

Terms of Reference (TOR)

Evaluating the Value of Rea Vaya BRT Phases 1A and 1B

1. Background

These Terms of Reference for preparation of a comprehensive Economic Evaluation that identifies and quantifies the cost and benefit impacts resulting from implementation of Phases 1A and 1B of the Rea Vaya Bus Rapid Transit (BRT) system in Johannesburg. This project is executed by the City of Johannesburg (CoJ), with funding from the Global Environment Facility (GEF) and implementation assistance through the South African Country Office of the United Nations Development Programme (UNDP).

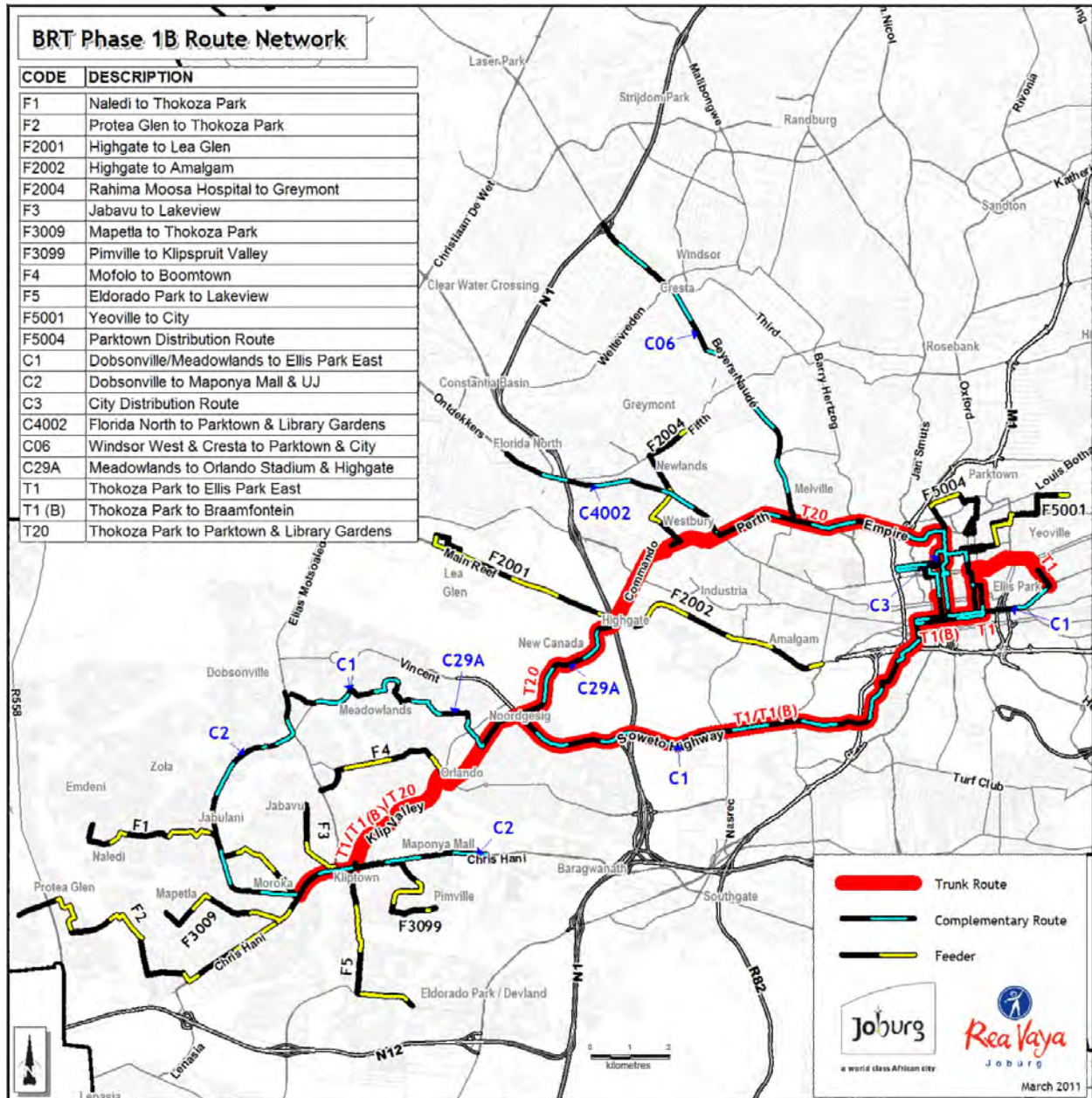
Johannesburg adopted BRT in principle as its long-term mass transit solution in November 2006. An extensive trunk network is envisaged in the long-term, as shown in the figure below.



The network will be rolled out in phases. The Operational Plan approved by Council in August 2007 and November 2008 (revisions) outlined three stages of Phase 1 implementation as follows:

- Phase 1A by 2009: 25.5 kilometres, 27 stations, 143 buses (incl. reserve), 70 000 passengers a day
- Phase 1B by 2012: 43.5 kilometres, 43 stations, 277 buses (incl. reserve), 137 000 passengers a day
- Full phase 1 (implementation will be staggered in sub-phases): 122 kilometres, 150 stations, 712 buses, 434 000 passengers a day.

The building of the busways and stations for Phase 1A began when the first construction contract was signed in September 2007. A starter service began operating on 30 August 2009 and other Phase 1A services were introduced in March and May 2010. The final approved network for Phase 1B is shown in the figure below.



Rea Vaya is a full BRT system, characterised by the following operational features:

- Rea Vaya has articulated buses that run in exclusive trunk buslanes in the middle of the road, and passengers board at stations
- The station platform and the bus floor are at the same height so boarding is “level”.
- Rea Vaya also uses “complementary” buses which have doors on both sides. This allows them to run on ordinary roads and pick up passengers on the kerbside. But they can also

enter the trunk busways and passengers can board at the stations on the right-hand side.

- The buses have multiple doors which speeds up boarding and alighting.
- All fares are paid before boarding the bus.
- The system has been designed to ensure high capacity in the future, with passing lanes for express buses, and multiple stopping bays at stations.

The roles of the City and the private sector are as follows:

- The City is providing the infrastructure, including depots.
- The City is paying for all fare collection equipment and all the intelligent transport systems.
- The City has contracted operations to the private sector, namely the fare collection system, ticket inspectorate, cleaning and security at stations, and the operations of the bus services. The bus contracts are being negotiated with affected bus and taxi operators, not tendered.
- In return for the bus operating contract, the affected operators (running 585 taxis) are expected to withdraw their competing services.
- The City will collect all fares and pay the bus company on a fee per kilometre basis, in terms of a 12-year contract.
- The City expects to be able to cover bus operator contract costs from fare revenue, while fare collection and station management contracts will be paid from city revenues.

Phase 1A uses 143 buses which have been ordered and delivered, made by Scania and Marcopolo. The fleet is made up of 102 complementary buses and 41 articulated buses. The emission standard is Euro 4 with particulate matter filters. The City ordered the buses on behalf of the future operator, and secured loan financing through BNDES (Brazilian ECA). The contracted operator will take over loan.

The whole system is characterised by intelligent controls. A 24-hour control centre run by the City manages bus operations using automatic vehicle location system on buses, provides real-time passenger information at stations, uses a CCTV system to monitor stations, and runs an advanced traffic management system for the bus operations. An automatic fare collection system is being implemented featuring smartcard ticketing linked to access control systems on the stations and buses. This will replace the temporary paper ticket system.

The handover of the temporary bus company operating the Phase 1A service to the Board of Directors elected by the taxi industry shareholders and their management team, took place on 1 February 2011. The construction by the Johannesburg Development Agency of the trunk network and station infrastructure for Phase 1B is currently in progress.

Bidders shall note that a service provider has been appointed by the City of Johannesburg for “Rea Vaya Financial Modelling”. Under the Financial Modelling appointment the service provider will develop a detailed financial model and analytical tools and apply them in order to provide decision-making support to the Rea Vaya BRT. The Financial Modelling appointment requires:

1. Phase 1B financial modelling
2. Decision-making and prioritising regarding further sub-phases and phases. This includes unit cost work and economies of scale analysis. It will also involve work to determine the economic costs and benefits of different Rea Vaya alternatives as well as comparing particular Rea Vaya phases with other modes including Metrobus, Metrorail, Gautrain and recapitalized mini bus taxis.

3. Short, medium and long-term projections of the revenues and costs of Rea Vaya.

The financial model and tools to be developed will quantify the costs and revenues of both the overall system of Rea Vaya as well as the individual system components. In particular these components include the bus operating company contract, infrastructure construction, infrastructure maintenance, station maintenance and management, the fare system, the intelligent transport systems, the control centre, inspectorate and law enforcement, security components, Rea Vaya staffing, marketing, and the costs of transition and negotiation.

The output of the “Financial Modelling” project will be made available to the successful bidder for use in the Economic Evaluation.

1. Objective of the services

The objective of the services covered by this Request for Proposals is to supplement earlier environmental and financial evaluations of the Rea Vaya BRT by preparing a comprehensive economic evaluation that includes a broad range costs and benefits to society, rather than the very narrow scope of the earlier evaluations. The City of Johannesburg (CoJ) intend to use the results of the economic evaluation to aid decision making and planning for future public transport investment. For the output of this study to meet this purpose the evaluation ideally requires identification and measurement of all types of impacts, on all people, over time and across geographical area of influence of the system. In practical terms the services requires identification and quantification of all *significant* impacts.

In specific terms the Economic Evaluation will:

- Quantify the economic costs and benefits of Phases 1A and 1B of the Rea Vaya BRT
- Discount future costs and benefits
- Specify how the costs and benefits are distributed, with clear identification of transfer payments such as taxation and subsidies
- Identify and evaluate impacts that can not be quantified in monetary terms
- Provide recommendations on how to optimise the benefits of the BRT investment

2. Scope of work and expected output:

The scope of work covers the following:

- The scope of the public transport system to be analysed is Phases 1A and 1B of the Rea Vaya BRT
- Geographical scope is the area of influence of Phases 1A and 1B which is to be determined by the Contractor
- The time period to be covered by the analysis is 12 years
- The base case, against which the benefits and costs shall be measured, is defined as the conditions prevailing before implementation of the BRT, with the changes over time (traffic growth, mode choice, vehicle characteristics etc) that would have been expected to take place if the BRT system was not implemented.

Specific outputs that the Contractor shall produce as part of these services are:

1. Quantification of User Benefits and Costs
2. Quantification of Secondary Benefits and Costs
3. Quantification of Direct Costs (Construction Operation and Maintenance)
4. Quantification of Other Benefits and Costs
5. Calculation of the distribution of costs and benefits
6. Economic Evaluation and Sensitivity Analysis
7. Final report

3.1 Quantification of user benefits and costs

The Contractor shall identify and quantify all significant benefits and costs associated directly with activity of travel itself and its effect on users. The impact on users of an improvement to a transport system will generally form the largest component of benefits accruing from the system. Implementation of the Rea Vaya BRT has significantly altered the characteristics of Johannesburg's transportation network, and in response, commuters may change their choices of the time, mode, path, and frequency of travel. The interconnected nature of the Johannesburg urban transportation network means that the Rea Vaya BRT, whilst clearly affecting the cost of travel of users of the BRT, also affects the monetary and travel time costs of users of alternative modes, such as the cars, mini-bus taxi, train or other bus services. As a result the Contractor shall ensure that the assessment of user costs includes both users of the Rea Vaya BRT and user costs of other modes in the area of influence of the BRT.

The assessment of user benefits and costs shall, as a minimum include:

2.1.1 Impact on BRT users

Travel time: which in turn is comprised of various elements such as walking to the BRT stop, waiting, riding the bus, or transferring between routes. The Contractor shall propose an approach to quantify the value of time. The approach shall make explicit allowance for variation in the value of time between the type of activity (walking, waiting, riding etc). Following valuation of time savings the contractor shall assess the amount of time saved as a result of implementation of the BRT, for users of the BRT and the effect (which may be positive or negative) on the travel time of users of other modes.

Fares: Fares paid by users shall be quantified, taking consideration of the distance based fare structure and any changes likely to occur upon implementation of the Automated fare Collection System. Other fare related costs such as use of feeder and distribution services shall be included.

Accidents and Crime: The Contractor shall propose a methodology to assess whether user perception of the safety of the BRT system influence perceived cost of travel, and to subsequently quantify the accident and crime rates per mode and establish a monetary value for any changes in these factors.

2.1.2 Impact on users of other modes

Implementation of the Rea Vaya BRT will result in mode shift for some existing car, taxi, train and bus users to the BRT. As a consequence, there will be changes in the performance of the network, with some road sections expected to show reduced travel time, whilst others may suffer reduced speeds due to reduced capacity. These performance changes affect the users of all other road-based modes.

For users of other public transport modes travel time shall be assessed using a similar approach to that described in paragraph 3.1.1 shall be used. For car users travel time will comprise in-vehicle time, parking search time and walking time, whilst time value for freight transport shall include time-related inventory costs.

The calculation of travel time per mode shall include the effect mode shift and any changes in travel speed on the network resulting from capacity changes or changes in traffic volumes attributable to the BRT.

As described under paragraph 3.1.1 the Contractor shall propose an approach to assess accident and crime related costs for users of other modes.

The Contractor shall assess any changes in user costs of cyclists and pedestrians attributable to the BRT.

2.1.3 Vehicle operating and ownership costs

The mode shift effects expected from the Rea Vaya BRT will significantly impact vehicle operating costs of other modes of transport due to the combined effects of changing numbers and vehicle-km travelled by each mode, as well as changed travel times on the road network. The Contractor shall quantify the fixed and variable costs of road based modes including cars, main-bus taxi, conventional bus, freight vehicles and the Rea Vaya fleet. Based on quantified amount of travel per mode the Contractor shall quantify vehicle operating and ownership costs for both the base case and after implementation of the Rea Vaya system.

3.1.4 Define vehicle activity

From the analysis required under the preceding steps the Contractor will have derived unit costs applicable to various cost elements for each type of vehicle active on the road network. The Contractor shall subsequently quantify the amount of travel by each mode under the Base-case scenario and also with the revised travel patterns after implementation of the BRT.

The Contractor shall utilise existing secondary data sources for this purpose which shall include the various references listed in paragraph 7 of these Terms of Reference.

Where necessary the Contractor shall apply relevant expansion factors in order to scale up partial data to Annual figures.

3.2 Quantification of secondary benefits and costs

The purpose of quantification of secondary benefits and costs is to internalise within the economic evaluation those secondary issues that are often ignored in a conventional “consumer surplus” benefit-cost analysis. These factors are generally not perceived by travellers in the same way as the user costs described in section 3.1.

The Contractor shall propose and implement a methodology to quantify the cost secondary benefits and costs that, as a minimum shall include:

- Air Quality
- Green House Gas emissions. The Consultant shall note that the CoJ has recently finalised a document “VCS Project Document: BRT REA VAYA PHASE 1A AND 1B, SOUTH AFRICA” in which emission reduction has been estimated in tonnes CO_{2eq} per year for the period to 2021. This document will be made available to the Contractor.
- Noise
- Accident costs not included under the user cost section

3.3 Quantification of direct costs

Direct Costs, namely those resources that are used to implement and operate the BRT System, shall be quantified. The Contractor shall utilise the cost elements developed during the “Financial Modelling” assignment, namely cost of bus operating contracts, capital expenditure on infrastructure and technology, maintenance costs, station operating costs, fare collection capital and operational cost, APTMS operational costs, law enforcement costs, institutional arrangements costs, etc

3.4 Quantification of other benefits and costs

3.4.1 Land use impacts

Land use impacts of the Rea Vaya are expected to comprise:

- Changes in Land development: The Contractor shall estimate how the Rea Vaya BRT is likely to influence the location and type of land development within the area of influence of the BRT. The approach used must exclude changes resulting from factors other than implementation of the BRT.
- Changes in Property Value: The Contractor shall develop and apply a methodology to quantify the changes in land-values that may result from reduced travel times and improved accessibility to economic and social activities associated with implementation of the BRT. The methodology must ensure that benefit from reduced travel time which have been quantified in earlier steps in the analysis are not double-counted
- Changes in the cost of development. The Rea Vaya BRT may promote increased density of development in the BRT corridors, and reduced “urban sprawl”. Following from the analysis

of changes in land development the Contractor shall quantify both capital and on-going costs to both Private and Public Sector that are likely to be influenced by a denser urban form resulting from the BRT.

3.4.2 Economic Development

Implementation of the Rea Vaya BRT may yield benefits related to the broader economic development of the City of Johannesburg. When assessing these benefits the Contractor shall clearly distinguish benefits that result in an overall increase in economic welfare for the City, from benefits simply redistribute economic impacts from one area to another. The Contractor shall assess and quantify the following economic development factors

- Increases in regional productivity and benefits of urbanization and agglomeration;
- Enhanced employment accessibility;
- Employment, output, and income effects due to construction and operations of transit projects.

3.5 Distribution of impacts

The benefits and costs that will have been quantified by the Contractor during the preceding tasks will not be distributed evenly across population. The Contractor shall calculate the distribution of benefits and costs according to the following categories:

- Disadvantaged users: Rea Vaya BRT has been designed to provide improved mobility, with associated access to economic and social opportunities, for people with physical disabilities. Provision of such mobility will allow improved access to medical services, shopping, education and employment opportunities not only for physically disadvantaged people but also economically or socially disadvantaged groups. The Rea Vaya BRT therefore helps the CoJ to achieve community equity objectives for upliftment of such groups as well as reducing the degree that captive public transport users are disadvantaged in relation to car owners.
- Mode: BRT riders compared with users of other modes.
- Income, race and gender: The analysis should clearly identify impacts related to income group with explicit assessment of costs and benefits to low-income people, race group and gender.
- Location: The costs and benefits shall be split according to the area of residence. This may be done at a rather broad level, for example by aggregating users from Soweto, rather than by Suburb within Soweto.

The calculation of distribution of impacts shall be supported by a user attitude and characteristics survey. This survey shall be conducted either on-board the BRT Buses or at stations with passengers waiting for the bus. As a minimum the surveys shall sample 2,000 users. The survey shall include but not necessarily be limited to:

- Time, date and location of the survey
- Surveyor name
- Details of the respondent: Age group, gender, race group, income group (NB: The Contractor shall propose a definition of “low-income” and subsequently quantify usage of the BRT by “low-income” users), physical disability (mobility or visually impaired)
- Mode of access to the BRT: Walk, Bicycle, Feeder Bus, Other Bus, Taxi, Car
- Mode to get from BRT to final destination: as above

- Fare paid to get from start of trip to final destination using BRT
- Fare paid to get from start of trip to final destination if they did not use the BRT
- Level of satisfaction with the BRT system: The survey shall include a series of questions to elicit the degree of satisfaction of users with the BRT system

The Contractor shall prepare a draft questionnaire for review and approval by the CoJ prior to undertaking the surveys. A pilot survey shall be performed on a small sample of users to test the effectiveness of the questionnaire and interviewing technique, prior to performing the full survey.

The findings of the survey shall be analysed and presented in an interim report on the User Survey.

3.6 Economic Evaluation and sensitivity analysis

The Contractor shall estimate the various cost and benefit impacts that have been described above for an analysis period of 12 years. Projections of future values shall be based upon clearly specified growth parameters. The Contractor shall ensure that true economic (or shadow) prices are used in the analysis by excluding transfer payments such as tax and subsidy.

All annual cost and benefits streams shall be discounted at an appropriate social discount rate to derive Net Present Value of the investment in the Rea Vaya BRT.

A sensitivity analysis shall be performed which, as a minimum shall include:

- Most likely, optimistic and pessimistic scenarios for ridership
- Capital and Fleet costs: Plus or minus 20%
- Operating and maintenance costs: Plus or minus 20%
- Secondary and other costs and benefits: Plus or minus 20%

3.7 Final report

The Contractor shall document all the work performed under the scope of these services in a Final Report. The Final Report shall be supplemented by an executive summary of no more than ten pages which presents the key findings of the analysis. The report shall include recommendations on how to optimise the benefits of the BRT investment and highlight issues for consideration when the CoJ implements further expansion of the system.

3. Project deliverables and reporting schedule

Commencement of services:	within one week from signature of contract
Inception Report:	within two weeks of commencement of services the Contractor shall prepare an Inception Report that specifies any changes to the workplan and methodology, and reports on initial work undertaken by the Contractor
Interim Report on User Survey:	within 8 weeks of commencement of services
Draft Final report:	within 12 weeks of commencement of services
Final Report:	within two weeks of receipt of comments from COJ and UNDP

4. Required skills and experience

Bidders shall have demonstrated experience in economic evaluation of infrastructure in South Africa. This experience shall include economic evaluation of road and transport projects. Whilst experience with Input-Output modelling and Econometric metric models is an advantage, prospective Bidders shall note that the time period allowed for this project is likely to preclude application of such techniques for this study. Experience with planning and design of Bus Rapid Transit systems is a prerequisite

Based on their experience, bidders shall provide their own estimate of the effort required for the above listed tasks in the proposal. The proposal shall include company background and experience, including relevant reference sites, and CV's for at least the following key roles:

- Task Manager / Transport Planner or Economist – should have a Post Graduate Degree in Economics or Transportation Planning. The Task Manager shall have at least 10 years experience in economic evaluation of transportation infrastructure, which shall include at least two projects in which the candidate was responsible for economic evaluation of road based urban public transport systems. In-depth knowledge of South African urban transport and urban development issues is a prerequisite.
- Transport Economist / Planner – shall have a minimum of a bachelors degree in Economics, Engineering or Town & Regional Planning, with a minimum of 5 years experience with planning and design urban public transport systems
- Economist – shall have a minimum of a bachelors degree in Economics or Town & Regional Planning, with a minimum of 5 years experience of economic evaluation of the impact of infrastructure investment.
- Survey Organiser – with a minimum of two years experience planning and executing transportation surveys.

Bidders attention is drawn to the evaluation criteria specified in Annex I of this RFP. Bidders are strongly advised to ensure that sufficient information is provided in their proposal to enable the client to evaluate compliance with these specified criteria.

The Proposal should indicate how the project is to be managed and coordinated.

Bidders shall note that it remains the responsibility of each Bidder to make their own estimate of the staffing requirements, manpower inputs required from each staff, and other resources required to fully comply with these Terms of Reference. The methodology section of each Bidders Operational and Technical Proposal shall specify the approach the Bidder will apply in order to comply with the both the Terms of Reference and the three month time period allowed for the study.

5. Payment schedule

For the purposes of payment schedule the basic contract value shall be defined as the contract value exclusive of the optional electronic bulletins during COP17

On submission of Inception Report:	20% of basic contract value
On submission of Interim Report:	20% of basic contract value

On Submission of Draft Final Report:	40% of basic contract value
On approval of Final Report :	20% of basic contract value

6. Facilities provided by the client

The client shall provide no facilities. Bidders shall make provision to provide all facilities, staff, professional support and physical infrastructure and logistical support required for timely completion of the project.

The CoJ will make available copies of all relevant documentation in the possession of the CoJ, which shall include:

- VCS Project Design Document for Rea Vaya Phase 1A and 1B, May 2011
- Operational Plan for Phase 1B
- Business Plan for Phase 1B
- Budget Proposal for PTIS Grant 2012-2015, October 2011
- Report on Prior Mode Survey, October 2010
- Report on Customer Survey of June 2011
- Report on Rea Vaya Indicators, June 2011
- Relevant financial information and financial modelling information

7. Organisational arrangements

This contract will be awarded by the United Nations Development Programme. Ms Nokufa Matitoane of UNDP shall handle all queries and correspondence related to procurement, whilst issues related to administration of the contract will be handled by Mr David Ingham: Project Coordinator of the NDoT / UNDP-GEF 2010 Sustainable Transport project.

The Contractor shall note that all technical liaison, supervision and management of activities of the Contractor will be performed by the Transportation Directorate of the City of Johannesburg. The designated contact point is: Ms Colleen McCaul

The Contractor shall submit all deliverables to the designated CoJ official who will review, comment, request amendment or approve as appropriate. All invoices shall be submitted to the CoJ who shall check the invoices for correctness, certify the invoice as due for payment (if no amendments are required) and forward to UNDP with a request that payment be made to the Contractor.