



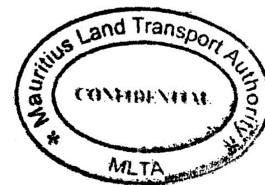
Mauritius

Light Rapid Transit Project

Feasibility Study

Executive Summary

(FINAL – CONFIDENTIAL)



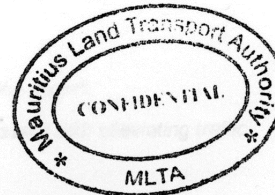
29 October 2013



The Mauritius Light Rapid Transit will be developed as a publicly owned infrastructure project. The project will be developed and operated by a private company, the Mauritius Light Rapid Transit Company (MLRTC), which will be established as a subsidiary of the Mauritius Land Transport Authority (MLTA). The MLRTC will be responsible for the design, construction, operation and maintenance of the MLRTC system. The MLRTC will be responsible for the design, construction, operation and maintenance of the MLRTC system. The MLRTC will be responsible for the design, construction, operation and maintenance of the MLRTC system.

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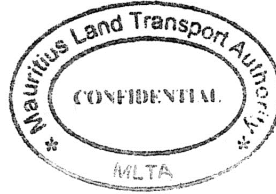


DISCLAIMER

In utilising the preliminary costs estimate information contained within this report it is important to recognise that SCE and the SCE team have no control over the cost of labour, materials, the equipment or services furnished by others, or over Contractor's methods of determining prices or over competitive bidding or market conditions. The estimates contained within this report of the construction and operating budgets have been made on the basis of the SCE team's experience and qualifications and represents SCE's best judgement as experienced and qualified professionals, and with our familiarity with the design and construction industry. SCE cannot and does not guarantee that Contractor's proposals, quantities, bids or actual construction costs will not vary from the estimate.

The forecasts presented within this report were developed using several assumptions based on both the data collected for forecasting, as well as the anticipated design parameters of the Mauritius Light Rapid system. These assumptions restrict the validity of the results to specific situations, which the reader should be aware of. Any future use of the presented forecasts, for any purpose, should be done with comprehensive knowledge of these limitations. Although SCE intended to provide complete, accurate and reliable patronage forecasts, the responsibility of validating the assumptions made lies with those whom intend on using the patronage forecasts.

SCE and the authors accept no liability or responsibility for any loss, damage, claim, expense, cost or liability from the inappropriate use of the forecasts, cost estimates, financial and economic analysis provided. SCE will not be liable in relation to incorrect conclusions should any information be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to SCE. The assessment and conclusions are indicative of the situation at the time of preparing the report. Within the limitations imposed by the scope of services and the assessment of the data, the preparation of this report has been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable consultants under similar circumstances. No other warranty, expressed or implied, is made.



Executive Summary

The Mauritius Light Rapid Transit (MLRT) project is a priority transport infrastructure project that will deliver major and much-needed travel improvements to communities in the Republic of Mauritius, as well as substantial transport, economic, environmental and community benefits to the nation.

The MLRT will enhance travel along between Curepipe and Port Louis – a corridor that serves the fastest growing areas in Mauritius and that will be of increasing importance to the country's future economic development and prosperity. It will reduce traffic congestion, meet the current and emerging transport needs of Mauritians and improve access to jobs and services for people living in the corridor, while providing greater travel choice.

This business case describes the project and its benefits, providing the justification for this investment. It draws on work carried out for the Government of Mauritius (GoM) on the Reference Design, which itself built on extensive planning and scoping work undertaken. This includes understanding the strategic economic, population, transport and sustainability imperatives to be addressed; forecasting of customer demand; estimating costs and quantifying the financial and economic benefits the project will deliver.

Strategic Rationale for the MLRT

The current constraints associated with the existing transportation network in Mauritius have been examined. The key findings and strategic rationale for the MLRT are as follows.

Economic Development

- Vehicle growth is on average 4 to 10 times higher than population growth
 - ➔ *The MLRT would act as an alternative mode of travel, and assist with alleviating traffic congestion in and around Port Louis.*
- National productivity in Mauritius has declined in recent years
 - ➔ *The development of the project would lift national productivity by providing supporting infrastructure to support growth and change in the economy.*
 - ➔ *It is estimated that the MLRT could contribute up to Rupees (Rs) 12,479 million in economic output during the construction phase of the project.*
- Mauritius has one of the lowest labour force participation rates compared to its neighbours
 - ➔ *The development of project would foster job creation and improve accessibility to and from employment centres, directly providing different avenues for increasing the labour participation rates and hence labour productivity.*
 - ➔ *It is estimated that the MLRT could contribute around 7,000 of full time equivalent jobs directly and indirectly during the construction phase of the project.*

Social Development

- Road traffic accidents and fatalities have increased over the last 5 years
 - ➔ *The development of the project as an alternative to road use would alleviate congestion and reduce the underlying incident of road vehicle accidents.*



Tourism has shown modest growth in recent years

- *Future potential extension of the project's corridor to the airport would provide better linkages for tourists.*
- *The rail alignment would also increase tourist accessibility within inland Mauritius, and promote greater tourist related activities within the townships along the corridor.*
- *The completion of the project would support tourism related industries via enhanced accessibility, connectivity and hence an overall increase efficiency in tourist related activities.*

Environmental Development

- Transport related emissions are the second biggest component of total carbon dioxide emissions in the country.
- *The project's development would provide a cleaner alternative for moving patrons and would help meet the country's goal of economic growth within a sustainable environment.*

Estimated Cost of the MLRT

The Capital Expenditure (CAPEX), Operational Expenditure (OPEX) and patronage were forecasted for the project's implementation. The risk adjusted cost estimates are presented in **Figure E-1** for CAPEX and **Figure E-2** for OPEX below.

The risk adjusted options are calculated on the base estimate utilising Monte Carlo simulation to determine a P50 and P90 value for the estimated CAPEX and OPEX (henceforth also referred as P50 and P90). The P50 and P90 percentiles reflect the likelihood that the cost estimates are not exceeded, that is there is a 50% or a 90% chance the estimates provided will not be exceeded.

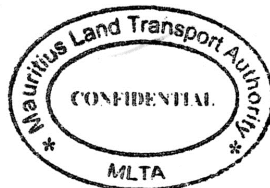
These estimates, along with all other figures reported, are based on partially elevated rapid transit railway built as approved by the GoM.

CAPEX

- The CAPEX is expected to range from Rs 21,292 million (P50) to Rs 22,919 million (P90).

OPEX

- On an annual basis, the OPEX is expected to range:
 - from Rs 788 million (P50) to Rs 818 million (P90) in 2018 - 2027;
 - from Rs 808 million (P50) to 839 million (P90) in 2028 - 2037; and
 - from Rs 829 (P50) to Rs 861 (P90) in 2038.



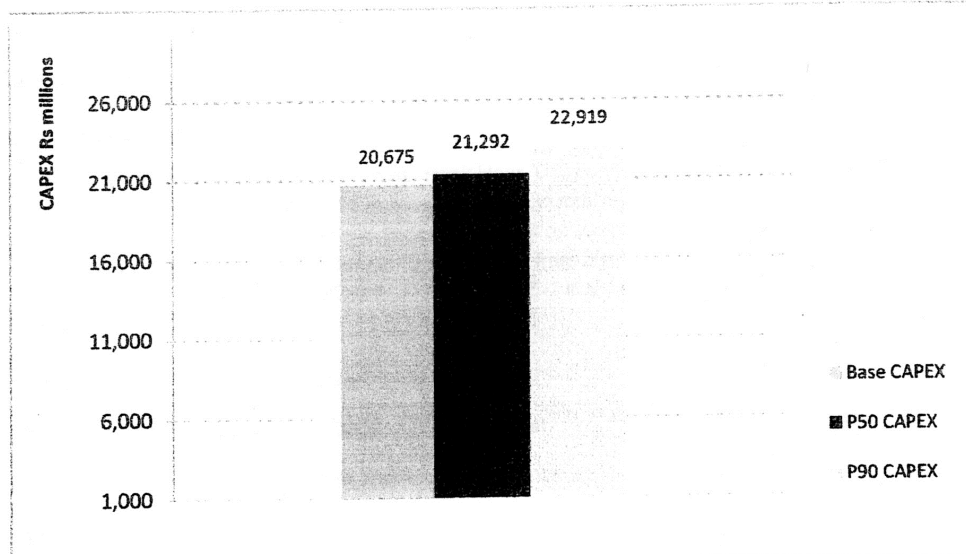


Figure E-1: CAPEX Estimates

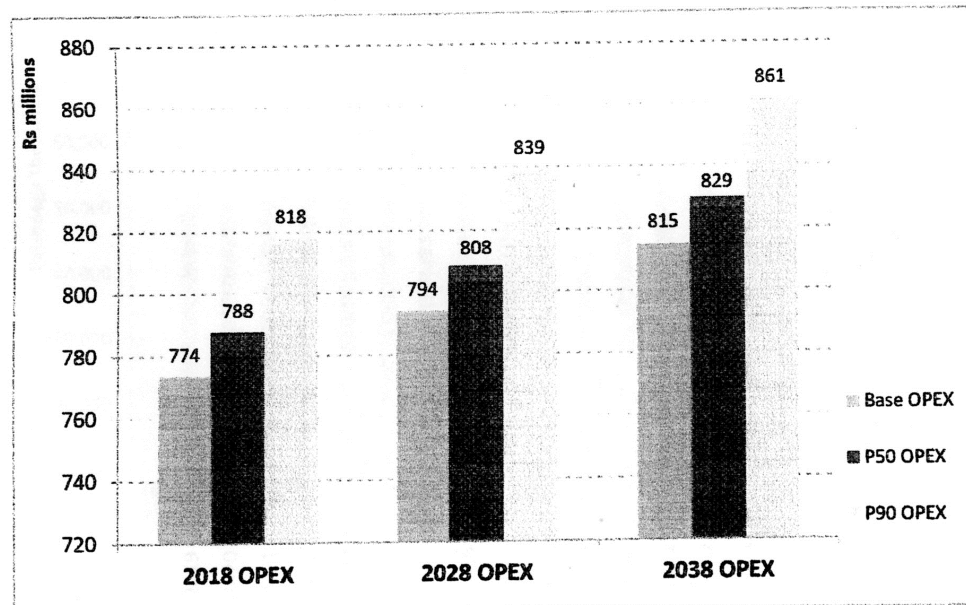
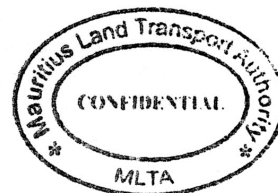


Figure E-2: OPEX Estimates





Patronage and Revenue Forecasts

A VISUM traffic model was used as a basis for forecasting ridership on the MLRT. Patronage forecasts were generated over a 20 year forecast period on the basis of 10 year intervals – that is, 2018, 2028 and 2038.

A summary of the patronage forecasts in AM Peak Hour, Daily and Annual terms are presented in **Table E-1**. As shown, ridership of the MLRT is expected to total approximately 50 million passengers per annum in 2018, and grow upward to approximately 54 million passengers per annum by 2038. This reflects a 4% growth increase over a 10 year period from 2018 to 2028, followed by a 4.6% growth for the next 10 years from 2028 to 2038. **Figure E-1** illustrates the annual patronage growth from 2018 to 2038.

Table E-1: Summary of Patronage Forecasts

Year	AM Peak Hour	Daily	Annual
2018	18,472	163,765	50,239,998
2028	19,219	170,387	52,271,683
2038	20,099	178,189	54,665,100

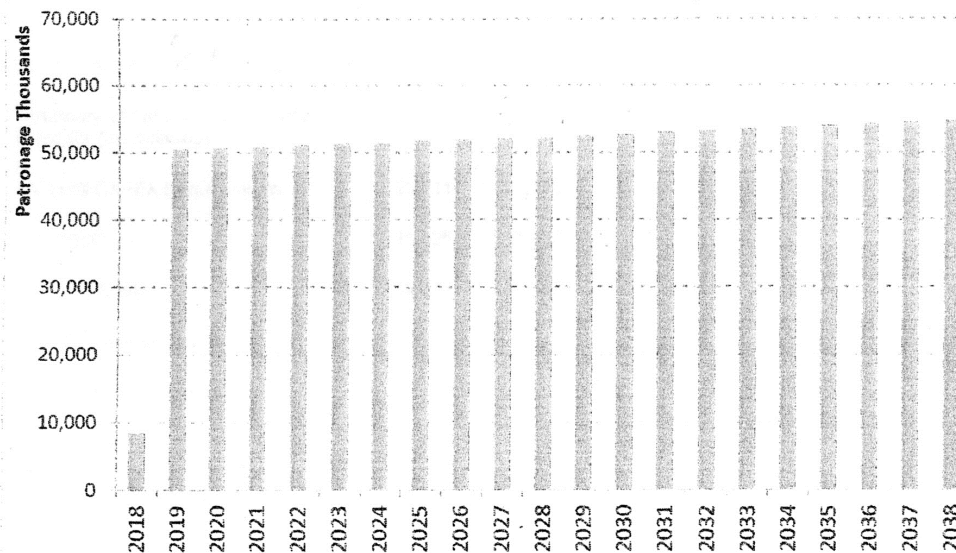
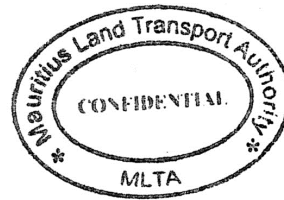


Figure E-3: Annual patronage over term of project

Based on the above ridership forecast, fare box revenue has been estimated for the 19 stations. The MLRT fare structure has been modelled to be similar, on average, to the fare of buses in year 2012. The corresponding revenue estimates of the MLRT are described in **Table E-2**. It is estimated that

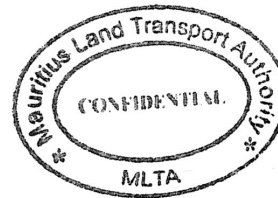


over a 20 year operational period, the present value (PV) of farebox revenue would be approximately Rs 18,266 million.

The lower revenue estimated in year 2018 reflects only a two month operation period as construction is expected to complete only by the end of October 2018.

Table E-2: Summary of daily and annual patronage and fare revenue forecasts

Year	Daily Patronage '000	Annual Patronage '000	Fare Revenue Rs millions (annual)
2018*	164	8,373	204
2028	170	52,272	1,277
2038	178	54,665	1,335
PV Fare Revenue (Rs million)		18,266	



Notes: * Partial year adjustments are factored into the year 2018 to account for a 2 month operation period: Nov-Dec 2018.

Financial Evaluation of the MLRT

In addition to farebox revenue, advertising revenue and the residual values of the MLRT were taken into account within the financial evaluation. Table E-3 summarises the PV of all costs and benefits assessed over a 24 year evaluation period for the project.

Table E-3: Summary of all financial costs and benefits

Summary of Financial Costs and Benefits (Rs millions)	P50	P90
PV Total CAPEX Requirements	20,611	22,186
PV OPEX	11,425	11,862
PV Total Costs	32,036	34,048
PV Fare Revenue	18,266	
PV Advertising Revenue	395	
PV Residuals	4,549	4,896
PV Financial Benefits	23,210	23,557

The results for the evaluation criteria of the project are summarised in Table E-4 and Figure E-4.

The NPV of the project indicates a negative return based purely on the financial criterion.

- The NPV of project ranges from Rs-8,826 million (P50) to Rs-10,491 million (P90).
- The BCR ranges from 0.69 (P90) to 0.72 (P50).

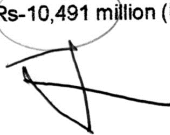




Table E-4: Summary of results for the financial evaluation

Summary of Results	P50	P90
NPV (Rs million)	(8,826)	(10,491)
NPV per \$ capital invested	(0.41)	(0.46)
IRR	(0.93)%	(1.32)%
BCR	0.72	0.69

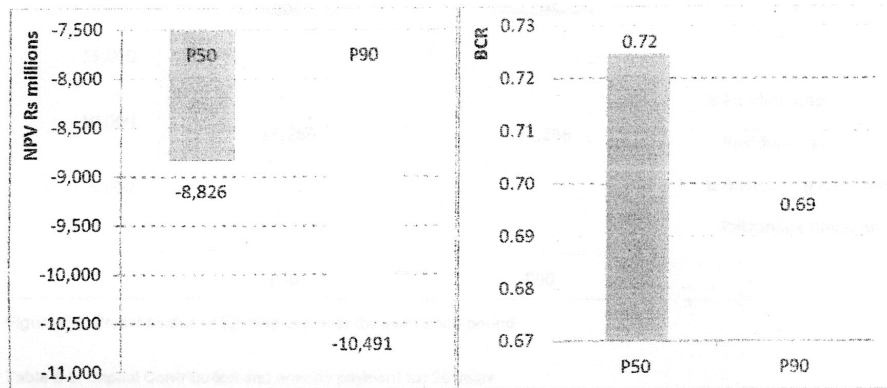
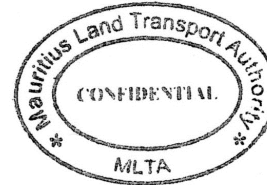


Figure E-4: Evaluation criteria

Funding Gap

Given the expected difference between cost and revenues, the net cost associated with the project's implementation is represented as the funding gap (see Figure E-5). The funding gap is defined as the amount of costs that was estimated to exceed the revenues over the evaluation period to achieve a break-even outcome (i.e. when all revenue and costs over the evaluation period are equivalent).

Based on the anticipated funding gap described above, the equivalent annuities represent the annualised cost over the 24 year evaluation period. The annualised costs are representative of the annual payments that GoM would need to contribute in order to break-even over the 24 year evaluation period.

Table E-5 outlines the annuity payments of the funding gap based on the premise that GoM makes no upfront capital contribution, and a percentage capital contribution ranging from zero up to 20% of the MLRT's total capital cost. The payments are calculated based on a GoM cost of capital of 2.48%. This rate is as per the average yield of the 3 months Mauritian T-bill from 1 January 2013 to 30 June 2013.

For example, a 10% capital contribution implies an upfront payment of between Rs 2,129 million (P50) to Rs 2,292 million (P90). The corresponding annuity payment required from December 2018 to December 2038 would range from Rs 445 (P50) million to Rs 544 million (P90) (see Figure E-6).

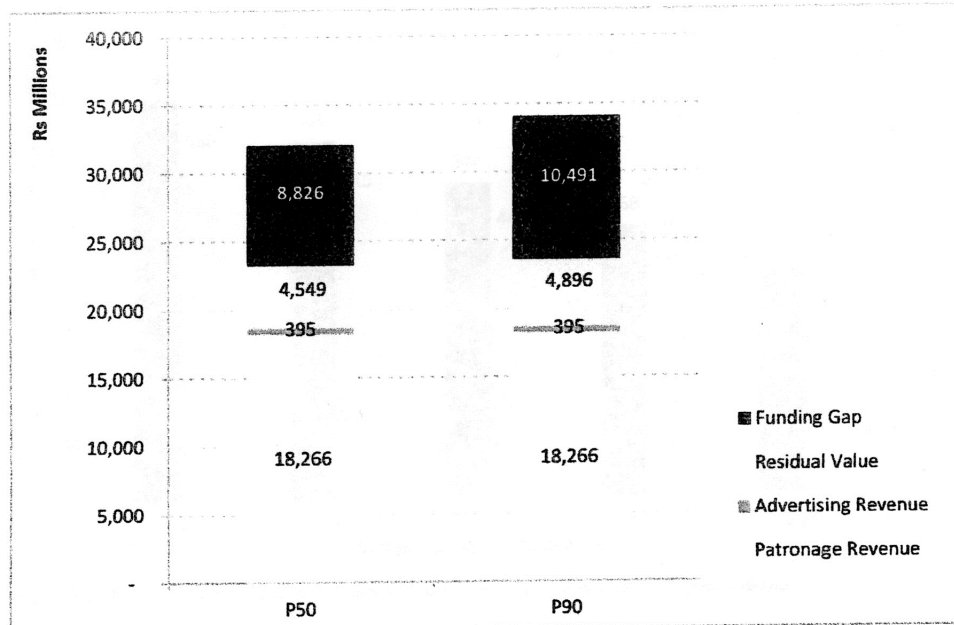
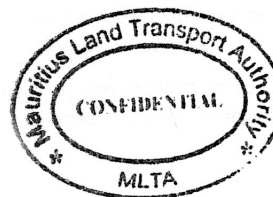


Figure E-5: Present value of funding gap over the evaluation period

Table E-5: Capital Contribution and annuity payment for 20 years

Annuity Payments (Rs Millions)	P50	P90
Construction Cost	21,292	22,919
Required Annuities (zero capital contribution)	586	696
5% Capital contribution	1,065	1,146
Required Annuities	515	620
10% Capital contribution	2,129	2,292
Required Annuities	445	544
15% Capital contribution	3,194	3,438
Required Annuities	374	468
20% Capital contribution	4,258	4,584
Required Annuities	303	392



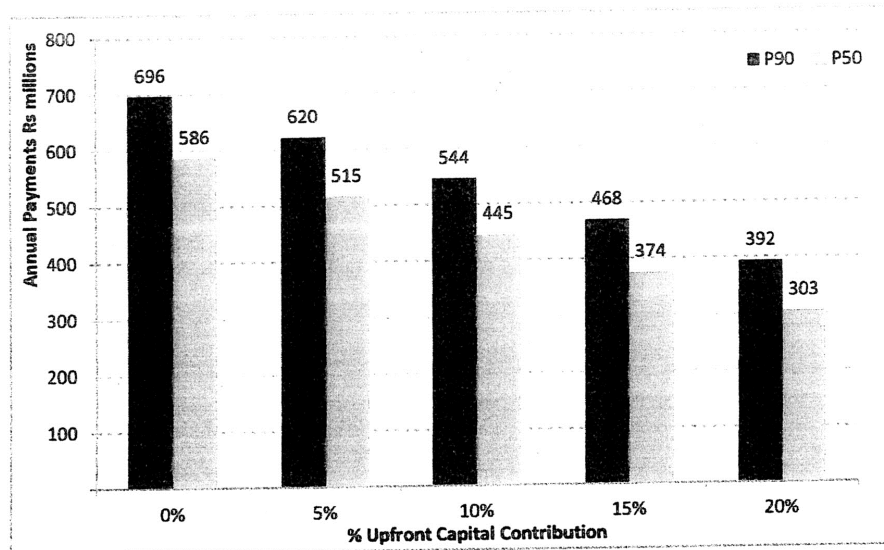
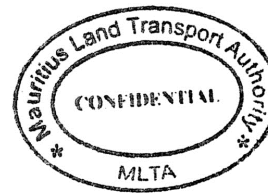


Figure E-6: Relationship of capital contribution and annual payments required for 20 year operation

Alternative funding sources

To potentially supplement the annuity payment required for the project, various 'alternative' revenue sources for transit funding have been identified and discussed by looking at the feasibility of the sources through international applications. Examples of these include the following:

- Redirection of existing subsidies
- Station rents
- Parking charges
- Joint development
- Wi-Fi sales
- Infrastructure bonds
- Congestion charges



The effect of quantifying the above revenue sources are however difficult, especially prior to the capital development that is required to generate any revenue. Estimates for the revenue these sources may produce are also difficult to source.

Furthermore implementing the above revenue sources may also introduce risks that the revenue rights are not passed towards the concessionaire. Despite these considerations, it still remains clear that sufficient opportunities exist that can be implemented to generate the income that will be required to subsidise the cost of the MLRT and will contribute to the sustainability of the service.

Through an assessment of priority, advertising has been identified as the most "practical" revenue source (as quantified in the financial evaluation), primarily due to its ease of implementation, and the stability of the revenue stream.



ECONOMIC EVALUATION OF THE MLRT

An economic evaluation of the MLRT was also undertaken by extending the financial evaluation to take into account road user benefits along the project corridor. These road-user benefits monetised include vehicle operating cost savings, travel time savings, accident savings and vehicle emission savings arising from the introduction of the MLRT.

The monetised benefits are added to the financial costs and revenues to determine the total cost and benefits of the project. A summary of the benefits in costs savings is summarised in Table E-6 below. Cost savings are assumed to be similar under the P50 and P90 scenarios. The VOC savings accounted for the highest amount of cost savings with the reduction driven by the decrease in road vehicles along the project corridor.

Table E-6: Summary of cost savings

Summary of Savings Result	(Rs millions)
PV VOC Savings <i>velu qal oru</i>	9,546
PV Travel Time Savings	4,844
PV Accidents Savings	508
PV Emissions Savings	1,006
PV Total Cost Savings	15,904

Over time, it could be expected that the introduction of the MLRT would contribute to a reduction in road infrastructure investments due to the mode shift in passenger travel. This impact however is not quantified in the economic analysis.

The overall economic evaluation is presented in Table E-7. It demonstrates that the MLRT returns a net positive economic return to society with an additional Rs 15,904 million in road-user benefits. The additional benefits results in a positive NPV outcome for the project, as well as a benefit cost ratio (BCR) of greater than 1 (one).

Table E-7: Summary of results for the economic evaluation

Results Summary	P50	P90
Financial NPV (Rs millions)	(8,826)	(10,491)
Saving Benefits (Rs millions)	15,904	
Economic NPV (Rs millions)	+7,077	+5,413
Economic Rate of Return	4.81%	4.17%
Financial BCR	0.72	0.69
Economic BCR	1.22	1.16

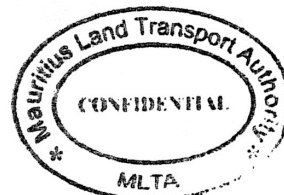




Figure E-7 compares the total economic NPV against the financial NPV. The project has positive economic NPV with the consideration of the benefits derived from cost savings. Similarly Figure E-8 shows that the BCR has also improved under the economic evaluation.

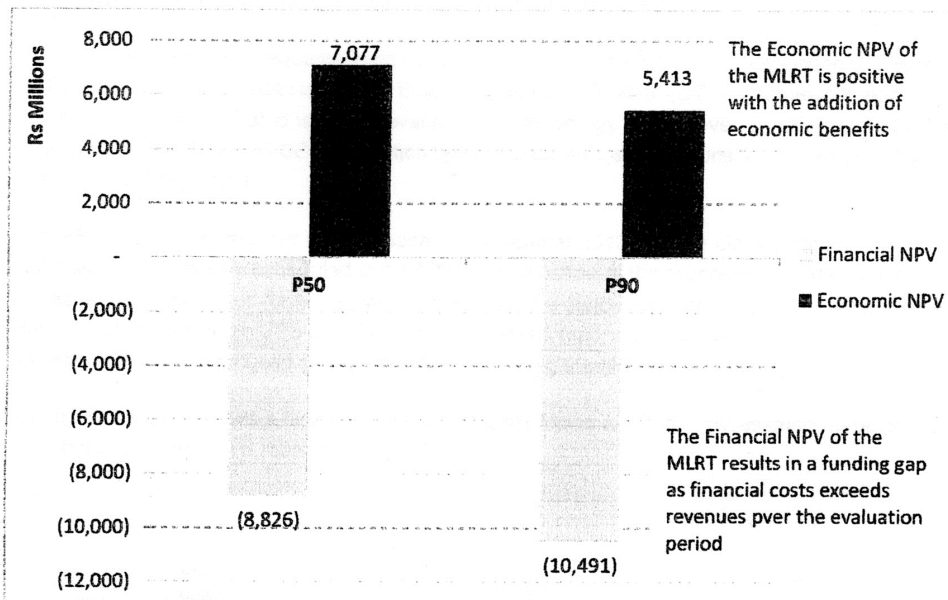


Figure E-7: Comparison of Financial NPV and Economic NPV

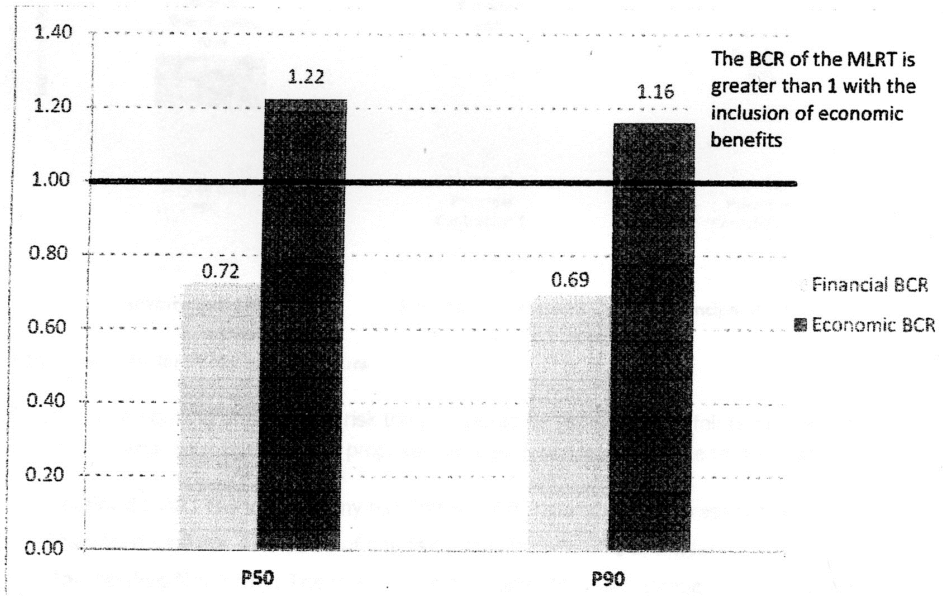
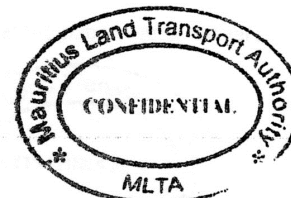


Figure E-8: Comparison of Financial BCR and Economic BCR





NPV of Retained Risk

Concurrent to the preparation of this feasibility study, the procurement process had commenced in tandem as requested by the GoM. Market sounding was carried out in December 2012, followed by the release of the Request for Expression of Interest (EOI) in February 2013.

EOI responses were subsequently received in April 2013, with a total of 11 respondents. The request for EOI was structured under a Design, Build, Finance and Operate (DBFO) framework, and respondents were evaluated under an evaluation methodology as approved by GoM. Out of the 11 submissions, the GoM and SCE evaluation team shortlisted 6 submissions for the Request for Proposal (RFP) invitation.

The RFP invitation is targeted to be released in November 2013 with the closing date for the submission of proposals scheduled in April 2014. Evaluation of the proposals would proceed thereafter, where a Value for Money assessment is to be conducted through a shadow bid model, or Public Sector Comparator (PSC). The financial analysis reported within this feasibility report (i.e. raw PSC) would be used as the basis for developing the shadow bid model.

The figure below provides a high level overview for the Value for Money assessment to be conducted once bid submissions are received in April 2014.

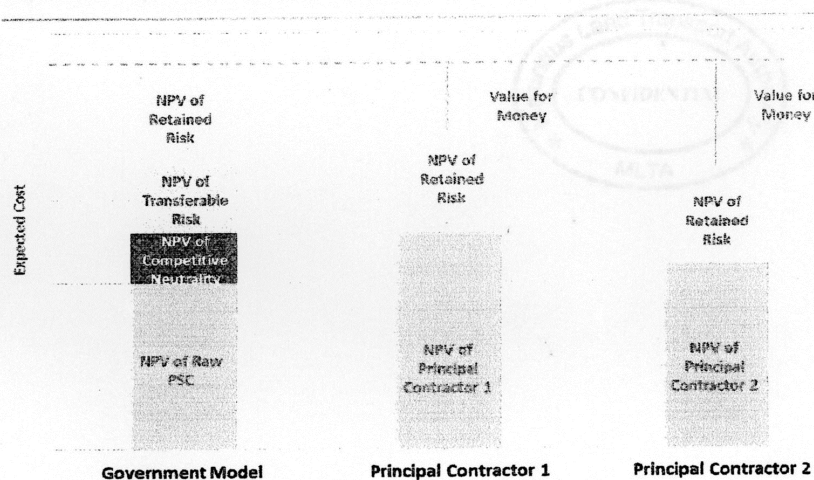
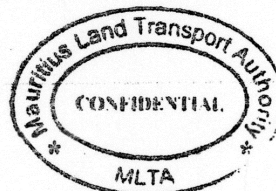


Figure E-9: Value for Money basic structure

As shown, the pricing of additional risk transfer would be required for a fair comparison between the PSC model and respondents' RFP proposal. A brief description of these terms is as follow:

- **Retained Risk:** The value of any risk that is not transferable to the respondent.
- **Transferable Risk:** The value of any risk that is transferable to bidder.
- **Competitive Neutrality:** The value of the net competitive advantage a government business has due to its public ownership.
- **Raw PSC:** Total of all capital and operating costs and revenues under the public sector delivery of the project.



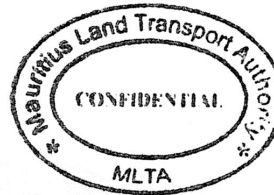


Conclusion

Based on the financial cost and revenue streams estimated, the implementation of the MLRT by the GoM would result in a funding gap of Rs8,826 million. The funding gap would result in the need for a government contribution. The recurrent contribution over a 20 year operation period is expected to be Rs586 million per annum assuming a zero upfront capital contribution, and a GoM cost of capital of 2.48%. These funding amounts are based on a base capital cost estimate of Rs21,292 million, and are exclusive of land acquisition costs.

The contribution required by GoM are predicated on the basis that the forecast patronage (and hence revenue estimates) are realised, with the fares of the MLRT being modelled to be equivalent to current (2013) bus fares. The pricing of MLRT fares to be equivalent to existing bus fares would maximise ridership whilst mitigating road congestion along the project corridor.

Overall, while the implementation of the project would require a contribution, it is common practice for forms of public transport, even where services are provided by private entities, to require a contribution from Government. Taking into account the economic benefits that could be expected by having an MLRT on the road network (i.e. vehicle operating cost savings, travel time savings, accident savings, and emission savings), the project would result in a net positive outcome of Rs7,077 million (a BCR of 1.22).





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