



**LIGHT RAIL STAGE 1
REVIEW OF COSTS JUNE 2018**

EXECUTIVE SUMMARY

Light Rail Stage 1, Gungahlin-Civic (LRS1), is currently under construction as a Public Private Partnerships (PPP) project and due to start operations in December 2018. On 6 June 2018, the ACT Government handed down its budget for FY2018-19 and for Forward Estimates through FY2021-22.

The purpose of this paper has been to review and develop cost projections for LRS1, given new information in the ACT Budget for FY2018-19 and to draw conclusions therefrom, in particular to:

- identify relevant and basic costing data;
- verify the derivation and validity of the project cost of \$939 million, claimed by the Government as the Present Value of the LRS1 project cost at January 2016; and
- perform an independent analysis to determine for LRS1 the real contract cost, project cost, cost to the ACT community and the total project liability for ACT taxpayers.

For the first time in its budget for FY2018-19, the ACT Government has published expected expenditures for FY2018-22 for Light Rail Stage 1, which have been most edifying. Budget figures and those published by the Government in its Contract Summary, June 2016, have permitted a revised, detailed analysis of LRS1 costs.

It is shown conclusively herein that the \$939 million project cost for construction and 20 years of operations, claimed by the Government since June 2016, is not correct and so has been somewhat misleading.

The second revelation in the budget (admitted by way of notes to the various tables) is that the figures therein for annual Availability Payments (Service Payments) to be made to the contractor are mostly the same as those contained in the Contract Summary, ie estimates have not been updated since publication in June 2016.

Any experienced project manager would be very suspicious of these figures, given the volatile nature of large projects and provisions in the contracts for reclamation of cost escalations. It implies one or a combination of several things, namely that: the estimates made in early 2016 are still valid, which is highly improbable; or contract costs have in fact increased, as would be expected, but the Government has either not yet been advised or not inquired of progression of construction costs; or the Government is aware of the real liability but has chosen, deliberately, to stick with the 2016 figures, knowing that they are in fact wrong and could increase significantly.

The real Project Cost (Contract Cost plus Capital Contribution) (Dec18) is **\$1.362 billion** and is considered an absolute minimum, given that budget figures are those from early 2016 and that there have been recent reports of schedule blowouts. ACT taxpayers should expect this figure to increase significantly.

The analysis determines four principal costs and shows the progressive total costs for each, namely the Contract Cost of \$987 million (excludes Capital Contribution), the Project Cost of \$1.362 billion (includes Capital Contribution), the real cost to the community of \$1.529 billion and the total taxpayer liability of the project of \$1.673 billion.

The analysis also determines the corresponding costs per passenger. Given a maximum of 6.3 million passengers pa (Stage 1 Business Case figure), the real Project Cost per passenger is \$10.81, over each of the 20-year operations period. If one considers only the annual Maintenance/Operating costs, the subsidy is \$3.46, which would be the real cost per passenger after completion of the 20-year contract period, until end of system life.

There could also be another anomaly in the Budget figures concerning the Risk-Retained by the ACT Government of \$129 million. This sum does not appear to be accounted for in the Budget papers.



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When drawing relevant conclusions from the analysis, it became evident that there were several pertinent questions that should be put to the Government to answer, listed in the box below.

Does the Government still maintain that the Stage 1 project cost at January 2016 is \$939 million and how justified?

Does the Government still stand by the Budget FY2018-19 figures for Availability Payments (Service Payments)?

Given that notes to Budget tables admit that the figures used are taken from earlier project documentation, for which estimates were made in 2016 or earlier, when will the Government reveal the actual project costs evolving under the contract?

Will the Government acknowledge a real (Dec18), minimum Project Cost of \$1.362 billion and, if not, why not?

How and where is the Risk-Retained sum of \$129 million accounted for in the Budget papers?

Will the Government acknowledge a real Project Cost per passenger of \$10.81 over the operating period of the contract and, if not, what does it believe the subsidy per passenger to be?

In brief, estimated expenditures for LRS1 in the FY2018-19 Budget papers are out of date by perhaps as much as three years and do not reflect the true cost situation evolving under the production contracts.

ANALYSIS

References:

- A. ACT Budget Paper 3, FY2018-22.
- B. Contract Summary, June 2016, prepared by Capital Metro Agency.
- C. Initiation of Light Rail Project Report N0 5/2016, ACT Auditor-General, 16 June 2016.
- D. Capital Metro Stage 1 Business Case, 31 October 2014.
- E. National Public Private Partnership Guidelines, Vol 5: Discount Rate Methodology Guidance, August 2013.

Assumptions and Terminology

See Annex B for relevant terminology, abbreviations, assumptions and some data from the FY2018-19 budget papers.

Introduction

Light Rail Stage 1, Gungahlin-Civic (LRS1), is currently under construction and due to start operations in December 2018. It is a Public Private Partnerships (PPP) project, ie private sector contractors will design, finance, construct, maintain and/or operate infrastructure assets. The Government will make service payments over the life of the contracts, intended to cover the costs incurred by the private sector provider in constructing, maintaining and/or operating the assets. At the end of the contracts, the infrastructure assets will be owned by the Territory.

On 6 June 2018, the ACT Government handed down its budget for FY2018-19 and for Forward Estimates through FY2021-22 (Ref A).

The ACT Government has always maintained that the Present Value of total project cost for LRS1, at January 2016, is \$939 million for construction and 20 years of operations (Contract Summary, Ref B). This figure was arrived at by discounting to January 2016, at an assumed rate of 7.52% pa, the nominal Availability Payments for years FY 2018-19 through FY2038-39, the ACT Retained Risk and Capital Contribution by the ACT Government at start of operations.

Despite challenge that the Government's methodology was erroneous, the A-G's office upheld this value of \$939 million (Ref C). In reality, the figure is much higher and can be demonstrated.

A major difficulty for external analysts has always been somewhat misleading information made public by the Government and by the lack of information about the contracts negotiated for LRS1, because of contract



confidentiality. Particularly important data items that are unknown are the nominal and real interest rates to be paid on capital borrowed by contractors during construction and on capital being recovered during the 20-year operations period.

For the first time, the FY2018-19 budget provides figures for LRS1 for four consecutive years. It is the first real opportunity for independent analysts to cross-relate planned expenditures on LRS1 with project figures published in 2016. The relationship between the two sets of figures is very edifying.

Purpose

The purpose of this paper is to review cost projections for LRS1, given information in the ACT Budget for FY2018-19 and to draw conclusions, in particular to:

- identify relevant and basic costing data;
- verify the derivation and validity of the project cost of \$939 million, claimed by the Government as the Present Value of the LRS1 project cost at January 2016; and
- perform an independent analysis to determine for LRS1 the real contract cost, project cost, cost to the ACT community and the total project liability for ACT taxpayers.

Note: While this analysis is independent of Government, all analysis is based only on cost estimates for LRS1 published to date by the Government to develop the real project costs.

Discussion

Tables at Annex A summarise the evolution of costs for LRS1 published by the Government since 2016 and subsequent independent analysis of those costs. Sources for published costs are identified by the referenced documents.

It can be shown, using the Government's own figures, that the official cost of LRS1 at \$939 million (Jan16 prices) was and is quite fallacious and is indeed significantly higher at around \$1.362 billion (Dec18 prices), some 33% higher. Earlier independent analysis attempted to show that the Government's use of a discount rate of 7.52% pa to reduce nominal costs of \$1.780 billion to \$939 million was improper use of discounting theory and that nominal costs should have been discounted at the expected Real Interest Rate to be paid on capital borrowings by contractors. See further discussion under *Fallacious \$939M LRS1 Cost*.

Most of what reduces to \$939 million are the Availability Payments to be paid to contractors over the 20 years of operations. These Payments, as estimated in preparation of the Contract Summary before June 2016, are shown in Table A2A. Yet, as seen in Table A7, budget estimates for FY2018-19 through FY2021-22 are mostly the same as corresponding figures in the Contract Summary. Such an exact relationship after two years of construction of LRS1 is highly improbable, suspect and should be challenged. See further discussion under *Comparison of Budget and Contract Summary Figures*.

Availability Payments comprise two components: Maintenance/Operations and Capital Recovery and interest paid thereon. Before the FY2018-19 budget, only the expected Availability Payments for the 20 years 2019 through 2039 were published in the Table 6 of the Contract Summary. Without knowing interest rates paid on capital, provided for in the contract, it was difficult to establish accurately respective components for the Maintenance & Operations and Capital Recovery. Now, for the first time the Budget papers separately identify these two components of the Availability Payments (see Table A8 below). This has now allowed the estimation of the interest rate applicable to recovery of unpaid capital, ie on \$332 million, being the difference between the stated construction cost of \$707 million and the Capital Contribution of \$375 million. See further discussion under *Identification of operating subsidies*.

Fallacious \$939M LRS1 Cost

Basic project data are:

- Nominal cost of construction, FY2018-19: \$706.703 million (Table A1)
- Capital Contribution, FY2018-19: \$375 million (Table A1)
- Capital to be recovered, FY2018-39: \$331.703 million
- ACT Retained Risk, FY2018-19: \$129.689 million (Table A3)



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The Contract Summary discounted the nominal Availability Payments for years FY 2018-19 through FY2038-39 to January 2016 at 7.52% pa to arrive at a total cost of \$939 million (Table A4).

The Contract Summary clearly states that the 7.52% discount rate used was adopted by reference to Volume 5 of the Private Partnership Guidelines (Ref E) and, therefore, does not necessarily bear any relationship to the actual interest rates incurred on capital borrowings by the LRS1 consortium.

Discounting theory is meant for *comparisons of competing projects* but, once the project is selected, capital recovery needs to be treated as are mortgages. Volume 5 of the PPP Guidelines is very specific on the purpose of Discounted Cash Flow (DCF) analysis in that it is used to “*compare different cash flow streams*” and nowhere in the document does it say that DCF is valid for discounting a series of mortgage periodic repayments.

The Contract Summary discount rate of 7.52% is taken here as nothing but a discount rate used in the context of DCF and is not the nominal interest rate on borrowings, as implied in the Summary. An essential element of this analysis has been to determine the most probable nominal and real interest rates on capital borrowed, through reference to Budget FY2018-19 and other published figures. See later discussion under *Comparison of Budget and Contract Summary Figures*.

In addressing the Woden Community Council in 2017, the Deputy-Director of Transport Canberra said that the capital cost to be recovered under Availability Payments was analogous to paying off a bank loan at x% per period over say 20 years. This paper agrees with that statement and acts upon it.

For any mortgage, the periodic repayment is constant for each defined period (normally monthly), but the two components of equity and interest payable vary by period – equity increasing by period and interest decreasing. However, both these series of figures are in nominal (future year) terms and need to be discounted at the Real Interest Rate to find the Present Value at a given Base Date.

It is patently in error to discount a single series of nominal costs to a Base Date using the same nominal interest rate, as was done in the Contract Summary. In mortgage terms, that would reduce the sum of nominal repayments to the principal borrowed, implying that there is no interest to be paid at all, which is obviously incorrect. The correct procedure is to discount the series of nominal repayments at the real adjusted interest rate¹, then subtract the Principal borrowed to obtain the present value of total interest payable.

The total nominal project cost for LRS1, at Dec18, is \$1.78 billion (Ref C), which, according to the Contract Summary, reduced to \$939 million at January 2016. It can be shown that discounting of the nominal Availability Payments plus capital costs at the erroneous 7.52%, back to January 2016, indeed gives a project cost of \$939 million. However, discounting of nominal costs to a Base Date of December 2018, at the Real Interest Rate of 5.42% pa, gives the correctly calculated project cost of **\$1.362 billion**. See discussion under *Identification of real project costs*.

Note: These derived costs depend on the validity of the figures in the Budget FY2018-19, which are highly suspect, given that source cost data has not been updated since early 2016 or even earlier, as will be discussed under Comparison of Budget and Contract Summary Figures.

Note also in Table A4 that there is no separate component for recovery of the outstanding production costs of \$332 million (principal and interest), these being subsumed in the Availability Payments. Thus, neither the respective nominal or discounted total of costs of the two components of Availability Payments - Capital Cost Recovered and Maintenance & Operations – were known before Budget FY2018-19.

Given the truth of the foregoing figures, one could say that the ACT Government has continuously, intentionally or in ignorance, misled ACT taxpayers as to the true, real cost of the LRS1 and should be challenged to defend its figures.

Comparison of Budget and Contract Summary Figures

It may be seen from Table A7 that the Service Payments in Table B.1, Appendix B of Budget Paper 3, are identical or almost identical to the corresponding estimates in Table 6 of the Contract Summary. In fact, most

¹ [%Int-Rad] The Real Interest Rate-Adjusted, on capital borrowed, is determined by the following formula:

$$\%Int-Rad = ((1+\%Int-nominal)/(1+\%Inf))-1$$



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LRS1 budget figures have not been updated from the published 2016 estimates. Several of the tables in the Budget cite one or other of the following notes:

- "The figures for Light Rail – Stage 1 are pre-financial close estimates.", or
- "The spend estimates for Light Rail – Stage 1 are derived from the original program set out in the contract. The ultimate spending profile for the project is the responsibility of the primary contractor."

This is an admission by the Government that LRS1 budget figures do not reflect the true liability that is or could be evolving under the LRS1 contracts. The statement that "The ultimate spending profile for the project is the responsibility of the primary contractor" is true but the budget eventually has to pay all costs and, therefore, should reflect expected expenditures, as best as possible. Does "The spend estimates for Light Rail – Stage 1 are derived from the original program set out in the contract" mean that the costs as negotiated in 2016 have not changed?

Any experienced project manager would be very suspicious of these figures, given the volatile nature of large projects and provisions in the contracts for reclamation of cost escalations. It implies one or a combination of several things, namely that:

- the estimates made in early 2016, some three years ago, are still valid, which is highly improbable, and the Transport Canberra and the Government know no different; or
- contract costs have in fact increased, as would be expected, but Transport Canberra, as the contract administrator, has not yet been advised of escalated costs to be claimed by the contractors nor has inquired of progression of construction costs; either way, it could be seen as a dereliction of duty by the contract administrator; or
- Transport Canberra is aware of the real liability but the Government has chosen, deliberately and possibly for political reasons, to stick with the 2016 figures, knowing that they are in fact wrong and could increase significantly.

Despite recent rumours and media reports to the contrary, the Government and contractor staff deny that the project is behind schedule and that it will not be ready in December 2018 as planned. At the same time, neither party will acknowledge an actual completion/commissioning date. Canberran taxpayers can, therefore, reasonably expect significant delays and such delays cost money.

Given the cost of probable schedule delay and no recognition in the budget of most probable construction cost escalations beyond \$707 million, the FY2018-19 budget figures for both capital cost and Availability Repayments could need to be increased significantly in a revised budget. The Government should be challenged to defend its budget figures for LRS1, with verifiable data.

Identification of real project costs

Budget Paper 3 gives a breakdown of Availability Payments (therein called 'Service Payments') to be made to the Canberra Metro consortium. By admission, (see Note 1 of table), these figures are the same as in Table 6 of the Contract Summary and, therefore, have not been updated for some three years. See Table A6.

For the first time, budget papers have provided enough information to permit some detailed analysis of the real costs and taxpayer liability of LRS1, not having been done in the Contract Summary or in earlier budgets. In particular, Availability Payments (Service Payments), are now broken down into 'Maintenance/Operating Costs' and 'Interest'.

Detailed analysis has involved considerable spreadsheet work (not shown herein) to provide figures presented in Tables A8 through A11.

Table A8 shows the results of independent analysis to determine the Real Interest Rate applicable to the figures shown in the Budget tables. To achieve this, analysis equated the project cost determined separately by two methods, with minimal error. Method 1 used Contract Summary figures to determine the contract cost of \$987.5M (sum of Availability Payments and Risk Retained at FY2018-19). Method 2 used the total recovery cost of the \$332M loan (707-375) plus calculated Maintenance/Operations cost to determine project cost of \$987.5M. The methodology proves a Real Interest Rate on capital borrowings of 5.42% pa (nominal 8.58% pa), with minimal error in Maintenance/Operations costs shown in the budget as proof of the method.



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Table A9 shows the results of independent analysis and contrasts them with the Government figures given in the Contract Summary, in respect of the nominal total at FY2018-19 and respective present values at Jan16 and Dec18.

The real Project Cost (Contract Cost plus Capital Contribution) is therefore **\$1.362 billion**. It is considered a minimum, given that budget figures have not been updated since those estimated for the Contract Summary in early 2016 and, given recent reports about schedule blowouts, one should expect this figure to be even higher.

The difference in the January 2016 figures of \$939 million always claimed by the Government, inappropriately, and the real cost of \$1.362 billion is quite large, there being a 33 % difference.

Table 10 shows a more detailed cost breakdown and comparison but also shows the progressive total costs for each of the Contract Cost (\$Cost-Contract (23Y)) of **\$987 million**, the Project Cost (\$Cost-Project (23Y)) of **\$1.362 billion**, the real cost to the community (\$Cost-Community (23Y)) of **\$1.529 billion** and the total taxpayer liability of the project (\$Total Project Liability (25Y)) of **\$1.673 billion**.

The actual cost to the community adds the opportunity cost of the Capital Contribution of \$375 million, at a nominal interest rate of 6% pa and real rate of 3% pa). The total project liability for the taxpayer adds the Government costs of pre-contract activity – public service and outsourcing to contractors – plus contract administration costs.

Apparent anomaly between Contract Summary and Budget figures

The Contract Summary and the A-G's report (Ref C) both mention a 'Risk-retained' by the Government as a contingency. Table 5 of the Contract Summary gives a discounted value for Territory-retained Risk Contingency of \$117 million, whereas the A-G's report gives a nominal figure of \$129.689 million, both separate to the Availability Payments. The latter figure is accepted for this analysis.

Both the Contract Summary and the A-G's report state that Risk-retained is not included in the periodic Availability Payments, yet it is clear in the FY2018-19 budget papers that the Risk contingency is included in the \$707 million construction cost and the \$332 million (after deduction of the \$375M Capital Contribution) slated for repayment with interest throughout the contract.

What is the apparent anomaly? In the Contract Summary, Availability Payments do not include the Risk-Retained and the budget papers use the same Availability Payments, yet does not mention specifically a Risk-retained figure of \$129 million, it having been subsumed in the \$707 million capital cost. So, where in the budget figures does the Risk-Retained appear to get repaid? It seems to have been ignored.

Annual subsidies

Table A11 shows the derived costs (subsidies) per passenger, given a maximum of 6.3 million passengers pa (Stage 1 Business Case (Ref D) figure). The most relevant subsidy is the real \$Total Project Cost per passenger at **\$10.81** (Dec18). If one considers only the annual Maintenance/Operating costs, the real subsidy is \$3.46, which would be the real cost per passenger after completion of the 20-year contract period, until end of system life.

Relevant Conclusions

From the foregoing discussion of the analysis of LRS1 costs, given new information in the ACT Budget for FY2018-19 and Forward Estimates, there are several important conclusions to be drawn.

Fallacious \$939M LRS1 Cost

In respect of the initial costing of the project by the Government, it can be shown that the January 2016 estimate of \$939 million published in the Contract Summary, June 2016 was patently in error, having been arrived at by discounting the nominal total project cost of \$1.78 billion by an erroneous discount rate of 7.52% pa, a rate that was totally unrelated to real interest rates to be paid on capital borrowings.

Given the truth of the foregoing figures, one could suggest that the ACT Government has continuously, intentionally or in ignorance, misled ACT taxpayers as to the true, real cost of the LRS1 and should be challenged to defend its figures.

Question: Does the Government still maintain that the Stage 1 project cost at January 2016 is \$939 million and how justified?



Comparison of Budget and Contract Summary Figures

The series of Availability payments (Service Payments) to be made to the LRS1 contractor, listed in Budget Paper 3, are identical or almost identical to the corresponding estimates in Table 6 of the Contract Summary, figure that have not been updated from the published estimates of early 2016. The Budget admits this in notes to several of the tables in the Budget Papers.

This is an admission by the Government that LRS1 budget figures do not reflect the true liability that is or could be evolving under the LRS1 contracts.

Given that the Government, as the contract administrator, should be aware of what costs are evolving under the contract, Budget figures imply that the Government has chosen, deliberately, not to reveal the probable liability but to stick with the 2016 figures, knowing that they are in fact wrong and that they could increase significantly. The Government should be challenged to defend its budget figures for LRS1, with verifiable data.

Question: Does the Government still stand by the Budget FY2018-19 figures for Availability Payments (Service Payments)?

Question: Given that notes to Budget tables admit that the figures used are taken from the Contract Summary, for which estimates were made in 2016 or earlier, when will the Government reveal the actual project costs evolving under the contract?

Identification of real project costs

For the first time, budget papers have provided enough information to permit some detailed analysis of the real costs and taxpayer liability of LRS1, not having been done in the Contract Summary or in earlier budgets.

Analysis shows that the real (Dec18) Contract Cost is **\$987 million**, and that the real Project Cost (Contract Cost plus Capital Contribution) is **\$1.362 billion**. These figures are considered minimums, given that budget figures have not been updated since those estimated for the Contract Summary in early 2016 and probable evolution of costs under contract.

Given a real, minimum Project Cost is **\$1.362 billion**, by adding the real (interest) cost on the \$375 million Capital Contribution, the real cost to the community would be **\$1.529 billion**. If one then adds the off-contract administration and outsourcing costs, the total taxpayer liability for the project rises to **\$1.673 billion**.

Question: Will the Government acknowledge a real (Dec18), minimum Project Cost of \$1.362 billion and, if not, why not?

Apparent anomaly between Contract Summary and Budget figures

Both the Contract Summary and the A-G's report identify a contingency figure, a 'Risk-retained' by the Government, of about \$129 million, and is not included in the Availability Payments.

It is clear from the budget papers that the Risk contingency is included in the \$707 million construction cost and the \$332 million (after deduction of the \$375M Capital Contribution) slated for repayment with interest throughout the contract. However, the Availability Payments (Service Payments) do not include the Risk-Retained figure of \$129 million. So, where in the budget figures is the \$129 million accounted for?

Question: How and where is the Risk-Retained sum of \$129 million accounted for in the Budget papers?

Annual subsidies

Given a maximum of 6.3 million passengers pa (Stage 1 Business Case figure), the real Project Cost per passenger is **\$10.81**, over each of the 20-year operations period. If one considers only the annual Maintenance/Operating costs, the real subsidy is \$3.46, which would be the real cost per passenger after completion of the 20-year contract period, until end of system life.

Question: Will the Government acknowledge a real Project Cost per passenger of \$10.81 over the operating period of the contract and, if not, what does it believe the subsidy per passenger to be?

In brief, estimated expenditures for LRS1 in the FY2018-19 Budget papers are out of date by perhaps as much as three years and do not reflect the true cost situation evolving under the production contracts.

Smart Canberra Transport, 30 June 2018

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LIGHT RAIL STAGE 1 - COSTING TABLES

Introduction

The following tables summarise the evolution of costs for Light Rail Stage 1 (LRS1) published by the Government since 2016 and subsequent independent analysis of those costs. Sources for published costs are the Government’s Contract Summary, June 2016, and the ACT Budget Papers for FY2018-19.

The purposes of analysis have been:

- to identify relevant and basic costing data [Tables A1 through A7]
- verify the derivation and validity of the project cost of \$939 million, claimed by the Government as the Present Value of the LRS1 project cost at January 2016; and
- perform an independent analysis to determine for LRS1 the real contract cost, project cost, cost to the ACT community and the total project liability for ACT taxpayers [Tables A8-A11].

Tables

The following tables document the results of the research and analysis done in preparation of this paper. Descriptions are provided as introductions to the data/information in each table.

- Table A1: Construction Cost and Capital Contribution.
- Table A2A: Copy of Table 6 from Contract Summary (Ref B) – Availability Payments (Nominal).
- Table A2B: Totals and averages of Table A2A figures [not shown in the Contract Summary].
- Table A3: LRS1 costs as presented in the A-G report (Ref C).
- Table A4: Copy of Table 7 from Contract Summary (Ref B).
- Table A5: ACT Budget 2018-19, Appendix B [extract] Table B.1: PPP Impact - Light Rail - Stage 1.
- Table A6: Budget Paper 3, Appendix B, Table B.1: PPP Impact – Light Rail – Stage 1.
- Table A7: ACT Budget 2018-19, Statement H, Appendix B [extract].
- Table A8: "ACT Budget 2018-19, Statement H, Appendix B [extract] and independent estimates.
- Table A9: Light Rail Stage1 Costs: Project Cost Summary-Independent Analysis.
- Table A10: Light Rail Stage1 Costs: Cost Summary-Total Project Liability-Independent Analysis.
- Table A11: Light Rail Stage1 Costs: Cost Summary-Subsidies per Passenger-Independent Analysis.

Table A1 shows the long-standing, published cost for Stage 1 construction and the Capital Contribution to be made by the Government upon commissioning of the stage, nominally but not definitely in December 2018. It shows the spread of expenditure over three years of the \$707.703 million production cost, with \$691.160 million in the FY2017-18, just ended. These figures are somewhat confusing, given that the \$375 million component is not due for expenditure until December 2018 at the earliest.

Table A1				
Light Rail Stage1 Costs				
Construction Cost				
Cost Item	Nominal Total \$'000	FY2017-18 \$'000	FY2018-19 \$'000	FY2018-20 \$'000
Construction Cost [Dec18] [1]	706,703	691,160	15,353	190
Capital Contribution [Dec18]	375,000		375,000	
Capital-recovery over 20 years [2] [3]	331,703			
Notes:				
1. From Budget Paper 3, Table 5.2.3: Public Private Partnerships				
2. %Interest Rate on Capital-recovery not known due to contract confidentiality.				
3. %Interest Rate needs to be interpolated from budget figures.				



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Table A2A shows the nominal Availability Payments copied from Table 6 of the Contract Summary (Ref B), estimated at least six months before June 2016.

Table A2A											
Light Rail Stage1 Costs											
Project Summary - Table 6											
Financial Year ending 30 June:	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Availability Payments (\$'000) [1]	36,061	54,269	54,719	55,841	56,811	59,240	59,316	62,970	60,237	61,870	62,954
Financial Year ending 30 June:	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Availability Payments (\$'000) [1]	64,257	67,025	67,296	78,534	68,971	70,461	71,370	73,329	75,884	12,937	-

Note 1: Figures in in nominal (future) dollars

Table A2B summarises figures in Table A2A. These are not given in the Contract Summary.

Table A2B	
Light Rail Stage1 Costs	
Cost Summary June 2018	
Average	Total
\$'000 pa	\$'000
56,753	624,288
[1]	[1]
59,097	650,064
57,925	1,274,352

Table A3 summarises costs presented by the Auditor-General (Ref C) and shows the derivation of the total nominal cost of LRS1 Availability Payments, Capital contribution and Territory retained risk of \$1.779 billion at December 2018.

Table A3		
Light Rail Stage1 Costs		
Auditor-General's Report, June 2016		
Cost Item	@Dec18 \$'000	Notes
Territory capital contribution	375,000	[1]
Availability payments to the successful consortium	1,274,352	[2]
Territory retained risk amount.	129,689	[1]
Total	1,779,041	[1] [2]
Notes:		
1. FY2018-19 value		
2. Sum of nominal payments FY2018-19 through FY 2038-39		

Table A4 is a copy of Contract Summary Table 7 that shows the origin of the claimed Present Value in 2016 (PV2016) of LRS1 cost of \$939 million. The reason for some figures is not understood and not explained therein. Independent analysts have always challenged this figure on the grounds of erroneous discounting methodology.

The Contract Summary clearly states that the 7.52% discount rate used was adopted by reference to Volume 5 of the Private Partnership Guidelines (Ref E) and, therefore, does not necessarily bear any relationship to the actual interest rates incurred on capital borrowings by the LRS1 consortium.

Discounting theory is meant for *comparisons of competing projects* but, once the project is selected, capital recovery needs to be treated as are mortgages. Volume 5 of the PPP Guidelines is very specific on the purpose of Discounted Cash Flow (DCF) analysis in that it is used to “*compare different cash flow streams*” and nowhere in the document does it say that DCF is valid for discounting a series of mortgage periodic repayments.

The Contract Summary discount rate of 7.52% is taken here as nothing but a discount rate used in the context of DCF and is not the nominal interest rate on borrowings, as implied in the Summary.



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Cost Item	Net Present Cost (\$ m) Territory Payments	Net Present Cost (\$ m) Direct Cost Breakdown
Availability Payments	520	
Territory Contribution	305	
D&C [Design & Construction]		534
Operating costs and life cycle		269
Financing/SVP and other		22
Territory-retained Risk Contingency	114	114
Net Present Cost (7.52% discount rate)	939	939
For comparison – 8.52% discount rate	879	879
For comparison – 6.52% discount rate (Territory Contribution only)	948	948
For comparison – 6.52% discount rate	1,007	1,007
Note 1: The discount rate was calculated in accordance with methodology set forth in the Australian Government National Public Private Partnership Guidelines, Volume 5.		
Reason for this figure not understood and not explained in the document.	'SVP' not explained in the document but could mean Stable Value Protection	Discounted 3 years from Jun19 to Jan16

Table A5 shows the \$939 million cost at Jan16, escalated to show a cost in FY2018-19 \$1.159 billion. This figure is what the Government would probably say is the current cost, but it is also wrong due to erroneous discounting methodology. To be consistent, the Government should at least acknowledge the \$1.159 billion cost. But the actual cost is much higher.

Cost Item	Discount Years [1]	3
	%Deprec pa [2]	3.00%
	%Discount pa [3]	7.52%
	Real PV 01-Dec-18 \$ '000	Real PV Jan16 \$ '000
Availability Payments (AP) [4] [5]	655,142	530,403
Territory retained risk amount TRR) [6]	129,689	104,996
Territory capital contribution (TCC) [7]	375,000	303,600
AP + TRR	504,689	408,597
Total (TCC+AP+TRR) [8]	1,159,831	939,000
Notes:		
1. Years discounted Jan19 back to Jan16 .		
2 Based on ABS figures for production index.		
3. 7.52% discount rate applied in Contract Summary.		
4. AP nominals discounted at 7.52% pa to FY2018-19 [Dec18].		
5. AP nominals depreciated further at 7.52% pa for 3 years to Jan16.		
6. TRR \$129m Dec18, depreciated at 7.52% pa to Jan16 (3 years).		
7. TCC \$375m depreciated at 7.52% pa to Jan16 (3 years).		
8. \$939m figure from Contract Summary. \$1,159 billion is calculated.		

Table A6 shows, for the first time, the breakdown of Availability Payments (therein called 'Service Payments') to be made to the Canberra Metro consortium. By admission, (see Note 1 of table), these figures are the same as in Table 6 of the Contract Summary and, therefore, have not been updated for at least two and a half years.



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Item	FY 2018-19 \$'000	FY 2019-20 \$'000	FY 2020-21 \$'000	FY 2021-22 \$'000
Headline Net Operating Balance (HNOB) Impact				
Maintenance/Operating Costs	21,216	25,722	26,172	27,294
Interest	15,922	18,901	18,275	17,664
Depreciation	10,559	14,079	14,079	14,079
Total HNOB Impact	47,697	58,702	58,526	59,037
Assets and Liabilities				
Lease Asset [2]	693,393	679,314	665,235	651,156
Lease Liability	- 330,029	- 320,383	- 310,111	- 299,229
Total Impact on Net Assets	363,364	358,931	355,124	351,927
Payments to Canberra Metro				
Service Payments	37,138	54,269	54,719	55,840
Capital Contribution	375,000			
Total Payments	412,138	54,269	54,719	55,840

1. The figures for Light Rail – Stage 1 are pre-financial close estimates.
2. Includes accumulated depreciation.

Table A7 also shows Availability Payments (Service Payments) to be made to Canberra Metro, as well as the figures from Table 6 of the Contract Summary. Its purpose is to show that the two sets of figures re the same.

Item	2018-19	2019-20	2020-21	2021-22	Total	Comments
	\$'000	\$'000	\$'000	\$'000	\$'000	
Table B.1: Public Private Partnership Impact - Light Rail - Stage 1						
Payments to Canberra Metro					-	
Service Payments	37,138	54,269	54,719	55,840	201,966	[1] [2]
Capital Contribution	375,000				375,000	
Total Payments	412,138	54,269	54,719	55,840	576,966	
Contract Summary, Jun16 [2016 prices] For comparison						
Availability Payments	36,061	54,269	54,719	55,841	200,890	

Notes:
1. Budgeted figures are virtually the same as Contract Summary figures formulated in 2016 before contract signatures.
2. "The figures for Light Rail – Stage 1 are pre-financial close estimates." From Budget Paper 3, App B, Table B.1

Table A8 shows the results of independent analysis to determine the Real Interest Rate applicable to the figures shown in the Budget tables. To achieve this, analysis equated the project cost determined separately by two methods, with minimal error. Method 1 used Contract Summary figures to determine the contract cost of \$987.5M (sum of Availability Payments and Risk Retained at FY2018-19). Method 2 used the total recovery cost of the \$332M loan (707-375) plus calculated Maintenance/Operations cost to determine project cost of \$987.5M. The methodology proves a Real Interest Rate on capital borrowings of 5.42% pa (nominal 8.42% pa), with minimal error in Maintenance/Operations costs shown in the budget as proof of the method.

Item	2018-19 \$'000	2018-20 \$'000	2018-21 \$'000	2018-22 \$'000	2018-23 \$'001	Comments
\$Avail Payments (excl Risk)	na	54,269	54,719	55,841	na	[1] [2]
\$Repayment on \$332M @5.42%pa Real	na	28,404	29,256	30,134	na	[3] [4]
Maint/Op Costs (using 5.42% Real pa)	na	25,865	25,463	25,707	na	[5]
Maint/Op Costs (budget)	na	25,722	26,172	27,294	na	[5]
Error		0.56%	-2.71%	-5.81%		[6] [7] [8]

Notes:
1. 'na' : figures in budget table for these years not relevant to this proof of 5.42% pa being the Real interest used in budget.
2. Figures shown from BP3 Table B.1.
3. Independently calculated to find the Real interest rate applied in the Budget.
4. \$332M includes the \$129M Risk Retained.
5. Compare these figures.
6. Error in independent calculation; minimal for the three years shown.
7. 5.42%pa Real determined by equating \$Cost-Contract of \$987.5M, derived by two methods
8. Method 1 using Project Summary figures; Method 2 by calculating cost recovery of \$332M loan.



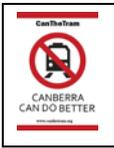
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Table A9 shows the results of independent analysis versus the Government figures in the Contract Summary, for the nominal total at FY2018-19 and respective present values at Jan16 and Dec18. The real Project Cost is an absolute minimum of **\$1.362 billion** at December 2018. This is 33% higher than the Government's claimed project cost.

Table A9				
Light Rail Stage1 Costs				
Project Cost Summary				
Cost Item	Independent Analysis			Comments/Notes
	PV Jan-16 \$'000	PV Dec-18 \$'000	Nominal FY2018-39 \$'000	
Contract Summary	[1] [2]	[3]		[4]
Availability Payments	530,403	655,142	1,274,352	
Risk Withheld	104,996	129,689	129,689	
Capital Contribution	303,600	375,000	375,000	
\$Cost-Project	939,000	1,159,831	1,779,041	[5]
Independent Analysis	[6]	[7]		
Availability Payments	708,211	771,894	1,274,352	
Risk Retained	197,851	215,642	129,689	[8] [9]
\$Cost-Contract (23Y)	906,062	987,536	1,404,041	
Capital Contribution	344,061	375,000	375,000	
\$Cost-Project	1,250,123	1,362,536	1,779,041	
Notes:				
1. PV16 figures are PV18 figures discounted at 7.52% pa from Dec18, in error (see Note 2).				
2. PV16 figures should have been PV18 figures discounted from Dec18 at annual escalation rate.				
3. PV18 figures are nominals discounted at 7.52% pa.				
4. Contract Summary Table 6 figures used.				
5. Nominals and PV16 figures corroborated by Auditor-General in Jun16 (in error).				
6. PV16 figures are PV18 figures discounted at assumed escalation rate of 3.0% pa, from Dec18.				
7. PV18 figures are nominals discounted at real interest rate of 5.42% pa (as it should be).				
8. Risk Retained is zero, it being accounted for in the Availability Payments.				
9. Risk Retained included in Contract Summary figures but apparently not in budget figures.				
Assumptions				
1. LRS1 will be commissioned as planned in December 2018.				
Data				
%Discount Rate-Gov pa	7.52%	Nominal discount rate used in Contract Summary.		
%Interest Rate-Real pa	5.42%	Real Interest rate matches BP3 Table B.1 within 1.0 % .		
%Interest Rate-Nom pa	8.58%	Nominal int rate on outstanding loan of \$331.7 M.		
%Escalation Index pa	3.00%	Assumed average escalation index (2,9% (ABS)).		

Table 10 shows a more detailed cost breakdown and comparison but also shows the progressive total costs for each of the contract cost (\$Cost-Contract (23Y)), the project cost (\$Cost-Project (23Y)), the actual cost to the community (\$Cost-Community (23Y)) and the total taxpayer liability of the project (\$Total Project Liability (25Y)). The actual cost to the community adds the opportunity cost of the Capital Contribution of \$375 million. The total project liability for the taxpayer adds the Government cost of pre-contract activity – public service and outsourcing to contractors – plus contract administration costs.



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Table A10 Light Rail Stage1 Costs Cost Summary - Total Project Liability		Contract summary			Independent Analysis	
Row	\$Cost component	Nominal \$'000	@ 7.52% pa [2]		@5.42%pa Real	Comment
			PV Dec16 \$'000	PV Dec18 \$'000	PV Dec18 \$'000	
1	\$Cost-Build	706,700	706,700	706,700	706,700	[1]
2	\$Cap Contribution	375,000	375,000	375,000	375,000	[1]
3	\$Cap Loan Principal	331,700	331,700	331,700	331,700	[1]
4	\$Cap Recovery (20Y)	651,734	392,501	484,808	551,538	
5	\$Cost Build + \$Int (8%)	1,026,734	767,501	859,808	926,538	R2+R4
6	\$Repayments (20Y)	1,274,352	530,403	655,142	771,894	
7	\$Risk-Retained	129,689	104,996	129,689	215,642	[A1]
8	\$Cost-Contract (23 Y)	1,404,041	635,400	784,831	987,536	
9	\$Cap Contrib	375,000	303,600	375,000	375,000	
10	\$Cost-Project (23Y)	1,779,041	939,000	1,159,831	1,362,536	
12	\$Int-Nominal at 6% pa (20Y)	450,000	3%pa Real	3%pa Real	3%pa Real	6% * \$375m * 20 [A2]
13	\$Int-Real at 3% pa (20Y)		152,829	167,000	167,000	3% * \$375m *20 [A3]
14	\$Contract Opportunity Cost	450,000	152,829	167,000	167,000	on \$375m \$Cap Contribution [A4]
15	\$Cost-Community (23Y)	2,229,041	1,091,829	1,326,831	1,529,536	
16	\$Off-Contract Government Costs	150,000	150,001	143,500	143,500	Check 2014-2019 budgets [A5]
17	\$Total Project Liability (25Y)	2,379,041	1,241,830	1,470,331	1,673,036	
Notes						
1. Nominal Government figures from 2018-19 Budget Papers						
2. Government used a discount rate of 7.52% pa (from Project Summary) (Actual interest rate in contract is unknown)						
Assumptions						
A1. \$Retained Risk (contingency) is included in the \$707m build cost.						
A2. Nominal Cost of Government borrowing is 6% pa						
A3. Real cost of Government borrowing is 3% pa						
A4. \$Opportunity Cost = Cost to Government borrowing \$375m [nominal and real]						
A5. Assumed off-contract costs but verifiable in 2014-19 budget papers						

Table A11 shows the derived subsidies per passenger, given a maximum of 6.3 million passengers pa (Stage 1 Business Case figure). The most relevant subsidy is \$Total Project Cost per passenger at **\$10.81** (FY2018-9 prices).

Table A11 Light Rail Stage1 Costs Cost Summary - Subsidies per Passenger		Contract summary			Independent Analysis	
Row	\$Cost component	Nominal \$'000	@ 7.52% pa		@5.84%pa Real	Comment
			PV Dec16 \$'000	PV Dec18 \$'000	PV Dec18 \$'000	
1	\$Cost Build + \$Int (calc)				551,538	
2	\$Maint&Ops (Calc)				435,998	
3	\$Cost-Contract (23Y)	1,404,041	635,400	784,831	987,536	
4	\$Total Project Cost (23Y)	1,779,041	939,000	1,159,831	1,362,536	
5	\$Total Community Cost (23Y)	2,229,041	1,091,829	1,326,831	1,529,536	
6	\$Total Project Liability (25Y)	2,379,041	1,241,830	1,470,331	1,673,036	
	Passengers pa (max)	6,300,000	6,300,000	6,300,000	6,300,000	Stage1 Business Case [A1]
	\$Subsidies per passenger	\$	\$	\$	\$	[A2]
7	\$Total Cost per passenger-Maint/Ops				3.46	
8	\$Total Project Cost per passenger	14.12	7.45	9.21	10.81	Includes \$Cap Contribution
9	\$Total Community Cost per passenger	17.69	8.67	10.53	12.14	Includes \$Cap Contribution
10	\$Total Project Liability per passenger	18.88	9.86	11.67	13.28	Includes \$Cap Contribution
Assumptions						
A1. Maximum capacity pa (67% standing)						
A2. Subsidies include annual depreciation of equipment.						



TERMINOLOGY AND NOTES

Terminology and Assumptions

Terms	Definition
ACT Retained Risk	A contingency figure retained by the ACT Government but actually included in the agreed \$707 construction cost.
\$Cost-Contract (23 Y)	LRS1 Contract Price
\$Total Community Cost (23Y)	Project Cost + Opportunity Cost on Capital Contribution
\$Total Project Cost (23Y)	LRS1 Contract Price + Capital Contribution
\$Total Project Liability (25Y)	Community Cost + off-contract Government and outsourcing costs
Availability Payment	Periodic payments to the contractor for capital recovery, interest paid on capital and ongoing costs of maintenance and operations.
Base Date	Date to which future costs or receipts are discounted.
Business Case	A primary project document that is meant to justify the project
Canberra Metro	Prime contractor for Stage 1.
Capital Contribution	\$375 million down payment to be made by the Government upon commissioning of LRS1.
Capital Metro	Erstwhile ACT Government light rail project office
Contract Summary	A public document prepared by Capital Metro Agency, as an overview of the LRS1 contract
Cost Price Index for transport	An escalation index relevant to the transport industry produced by the ABS
DCF Discount Rate	A nominal discount rate used to compare the costs and benefits of two or more competing projects determined using National Public Private Partnership Guidelines, Vol 5: Discount Rate Methodology Guidance, August 2013.
Headline Net Operating Balance (HNOB) Impact	Unknown. Need to ask Government.
Nominal Interest Rate	The interest rate paid on a loan principal, including a given inflation rate inflation.
Nominal value	The value of a cost to be incurred or a receipt in the current and or future years (or defined periods).
Present Value	The total value of a series of future payments (or receipts), discounted at a given rate per annum (or period).to a given base date.
Public Private Partnership	PPP is an alternative to standard procurement processes and comprises a different approach to planning, design, construction and, particularly, financing. This enables key items on the government's list of desired/required projects to be financed 'up front' from another source of money and for the project to be 'off-balance sheet'. <i>Association of Consulting Architects Australia</i>
Real Interest Rate	The interest rate paid on a loan principal, assuming zero inflation.
Real Interest Rate-Adjusted	The Real Interest Rate adjusted is the combination of Real and Nominal Interest Rates. $\%Int-Rad = ((1+\%Int-nominal)/(1+\%Inf))-1$
Real value	The Present Value at a Base Date of a serious of nominal values, discounted at a given Real Interest Rate.
Service Payment	See Availability Payment
Transport Canberra	Government directorate now responsible for light rail.



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Abbreviations	Term
ABS	Australian Bureau of Statistics
A-G	Auditor General
BP3	Budget paper 3
DCF	Discounted Cash Flow
FY	Fiscal Year
LRS1	Light rail Stage 1
PPP	Public Private Partnership
PV	Present Value

Assumptions	
A1	Forecast average Cost Price Index for transport is 3% [based on ABS figures].
A2	Real Interest Rate on capital borrowed by the LRS1 consortium is 5.42% pa, being a nominal interest rate of 8.58% pa, given the Cost Price index of 3% pa [actually derived herein by analysis].
A3	ACT Government can borrow funds at a nominal 6% pa (3% pa real).
A4	The \$129 million of ACT Retained Risk, identified in the Contract Summary and A-G report is a component of the stated \$707 million construction cost identified in the FY2018-19 budget papers, ie that this contingency provision will be used by December 2018.

Data from Budget Papers - Stage 1 Gungahlin-Civic

Information drawn from budget papers:

- *Budget Paper 3, Table 3.2.2: Stage 1 will start running in December 2018.*
- *BP3, Table 3.2.2: Expense initiatives: Light Rail Stage 1 – commencing operations \$850,000 in 2018-19, including delivering passenger safety and education campaigns.*

[This sum is outside the PPP contract price so is expenditure by Transport Canberra. One could expect also that there would be additional expenditure (not located in Budget) for complementary supplies such as park and ride stations.]

- *BP3, Table 3.2.2: Expense initiatives: Light Rail Stage 1 – \$150,000 is provided for design of the additional Mitchell light rail stop at Sandford Street.*

[There appears to be no funds allotted for construction in 2018-19 or later.]

- *BP3, Table 5.2.1: Summary of 2018-19 Infrastructure Investment Program Light Rail – Stage 1 provides for \$15.353 million expenditure in 2018-19 and a subsequent \$190,000 in 2019-20.*

[No explanation is given for this figure.]

- *BP3, Table 5.2.3: Public Private Partnerships: \$706.703 million of the budget year and forward estimates, including \$691.16 million in 2017-18:*

[Agrees with the often-cited construction cost of \$707 million.

It would appear from these figures that construction costs have been contained, ie no cost blowouts evident yet.

These figures imply that virtually all of the \$707M capital cost (\$691.16M) will be spent in 2017-18, instead of only the down-payment of \$375M, with the remaining \$332M repaid over the 20-year period (see later statement).]

Notes:

- Although not known (not privy to the PPP contract), it is almost certain that the \$707M construction cost does not include the interest to be paid over 20 years on the remaining \$332M.
- The Capital Works Program does not include capital provisions or public private partnerships.