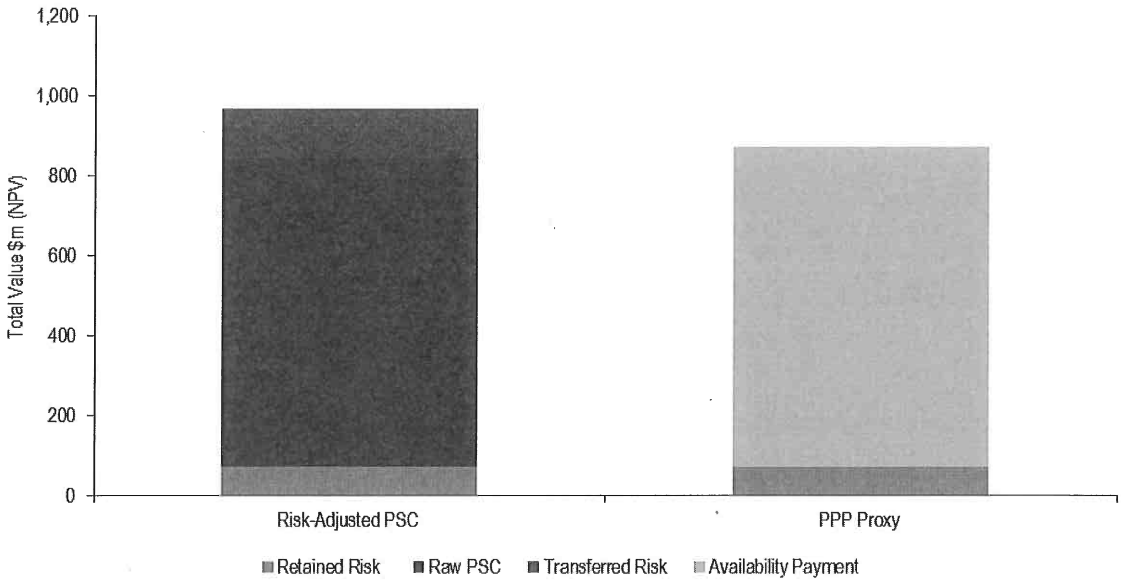
Table 45 Total cost ($m NPC) of PSC and PPP Proxy

Cost category (PSC)	PSC NPC $m	Cost category (PPP Proxy)	PPP Proxy NPC $m
Total Raw PSC	**$775m**	**Total PPP Proxy**	**$804m** (1)
Competitive Neutrality	$0m		
Transferred Risk	$124m		
Retained Risk	$71m	Retained Risk	$71m
Total Risk Adjusted PSC	**$970m**	**PPP Proxy + Retained Risk**	**$874m**

General Notes: Based upon PSC and PPP Proxy discount rates as applicable
Note 1: NPC of availability payments
Both the PSC and PPP Proxy cost estimates have been based on a P75 basis, as discussed above in section 9.2.4.

The foregoing PPP Proxy is an estimate only. It represents an analysis of a hypothetical, risk-adjusted whole-of-life cost for the project that is assumed for comparison purposes to be delivered by the private sector. Actual private sector bids may differ materially from the PPP Proxy. It is the market – not Capital Metro Agency – which will ultimately determine the cost of the project.

Figure 30 Comparison of PSC and PPP Proxy ($m NPC)



Chapter 7.0 provides qualitative analysis which supports the recommendation that an availability PPP be adopted for this project. The financial analysis contained above also supports that recommendation.

By bringing elements of the project 'in-house', ACT Government would reduce the potential for innovation and efficiencies and increase the risk associated with interface management which may be offered by the private sector. As a practical note, it is also re-emphasised that the ACT Government does not have rail or light rail construction or operational expertise within any of its directorates or operating entities, including TaMS or ACTION. Consequently, ACT Government does not have existing expertise in the design, construction, maintenance, operations or management of risks associated with the delivery of the project by more traditional means.

9.6 Term

The overall concession term includes a construction period and operating period.

Capital Metro Agency recommends proceeding with the project on the basis of an operating term in the order of 20 years (subject to performance). This recommendation is based upon consideration of the following factors to achieve an optimum balance of risk transfer and value for money:

- Transfer of risk (e.g. for major lifecycle costs and maintenance of assets) – which generally increases with a longer operation term;
- Affordability and annual availability service payments - annual availability service payments generally decrease with a longer operation term;
- Whole of life cost of the project – which generally increases to a certain extent the longer the operation term;

- Flexibility (e.g. regarding change in operator, or changes to the network structure) – which decreases from the Government perspective the longer the operation term; and
- Market feedback, as detailed in section 8.3.5.

9.7 Cashflow impact and funding strategy

9.7.1 Summary

9.7.1.1 Cashflow impact

The impact upon the ACT budget of the preferred option is shaped by the availability PPP delivery model recommended for the project. With an availability PPP model, ACT Government will not incur cash outflow with regards to the capital delivery cost of the project upfront. Instead, the ACT Government will be committed to a payment stream for the life of the operating term. This payment stream will be comprised of amounts to pay back both the original capital delivery costs and operational expenditures (i.e. ongoing operations, maintenance and lifecycle costs), together with associated financing costs. In broad terms, such payments shall be funded through ACT Budget appropriations. Separate accounting treatment is considered in section 9.10.

9.7.1.2 Funding strategy

The ACT Government is separately considering a funding strategy for the project.

9.8 Revenue from operations

Under the availability PPP structure, farebox revenue will be collected by the ACT Government and is therefore not part of the PSC or PPP Proxy model. The operations phase will therefore result in revenues from operations through ticket sales to customers. The table below outlines indicative potential revenues.

Table 46 Potential revenues from ticket sales

Variable/assumption	Value
Estimated daily patronage (2021)	15,120
Estimated daily patronage (2031)	20,207
Inferred compound growth in patronage based on 2021 and 2031 patronage figures (Note 1)	2.94%
Daily/annual multiplier (to convert average daily patronage to annual)	315
Estimated average fare per trip ($2014) (Note 2)	$1.01
Estimated annual patronage revenues in first full year of operations (Nominal, $m in FY 2020)	**$5.5m**
Estimated net present value of revenues from 2019 to 2039 (Note 3)	**$81m**

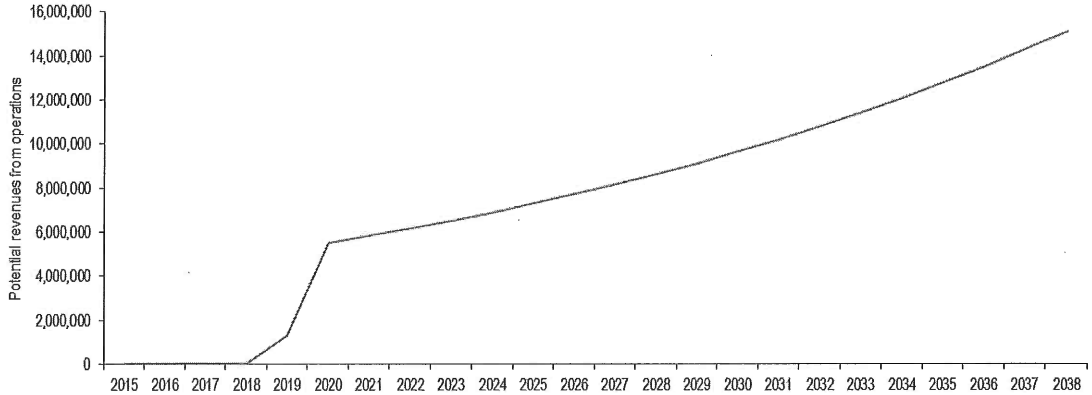
Source: Capital Metro Agency assumptions on estimated daily fare, considering an escalation rate of 2.75% per annum.

Note 1: Based on a 2015 model commencement point. These are light rail revenues based on estimated light rail patronage in 2021 and 2031 under the medium (with light rail) land use scenario from Capital Metro's patronage advisers. This does not take into account fare sharing arrangements between bus and light rail trips. This does not consider offsetting changes in bus patronage over the period as this has been considered separately.

Note 2: Estimated average fare per trip in $2014-15 of $1.35. For illustrative purposes, this figure was reduced by 25% as a proxy for potentially free interchanges between bus and light rail.
Note 3: Discounted using PSC discount rate.

This revenue profile is illustrated in the figure below.

Figure 31 Capital Metro operating fare revenues



Note: Years are financial years ending 30 June. The graph includes only to the end of 2038 as this is the last expected full year of the operating term.

9.8.1 Impact on Bus Network

Capital Metro Agency considers the integration of the light rail network with the bus network as critical to the success of the customer experience and operation of an excellent public transport system.

ACTION maintains a number of bus services which operate on, or very close to, the light rail route. The light rail route coincides with such bus services either in full or in part.

It is envisaged that once Capital Metro is operational, the adjustment of ACTION bus routes will be considered so as to:

- Provide integration between the light rail system and ACTION buses; and
- Minimise or eliminate unnecessary duplication of services.

Plans for any reorganisation of ACTION bus routes will likely not occur until a point in time after the Capital Metro procurement process has been concluded.

9.8.2 Value Capture

It is recommended that Government consider 'value capture' matters separately. This business case neither relies upon, nor makes recommendations regarding, value capture options.

For present purposes, it is simply noted that Capital Metro may generate 'value capture' opportunities. In this regards:

- **Background:** The provision of public transport infrastructure, such as light rail, improves transport accessibility for persons based within reasonable proximity of the transport system. Improved accessibility has a value to individuals and firms in several ways, including in cost and time savings.

The value of those savings may be manifested in numerous forms, including through increased land values in the transport corridor (as demand is increased for land stock within that corridor);

- **Definition:** 'Value capture' is the process of obtaining a share of the value uplift and other benefits created by the project that accrue to individuals and firms for use in meeting the costs of the public infrastructure which conferred such benefits. It is noted that value uplift is anticipated to occur from the time of project announcement;
- **Beneficiaries:** Key beneficiaries of public transport infrastructure include:
  - Property owners in the vicinity of the infrastructure;
  - Users of public transport;
  - Other transport users who benefit from reduced congestion;
  - Land developers;
  - Commercial operators; and
  - The general public (from the perspective of general economic, social and environmental benefits generated by the public transport).
- **Passive versus active:** Value capture can occur in a passive manner by allowing existing tax regimes to apply to those benefits which become part of the usual tax base. It can also be achieved in an active sense by implementing various measures to increase the share of value uplift that is captured.

In general terms, active value capture may result in a higher proportion of value being captured than passive value capture measures;

- **Value capture tools:** Specific mechanisms by which value may be captured include:

Table 47 Value capture mechanisms

Taxation	Non-Taxation
Rates	Land release
Land tax	Transport utility fees
Lease variation charges	Development fees
Direct levies	Joint development
District levies	Property sales
Congestion tax	

Value capture mechanisms may be implemented on a broad or narrow geographic basis.

- **Direct value capture:** It is noted that direct value capture may occur where Government is the owner of land. Any value uplift will increase the value of land holdings; and

- **Cashflow considerations:** Value uplift does not necessarily result in immediate cashflow to the beneficiary (for example, an increase in land value does not result in increased cashflow to the land owner until the property is sold). Value capture, however, typically aims to produce cashflows to assist in meeting outflows associated with infrastructure provision. This is a consideration to be had when contemplating value capture options.

Again, this paper makes no value capture recommendations. The foregoing is provided for information purposes only.

9.8.3 Other costs

Capital Metro Agency will or may incur project related costs which will not be included in availability payment amounts. In this regards:

- Per the discussion above, a P75 'retained risk' of $91m (nominal) is not transferred by Government to PPP Co. under the Availability PPP and so will not be contained within availability PPP calculations (note: this amount is contained within the risk contingency set forth in section 9.2.5). Please also refer to the discussion regarding retained risks in section 8.2.2 (an outline of key risks, including proposed allocation) and 9.2.5 (summary of the value of retained risk);

- ACT Government may, in its discretion, consider the provision of partial bid cost reimbursements for shortlisted (but unsuccessful) shortlisted consortia. As a default policy position, the ACT *Partnerships Framework* states partial bid cost reimbursements will generally not be paid by the ACT Government. As such, partial bid cost reimbursements are not contained with the cost estimate in section 5.1.2; and

- Capital Metro Agency will incur costs during the procurement, construction and operational phases of the project which are not passed to third parties (for example, costs associated with independently certifying construction works). If one were to assume project-related agency expenditure during the approximately three year construction period of $15 million p.a. (average, real), such agency costs would amount to approximately $45m. Actual Capital Metro Agency costs will be (i) in part influenced by commercial principles adopted during the procurement process, and (ii) subject to the realisation or otherwise of risk events during the procurement and delivery process, and (iii) a function of ordinary budget discussions from year to year.

9.9 Affordability

9.9.1 Affordability Signal

ACT Government may wish to provide an affordability 'signal' to market during the procurement process. An affordability signal may flag to the market the project cost above which the ACT Government does not wish to proceed with the project. There are both advantages and disadvantages to such an approach.

During the market sounding process, light rail industry participants noted that if an affordability threshold does indeed exist, it will be beneficial to both ACT Government and bidders for that signal to be communicated to the market.

9.9.2 Costs in excess of affordability

As noted elsewhere in this document, risk exists that project costs bid by the market may vary from cost estimations contained herein. Should bids be received by the ACT Government which are in excess of any

affordability threshold set by the ACT Government (regardless of whether such threshold is or is not signalled to the market), several strategies may be adopted to allow the project to proceed, including:

- Project scope may be modified with attendant cost adjustments; and
- Should affordability concerns be centred upon annual budget impacts, the proposed operation term may legitimately be lengthened with an attendant reduction in annual availability payments (albeit with an impact on whole of life costs).

Such affordability considerations shall continue throughout the procurement process.

9.10 Accounting treatment

9.10.1 Overview

Should the ACT Government decide to proceed with the project to construct and deliver a light rail system, the precise accounting implications will depend upon the specifics of the contractual agreements that are entered into with the private sector partner(s) to bring the project to completion.

9.10.2 Accounting Standard Current Status

There is currently no specific Australian Accounting Standard in relation to accounting for service operation term arrangements (a form of Public Private Partnership) from a grantor's (the Government) perspective. AASB Interpretation 12 *Service Concession Arrangements* provides the accounting requirements for the operator of the service concession arrangement. In 2011 the International Public Sector Accounting Standards Board issued IPSAS 32 *Service Concession Arrangements: Grantor* which essentially mirrors the treatment required by operators in Australia. IPSAS 32 is persuasive in the Australian context but not mandatory.

In order for service concession arrangement accounting practices to apply, the following tests must be met:

(a) The grantor (government) controls or regulates what services the operator must provide with the asset, to whom they are provided and at what price; and

(b) The grantor controls any significant residual interest in the asset at the end of the term of the arrangement, or the asset is used in the arrangement for its entire useful life.

If the above tests are met then the grantor is able to recognise the assets which are subject to the arrangement as service concession assets at their fair value.

(a) The timing for the asset recognition can be either during construction or at the end of construction depending on the terms of the arrangement. The timing can impact the value of the asset recognised and the amount of interest expense accrued.

(b) Fair value of the asset is the present value of the payments made by the grantor relating to the cost of the asset and interest payments, discounted using the appropriate interest rate.

The asset will reduce in value (from an accounting perspective) over its useful life as it is depreciated. Upon recognition of the service concession asset, a corresponding liability is also recognised. The liability is initially measured at the same amount as the service concession asset. The liability will reduce over the term of the service concession arrangement by the capital repayment component of the payments to the operator.

The Government's Net Operating Balance will be negatively impacted by three types of expenses:

(a) a finance charge (interest expense) which is calculated by applying the cost of capital of the operator to the outstanding liability;

(b) a service expense reflecting the provision of services or the availability of the asset by the operator (this does not include the capital repayment component); and

(c) a depreciation expense for the service concession assets reflecting the cost of the utility of the asset being used.

The Government's cashflow will be negatively affected by the total payments to the operator which involves the components for capital repayments, the finance charge and the service expenses.

Fundamentally there is no difference in impact on the ACT Government's financial statements between undertaking the project as a service concession arrangement or as a normal capital works project except for what may result from the efficiency of delivery (flowing from the procurement method).

The applicability of the above approach is subject to further deliberations by the AASB who have indicated that IPSAS 32 provides an appropriate basis for a Standard in Australia subject to some modifications. An *Exposure Draft* of an applicable Australian standard is currently expected to be issued by the AASB by early 2015.

There is currently no ACT government accounting policy on service concession arrangements. Any accounting policy issued will apply to the whole of the ACT Government, not just Capital Metro Agency.

Advice from a major accounting firm confirms the view of CMTEDD that until such time as an Australian Accounting Standard is issued, IPSAS 32 is the most appropriate accounting method to use for budgeting purposes, rather than following the accounting policies of other jurisdictions whose policies were formulated prior to the latest developments.

The discussion above addresses service concession accounting, not accounting for any costs incurred by the government, particularly Capital Metro Agency, in relation to the project (e.g. preparatory, tender and legal costs). Accounting advice is being sought in relation to the treatment of these costs.

9.11 Review 4 (Chief Minister, Treasury and Economic Development): Financial (only PPP/DCMO)

Chief Minister, Treasury and Economic Development Directorate to sign off that financial analysis has been undertaken in accordance with relevant guidelines and by an appropriately capable organisation. If not it is to be returned to the Directorate (only applicable for PPP/DCMO delivery models).

Review 4 (CMTEDD) Officer Name: _____

Signature: _____[signed]_____

Date: _____[dated]_____

10.0 Project governance

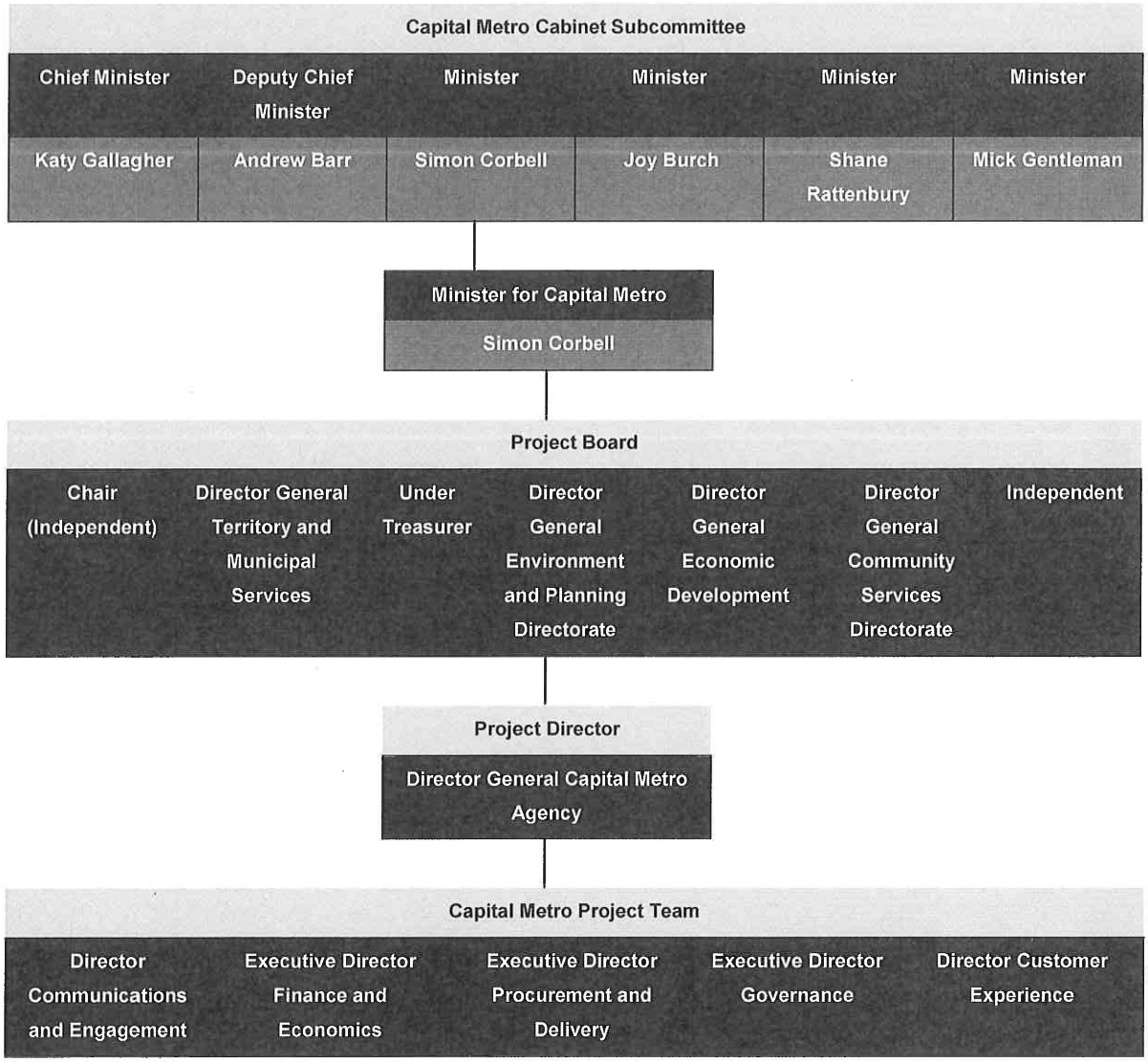
Key messages:

- Capital Metro Agency was established as an ACT Government directorate on 1 July 2013.
- Capital Metro Agency operates within a governance framework which includes a Project Board with independent members (including the Chair).

10.1 Governance

10.1.1 Structure

Figure 32 Governance structure for the project



10.1.2 Key milestones

Table 48 summarises a selection of key project milestones. Cabinet will be requested to provide approvals relating to each of these project milestones, including consortia short-listing and the award of contract.

Table 48 Procurement milestones

Milestone	Anticipated Timeline
Industry briefing	September 2014
EOI Process	Q4 2014 – Q1 2015
RFP Process	Q2 2015 – Q4 2015
Contract Negotiations	Q1 – Q2 2016
Contract Commencement	Q2 2016
Operations Commence	2019

10.1.3 Key roles and responsibilities

10.1.3.1 Organisational representation

Table 49 summarises ACT Government directorates represented in the governance structure.

Table 49 Directorates represented in the governance structure

Directorate	Representation
Chief Minister, Treasury and Economic Development	• The Chief Minister, Deputy Chief Minister and Treasurer hold positions on the Capital Metro Cabinet Subcommittee. • The Under Treasurer is the Deputy Chair of the Project Board. • The Director General of Economic Development is a member of the Project Board.
Environment and Planning	• The Minister for the Environment and Planning is a member of the Capital Metro Cabinet Subcommittee. • The Director General is a member of the Project Board.
Territory and Municipal Services	• The Minister is a member of the Capital Metro Cabinet Subcommittee. • The Director General is a member of the Project Board.
Community Services	• The Minister is a member of the Capital Metro Cabinet Subcommittee. • The Director General is a member of the Project Board.

10.1.3.2 Key groups

Capital Metro Cabinet Subcommittee

The Cabinet Subcommittee is the group accountable for key decisions regarding the project, including the decision (or otherwise) to proceed with the project.

Generally, matters to be escalated to Cabinet include:

- Matters likely to be of material reputational impact to the Government;
- Matters of significant concern to the community; and
- Material financial and investment matters.

Project Board

The Project Board is a key approver for the majority of important decisions on the project which do not require elevation to Cabinet.

Major responsibilities of the Project Board include:

- Strategy formulation;
- Endorsement of approvals to be referred to Cabinet;
- Project Director selection, monitoring, evaluation and mentoring;
- Monitoring of the project team's performance;
- Risk oversight;
- The provision of advisory assistance to the Capital Metro Agency project team; and
- Communication with key strategic stakeholder groups.

Project Director

The Project Director's role is to:

- Direct and manage the delivery of the project to meet ACT Government objectives;
- To ensure Capital Metro Agency is compliant with relevant legislation and regulations;
- To generally manage Capital Metro Agency; and
- To perform such other Director General duties as are necessary.

The Project Director is the nexus between the Project Board and the project team.

Project Management Team

The Project management team has responsibility for the day to day advancement of the project. Members are responsible for delivering the project according to the Project Board's direction under the supervision of the Project Director. They are involved in the detail of the project. Members of the team include:

- Director General (Project Director);
- Executive Director Governance and Operations;
- Executive Director Finance and Economics;

- Executive Director Procurement and Delivery;
- Director Customer Experience; and
- Director Communication and Engagement.

ACT Government Procurement Board

Capital Metro Agency shall liaise with the ACT Government Procurement Board to determine how and when the project interacts with that board. It is anticipated that Capital Metro Agency shall present its procurement plan to the Procurement Board prior to the issuance of a request for expressions of interest.

Project Control Group

The Project Control Group role has been fulfilled by the Project Board.

11.0 Stakeholder engagement

Key messages:

- Customer experience is a priority for the Capital Metro project.
- Capital Metro is being delivered in an open and consultative way. Significant consultation is underway and Capital Metro Agency will continue this process.
- Capital Metro Agency has developed a concept design to inform discussions on the type of light rail network proposed for Canberra.

11.1 Our customers

Capital Metro Agency is adopting a 'customer centric approach' when formulating project specification. The project is guided by the following customer principles:

- Simplicity: a simple to understand, use, find and interpret service;
- Convenience: a convenient service that offers suitable hours of operation, destinations that make sense, links to other modes of transport, accessibility and bike transport;
- Smart: smart access to information about my journey time and service, that is intuitive and easy to stay connected;
- Seamless: a seamless experience between the start of my journey through to my destination; and
- Modern: a service that is modern, professional and contributes to Canberra's positive image.

These customer principles complement fundamental customer requirements such as reliability, safety, personal security, frequency and efficient journey time.

11.2 Other stakeholders

The Capital Metro project is relevant to stakeholders that are internal to government and those that are external.

11.2.1 External stakeholders

There are a range of external stakeholders associated with the project, including the National Capital Authority, regionally-based community councils, suburban community associations, community interest groups, business and professional associations, and individual property and business owners.

Within the Australian Government, high priority stakeholders include the National Capital Authority (NCA). The NCA will need to be kept well informed and constantly engaged to ensure the project meets appropriate needs. Capital Metro Agency has undertaken substantial engagement and market research with the community to better understand the range of views and requirements in relation to the project.

11.2.2 Internal stakeholders

With respect to internal stakeholders:

- Cabinet and all ACT Government directorates are internal stakeholders of the project;
- Capital Metro Agency has consulted with Cabinet and all ACT Government directorates in the development of this business case; and
- Capital Metro Agency has ongoing forums through which to maintain continuous dialogue with internal stakeholders throughout the life of the project, including the Project Board, steering groups, and other formal and informal arrangements.

11.3 Communication and consultation

11.3.1 Communication strategy

A comprehensive communication strategy has previously been adopted and endorsed by Cabinet. The communication approach applied will be multifaceted, open and inclusive. The Capital Metro Agency is responsible for delivering all communications and engagement activities.

11.3.2 Consultation approach

Early and effective consultation on the concept design has enabled stakeholder and community views to contribute to the specifications that will be used in the tender process for the project. Consultation information will also inform other areas of government activity including Northbourne Corridor planning and the development of a *Light Rail Master Plan*.

Capital Metro Agency has taken an open and transparent consultation approach throughout the concept design phase, encouraging feedback across the full range of communication channels. Consultation on the concept design has occurred within government, across all stakeholders and the community.

This consultation program commenced in June and ran through to August 2014. The objectives of this consultation program were as follows:

- To involve the community in the design process, and gain community feedback on the following elements:
  - Urban design principles;
  - Landscape strategy;
  - Track options; and
  - Stop locations.

The initial public consultation program has been one part of an overarching communication and engagement strategy. Objectives of this strategy, which guide all communication and engagement activities throughout the early stages of the project, include:

- **Building public knowledge of the project** through open and two-way communication, ensuring that the latest information is publicly available and involving the public and stakeholders in the project wherever possible;
- **Open discussion of customer requirements** through user workshops, pop-up shops and face to face meetings;
- **Creating a multi-faceted communication approach** that aims to make project information accessible and reach all sectors of the Canberra community; and
- **Demonstrating the broader benefits of the project** and how it delivers on a range of key Government priorities and programs.

The community shall have opportunity to provide ongoing feedback as the project progresses. The section below outlines the communication methods that are being used on an ongoing basis.

11.3.3 Consultation channels

A full range of consultation channels will continue to be used, including:

- Face-to-face engagement activities;
- Advertising and mass communications activities;
- Media and public relations activities described;
- Social media; and
- Website and collateral development.

11.4 Documenting stakeholder engagement

The community consultation has resulted in over 16,500 individual interactions, ranging from seeking information from the website to in-depth stakeholder discussions. A summary of the activity at the conclusion of the initial six week public consultation period is provided in the table below.

Table 50 Summary of six week consultation activity

Consultation Activity	Interactions
Information sessions	345 (recorded feedback only, not visits)
Pop-up shop	227
Online surveys	432
Website	9,202 sessions (35,724 page views)
Facebook	315 (total of 496)
Twitter	196 (total 536)
Youtube	5,859
Stakeholder workshop	33
Total	**16,609**

All feedback from consultation has been considered and is reflected in the project's development to date, as incorporated in this *Full Business Case.*

12.0 Advisor engagement plan

Key messages:

- A variety of external advisors have been appointed to date to assist in developing various elements of the project.
- The list of external advisors is likely to change as the lifecycle of the project progresses and the needs of the project change.

12.1 Proposed advisor roles

Capital Metro Agency continues to work closely with Shared Services Procurement (SSP) on advisor engagement matters. In addition, senior SSP officers have been embedded within Capital Metro Agency to provide procurement advice and guidance on the engagement of key advisory mandates.

A variety of external advisors have been appointed to date to assist in developing various elements of the project. Capital Metro Agency always seeks value for money in the engagement of specialist advisors.

A list of key external advisory mandates presently engaged is outlined in Table 51. It is noted that these advisors are subject to change.

Table 51 Key external advisors engaged as at August 2014

Key Advisory Mandates	Scope of Engagement
Commercial and Financial	Business case, economic analysis, commercial advisory services, certain procurement support and other support areas.
Technical Design & Engineering	Development of various concept design iterations, as follows: • Iteration 1: develop transport product requirements to meet the project objectives and benefits; • Iteration 2: confirmation of the preferred project scope (infrastructure, urban design and operations) to enable detailed assessment; • Iteration 3: developing the design option to a point where a reference design and a business case can be developed.
Legal	Legal advice in respect of the procurement of the project, including on structuring of the procurement method, drafting and negotiating of the project documentation.
Risk Management	Risk assessment and planning.
Controls Management	Change management, cost and program controls.
Cost Estimating	Various cost estimation works.
Transport Modelling	Patronage forecasting and travel demand modelling.
Strategic Governance and Project Management and Advisory Support	Governance and project management support.
Operations Planning and Management	Light rail operations and maintenance planning and strategic transport planning advice including transport service interface.

Currently, advisors for certain future aspects of the project have not yet been appointed. This includes, for example, a transaction management advisor.

In addition, a number of other 'client side' advisors have been engaged to enhance specialist light rail / rail advisory capacity within the ACT Government. These advisors have been engaged to provide specialist light rail delivery and operations advice to the project on matters including ticketing, rail safety, community and stakeholder engagement and customer experience. A specialist adviser technical advisory panel has been established to provide the project with the ability to access specialist rail engineering and project management support.

To date, probity advice has been obtained from the Government Solictors' Office.

It is noted that this list of advisors is likely to change over the lifecycle of the project as the needs and specific requirements of the project change. Advisory services provided to date have enabled the preparation of this business case (and will facilitate progress of the project should Cabinet decide to proceed with the project). Continued engagement of advisors shall be dependent upon future Government decisions regarding the progression (or otherwise) of the project.

13.0 Timeline

Key messages:

- All indicative dates listed in this *Full Business Case* are subject to a number of factors, including Cabinet decisions regarding this business case.
- Financial close is indicatively expected to be reached during Q2 2016, whereupon design and construction activities are anticipated to commence.
- The project is currently indicatively expected to be operational in 2019.
- Indicative timing described herein is based upon concept design and assumptions on construction methodology.
- Actual timing shall be subject to completion of the procurement process and the realisation (or otherwise) of planning and other risks.

13.1 Project timetable

13.1.1 Overview

Key indicative project milestones are as follows:

Milestone	Anticipated Timeline
Industry briefing	September 2014
EOI Process	Q4 2014 – Q1 2015
RFP Process	Q2 2015 – Q4 2015
Contract Negotiations	Q1 – Q2 2016
Contract Commencement	H1 2016
Operations Commence	2019

13.1.2 Procurement phase

The tendering process is anticipated to commence with the release of the EOI in Q4 2014, with the EOI close date to be in Q1 2015. The EOI evaluation process is expected to be completed by the end of Q1 2015.

The RFP is expected to be issued in Q2 2015. The RFP close date is anticipated in Q4 2015. RFP evaluations are estimated to be completed towards the end of Q4 2015 with contract close expected in Q1 or Q2 2016. At contract close, the detailed design process will commence. The project is expected to achieve financial close during H1 2016.

13.1.3 Delivery phase

The overall duration of the concept design scope was assumed to be 37 months (including general programme contingency) from financial close to public opening. This leads to an expected start date for operations during 2019. This programme is used as the basis of the cost estimate (for financial modelling purposes in Chapter 9.0).

It is stressed, however, that all anticipated dates are subject to variation. The realisation of potential risks may impact significantly upon anticipated project timing.

13.1.4 Immediate next steps

Key near-term steps following approval of this *Full Business Case* (if approval is obtained) are as follows:

- Conduct industry briefing (September 2014);
- Preparation of EOI documentation and presentation to ACT Procurement Board;
- Release of EOI documentation;
- Evaluation of EOIs;
- Preparation of RFP documentation; and
- Consideration of key dependencies and strategies for benefits realisation and maximisation (ongoing).

Appendix A Assumptions book

A.1 Economic Values

Valuation year and discount rate

Table 52 Discount and inflation rates

Parameter	Value
Discount rate	7%

Table 53 Appraisal parameters

Parameter	Year
First year	2014 financial year
Dollar terms	2014 financial year
Operation	2019 as per construction profile
Appraisal period	30 years
Appraisal end year	2048 year
Annualisation factor - roads	345 days
Annualisation factor – public transport	315 days
Post last model year demand growth – roads	2% per year
Post last model year demand growth – public transport	2% per year

Travel time

Table 54 Value of Time per person hour

Main mode	2014 Value
Public transport	17.26
Private travel - car	17.26
Business travel – car	53.95
Car - total	19.10
Light Commercial Vehicle	53.95
Value of Time Growth	1%

Table 55 Journey factors

Main mode	Factor	Parameter
Light rail amenity benefit	10% of journey time	Factor
Unexpected wait time penalty	3.00	Factor

Vehicle Operating Costs

Table 56 Car vehicle operating (resource) costs (cents per km)

Main mode	2010 Value	2014 Value
Cars (average)	6.20	6.80
Light commercial vehicle	5.20	5.70
Heavy rigid truck	12.20	13.30

Table 57 Public transport operating costs (cents per km)

Main mode	2013 Value	2014 Value
Rail (per car)	5.95	6.10
Bus		5.10

Externality impacts

Table 58 Externality benefits (cents per km)

Main mode	2014 value			
	Car	Bus	Heavy vehicles	Rail (car)
Noise	0.99	2.39	5.99	0.18
Air pollution	3.03	34.07	35.94	0.42
Water pollution	0.46	5.11	5.39	0.01
Greenhouse	2.39	14.04	8.00	0.04
Nature and landscape	0.05	0.15	0.59	0.10
Urban separation & road damage	0.70	2.26	4.01	0.10
Upstream and downstream costs	4.08	21.06	32.00	0.00

Note: Parameters assume 2 cars per light rail train.

Health Benefits

Table 59 Health benefit of active transport per km

Main mode	2014 value
Walking	1.64
Cycling	1.09

Economic Productivity benefits

Table 60 Wider Economic impact assumptions

Assumption	Value
Uptick for business user impacts	10%
Elasticity of Labour Supply to Wages	15%
Marginal Worker Productivity	69%
Work trips percentage	9%
Commuter trips only	50%
Tax Wedge - New Workers	34%
Tax Wedge - Existing Workers	25%

Table 61 Wider Economic impact wage share and elasticity assumptions

Assumption	Wage Share	Agglomeration Elasticity
Agriculture, Forestry, and Fishing	18.2%	4.7%
Mining	19.7%	16.3%
Manufacturing	60.5%	3.5%
Furniture and other manufacturing	60.5%	3.5%
Electricity, gas, water and waste services	38.0%	10.8%
Construction	61.5%	5.1%
Wholesale trade	65.5%	3.4%
Retail trade	70.3%	0.3%
Accommodation and food services	62.9%	-1.1%
Transport, postal and warehousing	52.4%	4.4%
Information media and telecommunications	34.9%	5.1%
Financial and insurance services	51.8%	5.8%
Rental, hiring and real estate services	53.3%	5.7%
Professional, scientific and technical services	70.4%	5.5%
Administrative and support services	87.9%	3.0%
Public administration and safety	80.2%	6.2%
Education and training	87.0%	4.7%
Health care and social assistance	86.0%	2.9%
Arts and recreation services	61.5%	3.2%
Other (and unclassified) services	70.1%	0.7%

A.2 Financial Analysis Cost Assumptions

Key Assumptions

Forecast delivery capital cost, ongoing capital cost, and operating expenditure cashflows are presented in the table here below.

Table 62 Key assumptions

Cashflow Component	Source and Notes
Model period	• 23 years based on a 3 year construction period and a 20 year operating period
Delivery capital cost	• $507 million (NPC) over 3 year construction period • $610 million (nominal) as per current cost estimator cost estimates
Operating costs	• $209 million (NPC) over 20 year operations period • $483 million nominal over 20 year operations period
Maintenance costs	• $42 million (NPC) over 20 year operations period • $95 million nominal over 20 year operations period
Lifecycle costs	• $18 million (NPC) over 20 year operations period • $47 million nominal over 20 year operations period
Other assumptions	• Consumer Price Index at 2.75% (based on recent experience on similar projects), allocated to all operational expenditures (including lifecycle costs and operational contingency) except for salaries and wages. • Wage Price Index at 3.75% (based on recent experience on similar projects), allocated to salaries and wages related costs. • Construction Cost Index at 2.77% (based on 10 year average June 2004 / June 2014, Building Construction Indexin the ACT), allocated to the escalation of Capex related contingency.