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EDINBURGH TRAM NETWORK

Preliminary Financial Case: Line Two

4 December 2003

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Contents

Glossary

CAA	Capital Allowance Act
Capex	Capital Expenditure
CETM	Central Edinburgh Traffic Management
CSTM	Central Scotland Transport Model
DBM	Design Build and Maintain
DBOM	Design Build Operate and Maintain
DPOF	Development Partnering and Operating Franchise
EIB	European Investment Bank
FM/SY	Faber Maunsell/Semaly
IBA	Industrial Building Allowances
IRR	Internal Rate of Return
ITI	Integrated Transport Initiative
KPI	Key Performance Indicators
LEI	Local Economic Impact
LIBOR	London Interbank Offered Rate
LUTI	Land-use/ Transport interaction
MAWG	Modelling Appraisal and Working Group
MLA	Minimum Liquid Asset
NPV	Net Present Value
OHLE	Overhead Line Electrification
OJEC	Official Journal of the European Community
Opex	Operating Expenditure
PFI	Private Finance Initiative

P&M	Plant & Machinery
PPP	Public Private Partnerships
PUK	Partnerships UK
RPI	Retail Price Index
SE	Scottish Executive
SEEL	Scottish Enterprise Edinburgh and the Lothian
SEERAD	Scottish Executive Environment and Rural Affairs Department
SEPA	Scottish Environmental Protection Agency
SNH	Scottish Natural Heritage
SPC	Special Purpose Company
STAG	Scottish Transport Appraisal Guidance
the Council	City of Edinburgh Council
tie	transport initiatives edinburgh limited
TRAM	Traffic Restraint Analysis Model
TUBA	Transport User Benefit Appraisal
VAI	Vision Achievement Incentive
VAT	Value Added Tax
VTM	Variable Trip Matrix
WEL	Waterfront Edinburgh Limited

1 Executive Summary

1.1 Introduction

The purpose of this Preliminary Financial Case is to identify the options to procure and finance Line Two of the proposed Edinburgh Tram Network. **tie** is progressing the technical and financial analysis of Lines One, Two and Three of the Network. Faber Maunsell has been commissioned by **tie** to undertake a Network Effects Study which will seek to identify the optimum configuration of a network and the benefits which could arise from that. It should be noted that this is not an application for funding support from the Scottish Executive (SE) at this stage. No contractual commitment to the construction of the tram line has yet been made. Further development work is required to finalise the technical solution for the line and consequently the revenue and cost assumptions which are factored into the financial model contained within this Preliminary Financial Case. A formal application for Scottish Executive funding support will be submitted prior to the commencement of the tendering process for the contract to install the infrastructure for the Line in the form of an Outline Business which provides full details on the proposed infrastructure procurement strategy. This will contain an analysis of risk and the value for money implications of the various options. The present estimate of the timescale for this is 2005. In the interim **tie** will be working with the selected Development Partnering and Operating Franchise (DPOF) partner to develop further the revenues and costs for the Line.

It should also be noted that this document is a financial analysis of the project. The Scottish Transport Appraisal Guidance (STAG) 2 analysis is contained within a separate document prepared by Faber Maunsell. This Preliminary Financial Case has been informed by the work undertaken by Faber Maunsell in preparing the STAG 2 document. The STAG analysis concludes that the project meets all five key appraisal criteria.

Consideration has been given in this document to the most appropriate procurement route for the Edinburgh Tram network, of which Line Two forms a major element. This has been performed in the light of experience gathered from projects elsewhere in the UK which have been procured, or are in the course of procurement. Market willingness to take the key risks has been assessed within the operating and funding communities at this stage, and will continue to influence the process as the project is developed.

This Preliminary Financial Case contains the analysis of a number of financial models to illustrate a variety of financial structures which could be utilised to fund the delivery of Line Two. These structures will be subject to further refinement over the next year.

Description of the Line Two Project

The proposed Edinburgh Tram Network is a primary component of the Council's Local Transport Strategy, contributing to the easing of congestion, improved transport links to support economic development and social policy objectives.

Line Two will go from St Andrew Square, adjacent to the new bus station development, to the Airport and on to Newbridge serving key locations en route. It will connect Princes Street, Shandwick Place and Haymarket in the city centre to Murrayfield, South Gyle, Edinburgh Park, the Gyle Centre and the Royal Bank of Scotland's new headquarters at Gogarburn. It will provide interchange opportunities with mainline railway services at Haymarket and Edinburgh Park stations, and with bus services through the city centre and at the Gyle. It will also serve the proposed Park and Ride development at Ingliston.

In total the line covers 18km and has stops situated at 18 locations.

The demand for the tram has been derived through a detailed modelling process. This has forecast the patronage to be 5.38 million in 2011, rising to 6.94 million by 2026.

The revenues, capital, lifecycle and operating costs have been developed through a rigorous process and benchmarked by the technical consultants between Lines One and Two and against other UK projects. These will be subject to further refinement through the DPOF and infrastructure procurement processes.

Summary of Costs and Revenues

Description		Line Two (£)*
Capital Costs	Base Cost	256,728,320
	Contingency	21,792,000
Specified Capital Cost		**278,520,320**
	Optimism Bias	57,793,779
	Total	**336,314,099**
Lifecycle Costs	Total	**51,672,000**
Operating Costs	Per Annum	**6,417,600**
Revenue	2011	**6,690,000**
	2026	**8,310,000**

*All prices at Q2 2003, undiscounted.

The capital and lifecycle costs quoted above, with the exception of Optimism Bias, are derived from the STAG2 analysis conducted by Faber Maunsell.

The benefits of the project against the Planning Objectives are set out in the STAG2 document.

The appraisal has identified that this route from St Andrew Square to the Airport and via the branch line to Newbridge best meets the Planning Objectives in that:

It enhances the accessibility of key areas within the city thereby improving access to employment and social opportunities, especially for those without private transport;

Air quality is expected to improve as a result of the reduction in number of cars. This is a fundamental requirement of the environmental/sustainability aspiration of the city;

Traffic congestion is reduced as illustrated by the economic benefits arising from the introduction of the scheme; and

The tram itself will provide a safe and secure environment both on board and at the stops. There will be no increase in the number of accidents in 2009 as a result of the introduction of the tram.

It is therefore concluded that the introduction of the tram into west Edinburgh is consistent with the objectives of the City Council and will contribute well to the realisation of the Vision for Edinburgh.

1.2 Risks

tie has adopted a rigorous approach to risk management. This has identified a comprehensive package of risks surrounding the development of the project and has resulted in a comprehensive mitigation strategy. The risk documentation is subject to regular review and updating in order to manage proactively the identified risks.

An incremental Optimism Bias factor of 23%, over and above the defined contingency specified by **tie**'s consultants, has been applied to base capital costs and 14% to works duration using HM Treasury methodology. This represents an increase in Specified Capital Costs of £58 million and a prolongation of the construction period by 5 months compared to the base case provided by **tie's** consultants. The contingency costs included above have been advised to **tie** by their professional consultants, based on their detailed evaluation of the underlying costs and the remaining project risk. **tie** operate rigorous risk management procedures, which have supported the development of the project scope and costs. For the purposes of the assessment of the required funding the costs do not include the Optimism Bias element which is designed to accommodate more general contingent risk based on non-project specific factors.

1.3 Key Procurement Issues

A Procurement Working Group was established in January this year by **tie** which included representatives of the financial, legal and technical adviser teams as well as the Council, PUK and **tie.** An analysis of current UK light rail projects was undertaken to identify and review the issues arising from the procurement routes adopted in these projects. The group also developed an evaluation matrix based on the Council's objectives for the Edinburgh Tram Network and evaluated procurement options against a range of criteria.

The conclusions of this analysis led to the group recommending that **tie** proceed with a route which secured the early involvement of a tram operator to assist in the development of the project. It was felt that this option would support the development of an integrated transport solution for Edinburgh and contribute usefully to risk mitigation. **tie** is progressing a tendering process for an operator at this point.

The procurement analysis also led to the conclusion that the separation of system operating responsibility under a franchise arrangement from the infrastructure and equipment supply

contract would be more efficient. Further analysis of the exact method of infrastructure and equipment provision is to be undertaken in parallel with the selection of the selected operator.

It is currently anticipated that the final procurement model will result in substantially all construction risk being transferred to the private sector and that revenue risk will be substantially retained by the public sector parties to the contractual arrangements. These criteria will be refined as procurement negotiations proceed.

1.4 Funding Options

An analysis has been undertaken of a number of sources of funding the project, essentially the infrastructure contract, both public and private. Discussions have also been held with potential funders regarding the parameters of the funding for the infrastructure and equipment contract which would be acceptable. A commercial funding solution would utilise a mix of equity and commercial debt funding through a PFI/PPP style contract. A bond solution may be more effective but this will largely be dependent on rates pertaining at the time of financial close and will be a decision for the INFRACO. Leasing is an option which will remain under consideration as a potential means by which to capture the maximum tax benefit possible.

The format and timing of public sector funding input to the project also remains under consideration.

1.5 Results of Financial Model

It is considered that the optimum procurement and funding structure will involve the establishment of a separate private sector owned vehicle to construct and maintain the infrastructure and equipment (INFRACO), with another private sector entity acting as operator (OPCO). For planning purposes, the project is assumed to have a 30 year operational life post - construction.

tie will continue to work with its public sector stakeholders and private sector partners to design the optimum procurement and funding approach during the period in which Parliament considers the Private Bill and subsequently, if Royal Assent is given, through to conclusion of contractual negotiations. The proposals embodied in this Preliminary Financial Case represent the current best estimate of the outcome of that process.

The models illustrate three options for consideration by the Council and Scottish Executive as ways in which to fund Line Two. The impact of them can be illustrated by way of a Net Present Value analysis. The principal reason for the differential between the NPV's is driven by the timing of the cashflows in the respective models. The outcome of this, which is still subject to a full risk analysis on the INFRACO contract demonstrates that an Up-Front Grant funding route would offer the lowest NPV, subject to an analysis of risk pricing and allocation which may impact on the VFM assessment. This route does require significant resources to be available from public funds during the construction period, 2006 to 2009. A Full PFI solution requires greater cash in nominal terms but spreads the burden over the contract period and would probably offer a better risk transfer solution to the public sector. The Hybrid option can be solved to balance the available public sector funding support with the consequent implications for the NPV. Risk transfer under the Hybrid should be broadly similar to that achieved under a Full Private Sector solution.

Taking Line Two in isolation from any wider network consideration, the Executive has proposed a funding contribution to progress the project. However, **tie** is progressing concurrently Lines One and Two and as a consequence the available Scottish Executive funding has to be allocated between these Lines. This has been done on the split of the base capital costs for each line, with Line One including the costs of the shared section. Excluding the impact of Optimism Bias, over and above the priced contingency, this would result in a funding requirement in addition to the proposed Executive Grant of £65 million in 2003 prices based on the Up-Front Grant funded solution. Additional sources of funding are being pursued by **tie**. The Line is projected to achieve an operating surplus over the modelled project life, and **tie** is pursuing funding from property development and commercial income. In addition, the means of improving revenues through marketing activity are under examination. Revenues and costs will be refined during the DPOF process and the INFRACO contract definition and **tie** will be seeking to maximise the benefits arising from revenues and commercial income sources while minimising cost creep. The Outline Business Case seeking formal funding support will identify the totality of the funding requirement for the Line and how this is to be satisfied.

2 Introduction and Background

2.1 Introduction

The purpose of this Preliminary Financial Case is to identify the options to procure and finance Line Two of the proposed Edinburgh Tram Network. **tie** is progressing the technical and financial analysis of Lines One, Two and Three of the Network. Faber Maunsell has been commissioned by **tie** to undertake a Network Effects Study which will seek to identify the optimum configuration of a network and the benefits which could arise from that. It should be noted that this is not an application for funding support from the Scottish Executive (SE) at this stage. No contractual commitment to the construction of the tram line has yet been made. Further development work is required to finalise the technical solution for the line and consequently the revenue and cost assumptions which are factored into the financial model contained within this Preliminary Financial Case. A formal application for Scottish Executive funding support will be submitted prior to the commencement of the tendering process for the contract to install the infrastructure for the Line in the form of an Outline Preliminary Financial case which provides full details on the proposed infrastructure procurement strategy. This will contain an analysis of risk and the value for money implications of the various options. The present estimate of the timescale for this is 2005. In the interim **tie** will be working with the selected Development Partnering and Operating Franchise (DPOF) partner (see Section 5) to develop further the revenues and costs for the Line.

It should also be noted that this document is a financial analysis of the project. The Scottish Transport Appraisal Guidance (STAG) 2 analysis is contained within a separate document prepared by Faber Maunsell. This Preliminary Financial Case has been informed by the work undertaken by Faber Maunsell in preparing the STAG 2 document.

This report outlines the analysis which led to **tie's** decision on the most appropriate procurement route for the Edinburgh Tram Network, of which Line Two forms a major element. This has been performed in the light of experience gathered from projects elsewhere in the UK which have been procured, or are in the course of procurement. Cost escalation and funding issues have arisen on a number of these projects both during procurement and subsequently during operations, partly as a consequence of the procurement approach which had been adopted. In developing the procurement route, consideration has been given to the risks inherent in a project of this nature based on the evidence from other projects within the UK. Market willingness to take the key risks has been assessed within the operating and funding communities at this stage, and will continue to influence the process as the project is developed.

This Preliminary Financial Case builds on the previous work undertaken by Ove Arup and Partners in the Edinburgh LRT Masterplan Feasibility Study and the STAG 2 analysis conducted by Faber Maunsell to identify a preferred procurement structure and funding structure for Line

Two, based on the information available at the present time. This is not a bid for Scottish Executive funding support. The bid for Scottish Executive support to fund the tram procurement will follow the conclusion of the specification development exercise to be undertaken by **tie**, in conjunction with it's technical advisers and DPOF partner, and prior to the commencement of the tendering process for the infrastructure contract.

2.2 Description of tie/City of Edinburgh Council Relationship

City of Edinburgh Council (the Council) established **tie** as a wholly-owned company with the role of project procurement and implementation. **tie** was set up in 2002 with its own staff and the remit to develop the Integrated Transport Initiative (TI) and to take forward the development of the three tram line projects. The Council retains the transport strategy function and once agreed projects move to the detailed development and procurement stage, **tie** takes responsibility for these. **tie** and the Council have set up a liaison structure through a joint operating committee, which meets monthly to discuss and monitor progress on projects.

2.3 Outline of Previous Work

2.3.1 West Edinburgh Tram Scheme (Line 2)

Following the work undertaken by Ove Arup, Tram Line 2 was included within the Integrated Transport Initiative Preliminary Business Case in September 2002 as the West Edinburgh Tram Scheme. The West Edinburgh Tram scheme comprises Line Two of the Edinburgh tram network, following the North Edinburgh Loop (Line One), but due to be opened at broadly the same time (2009). The scheme is described as a "parallel" scheme and is in effect an incremental add-on to the core North Edinburgh Loop.

The alignment is based on the former CERT corridor and consists of a predominantly segregated alignment from the city centre to the south of and then along the A8 corridor to Newbridge. From the city centre to Edinburgh Park the route parallels the main Edinburgh Glasgow railway. It is proposed that the tramway will serve, amongst others, the key areas of South Gyle Shopping Centre, Edinburgh Park Industrial Estate and Edinburgh Airport.

The proposal put forward is to introduce guided bus in the short term (West Edinburgh Guided Bus or WEBS) with upgrade to tram operations in the medium to long term. Upgrade to a tram scheme is proposed after four years. The WEBS proposals include 7km of bus lane with 3km of guideway.

Following the introduction of WEBS, the proposal is then to develop a tram scheme incrementally along the same corridor to the eventual terminus at Newbridge. 14km of fixed track are proposed with 13km of segregated track and use of the WEBS alignment.

In an attempt to verify the chosen technology the advisory team reviewed earlier work investigating the available vehicle technologies. This identified viable options including Guided Bus and Light Rail System. Factors considered included public perception, potential to achieve modal shift from cars, segregation and comparison with standard bus services. In addition, assessments of patronage and cost implications were undertaken against the Council's Local Transport Strategy.

A Light Rail System has been identified as the preferred technology on which the project design has been based. STAG appraisal has demonstrated that the project fits well within each of the Government's five appraisal criteria and the scheme has been shown to contribute to meeting

the objectives of the Edinburgh Local Transport Strategy, such as reduction in congestion and pollution.

2.4 Description of Project Development

Grant Thornton were appointed in October 2002 to advise on the Preliminary Financial Case for Lines One and Two and reflect the latest market information available to the technical advisers. A number of workstreams have been undertaken to develop this Preliminary Financial Case.

Grant Thornton were appointed by **tie** with the following remit:

(1) To develop a robust Preliminary Financial Case in respect of Tram lines One and Two (North and West Edinburgh);

(2) Develop and support **tie**/the Council and the in the Parliamentary Submission of the Private Bills for the two tram projects;

(3) Support the Council during any Parliamentary Inquiry.

Within the Preliminary Financial Case, the key elements are to examine the following:-

(1) To examine the risks inherent in the project and to identify with **tie** how to mitigate these risks;

(2) To identify a means by which to procure the project which offers the optimum solution and mitigate the risks and pitfalls of other procurement exercises;

(3) To utilise the costs and revenue projections for the Line as prepared by Faber Maunsell within the financial model for the project; and

(4) To determine the optimal funding structure based upon the analysis conducted above.

A key element has been to work with **tie** and the technical advisers for both Lines One and Two to ensure comparability of revenue and costs across the two lines. The objective here has been to ensure that all relevant revenues, capital and operating costs are included and that they are constructed on a similar basis. The work has been focussed through a number of meetings to investigate the basis of the costings provided by the technical teams (Mott MacDonald in respect of Line One and Faber Maunsell in respect of Line Two). The costs contained within the financial models informing the Preliminary Financial Case have been subjected to cross-checking by **tie** and the technical teams. Changes in costs since the original specifications were developed for the Line have been identified and a rationale established for these movements by the technical teams. Similarly cost changes during the development of the project have been fully analysed and documented.

A second key workstream has been to analyse the impact of risk on the project. This has been undertaken through the establishment of risk workshops resulting in a risk identification and mitigation strategy. There has also been considerable discussion, including the Scottish Executive (SE), around the methodology with which to apply the latest version of the Treasury

Green Book guidance. An agreed basis for the application of this guidance has been established for the purposes of this Preliminary Financial Case. However this will need to be kept under review and revisited in the Business Case as a final view on how to treat the optimism bias adjustment is awaited from the Scottish Executive Financial Partnerships Unit. Risk and the Green Book treatment are considered in Section 4 below.

Analysis of the optimum procurement route for the Edinburgh tram network has also been undertaken in conjunction with representatives of **tie**, DLA, Mott MacDonald, Faber Maunsell and Partnerships UK (PUK). Due to the difficulties experienced on many other projects in the UK it was regarded as appropriate to consider an alternative procurement model which would better achieve the objectives of **tie**, the Council and the Executive. This involved an analysis of the issues which have arisen on other projects and the procurement structures utilised, focussing particularly on risk assessment and an assessment of market appetite for risk transfer. A list of key criteria were agreed for the tram network and a number of procurement options were scored against these criteria. The outcome of this analysis is set out in Section 5 below.

Following on from the work of the Procurement Group an analysis was undertaken of the potential funding options by Grant Thornton (GT). It is recognised that a potential mix of public and private sources of funding may be required to deliver the project. The funding options considered are set out in Section 6 below.

2.5 Summary of tie Advisers (roles and functions) and Working Groups

In order to develop the STAG 2 analysis and Preliminary Financial Case **tie** has established its own internal Project Management team and an advisory group working on a number of key elements of the project. The advisory team is as follows:-

Technical (STAG 2)	Faber Maunsell, supported by Semaly, Ash, Land Aspects and Roger Tym Partners
Financial (Preliminary Financial Case)	Grant Thornton
Transport Modelling	MVA and DSC
Legal (Procurement Strategy for Tram Network)	DLA
Legal (Parliamentary Process)	Bircham Dyson Bell
Legal (Planning and Scots law)	Dundas & Wilson
PR & communications	Weber Shandwick

tie has also established a number of groups to manage the process of development of the Tram Lines project. Key to this is the Steering Group which meets monthly and is attended by representatives of **tie**, the Council and all the advisory teams. This Group raises and discusses any major issues impacting on development of the projects.

Underneath the Steering Group are a number of sub-groups dealing with specific issues. Representatives of **tie** and relevant advisers sit on these groups and they report monthly to the Steering Group. The following sub-groups have been established:

- Environment and Design - To ensure a common approach to the overall environmental appraisal and to provide a forum to resolve individual critical environmental issues;
- Health & Safety - To ensure that all related aspects of safety are co-ordinated between tie, the Council and the technical advisers;
- Planning - To ensure a consistent approach to planning and urban design issues and identify and address the policy context and all material considerations for the Edinburgh Tram in full consultation with the Planning Authority. To identify and address the implications of the tram route on private property interests;
- Procurement - To ensure the development of a procurement strategy which enables the tram lines to achieve royal assent and be procured in the shortest possible time, with the minimum risk to successful operation;
- Public Relations & Communications - To ensure a consistent approach to the management of all PR and Communications across all ITI projects;
- Risk - To ensure alignment of, and a consistent approach to, the management of risk.
- Third Party Consultation - To ensure a consistent approach and where necessary the development of an appropriate strategy for dealing with third party interests, which could have a significant impact on the tram projects;
- Traffic Management & Streetscape - To ensure a consistent approach to traffic and streetscape issues, including orders, particularly in the light of other developments (e.g. Central Edinburgh Traffic Management (CETM)) and to ensure a co-coordinated and sustained liaison with the Council; and
- Transport, Modelling and Appraisal - To ensure a common approach to transport modelling and appraisal based on existing information. To ensure a common and practical strategy and implementation of the updating and enhancement of relevant traffic models.

2.6 Summary

The development of the Preliminary Financial Case requires to identify the issues and risks which have affected the deliverability of other light rail projects in the UK and to identify ways in which these can be mitigated in the delivery of this project. This has been achieved through a cohesive team structure which has led to an innovative procurement structure which **tie** and its advisers believe will assist in the delivery of the project. The revenue and cost projections contained within this Preliminary Financial Case have been developed by the technical team on the basis outlined in the STAG submission and have been the subject of a benchmarking exercise, both within the project team for Lines One and Two and with other projects in the UK.

The financial modelling for the Preliminary Financial Case is based on the revenue and cost projections provided by Faber Maunsell, subject to the review process noted above. The commercial financial structure contained within the models has been discussed with a number of financial institutions and represents a solution which is believed to be deliverable based on current market parameters.

3 Summary of STAG Appraisal

This section summarises the key conclusions arising from the STAG 2 analysis undertaken by Faber Maunsell in respect of Line Two. The remainder of this section is drawn from the executive summary of the Faber Maunsell STAG 2 document.

3.1 STAG 2 Executive Summary

The Council is examining ways of providing the city with the transport infrastructure necessary to promote and support a growing local economy and create a healthy, safe and sustainable environment.

As a key component of the strategy of public transport investment in Edinburgh, the Council is proposing to develop a network of modern light rapid transit rail systems, or trams. The tram system is being developed in stages and will focus on the major city transport corridors.

Line Two of the Edinburgh Tram Network links the City Centre to Murrayfield, Edinburgh Park, the Gyle, airport and the Newbridge park and ride at the western extremity. This line is expected to provide a number of positive benefits for the area, including economic regeneration and improved accessibility.

3.2 Scheme Description

The preferred route begins at St Andrew Square before travelling along Princes Street, Shandwick Place to Haymarket. It then runs parallel to the main Edinburgh to Glasgow railway line, initially on the north side but crossing over the railway to run on the south side as far as the new Edinburgh Park Rail Station.

From this point it crosses the rail line once more and runs northwards through the Edinburgh Park and Gyle Shopping Centre. After crossing the A8 to the east of Gogar roundabout the tram passes close to the new Royal Bank Of Scotland Headquarters (albeit on the north side of the A8) before reaching the new Park and Ride site at Eastfield Road. At this point the line swings northwards to Edinburgh Airport where it will terminate.

A second Branch Line (the Newbridge spur) will run between the Eastfield Road Park and Ride stop westwards towards Ratho Station and the new developments at Newbridge where it will terminate.

The frequency of both the main line and the Newbridge Spur will see 6 trams running in each direction in each hour during the peak. Each tram will have a capacity of up to 300 passengers giving an overall capacity for the system of 1,800 passengers per hour in each direction. It is proposed that the Tram depot will be located at Gogar .

Tram Specification

It is assumed that the trams will be semi-low floor or total low floor vehicles. This implies a floor height of between 300 and 400mm. This type of vehicle has been adopted in order to ensure that the alignment characteristics will cater for most currently available rolling stock.

Construction

The construction of Line Two is programmed to commence in mid 2006 with an estimated construction period of 36 months.

One of the early activities required for construction is the diversion of Public Utilities from beneath the tramway. This has, historically been undertaken, either as an advanced works contract or as part of the main works contract. Generally the inclusion of this phase within the main contract provides a reduction in programme due to the ability to coordinate efficiently within the main contract. The 36-month construction period is based upon the utilities diversions being undertaken entirely as part of the main contract.

Capital Costs

Capital cost are estimated at £279m including specified contingency (or £336m, including Optimism Bias), set at a base point of Quarter 2 2003. Costs have been derived from a comprehensive database compiled from analyses of costs for the infrastructure works of completed and proposed LRT schemes throughout the UK, currently advised prices from vehicle manufacturers and preliminary diversionary works estimates obtained from utilities companies. The resulting estimates take account of the prevailing factors influencing this particular scheme including location, relative complexity, environment and anticipated programme.

Operations

The single overarching objective from the operational viewpoint is to minimise journey times, so as to maximise the attractiveness of the service and minimise operating costs and rolling stock resources. The key is to achieve free flow wherever possible so that the running speed is the maximum safe speed for any particular type of environment.

3.3 STAG 2 Appraisal

Faber Maunsell have undertaken a STAG2 appraisal of Line Two examining the key issues of:-

- Environment;
- Safety;
- Economy;
- Integration; and
- Accessibility and Social Inclusion.

The matters arising from their analysis are set out in detail in the STAG2 report and in the Executive Summary from that report which is included as Appendix 1 of this document.

The appraisal has identified that this route from St Andrew Square to the Airport and via the branch line to Newbridge best meets the planning objectives in that:

It enhances the accessibility of key areas within the city thereby improving access to employment and social opportunities, especially for those without private transport;

Air quality is expected to improve as a result of the reduction in number of cars. This is a fundamental requirement of the environmental/sustainability aspiration of the city;

Traffic congestion is reduced as illustrated by the economic benefits arising from the introduction of the scheme; and

The tram itself will provide a safe and secure environment both on board and at the stops. There will be no increase in the number of accidents in 2009 as a result of the introduction of the tram.

It is therefore concluded that the introduction of the tram into west Edinburgh is consistent with the objectives of the City Council and will contribute well to the realisation of the Vision for Edinburgh.

3.4 Cost to Government

As required by STAG, the report includes consideration of the economic welfare impacts of the proposal (Transport Economic Efficiency, TEE). The appraisal provides a review of what users are willing to pay in order to use the tram line; the financial impact on private sector transport providers; and impacts arising from land use or other impacts of the tram line.

The benefits and costs of this tram project have been calculated over a 30-year period and are summarised below.

The Benefit Cost Ratio of the Preferred Route was calculated as 1.38. This means that the overall benefits of the scheme exceed the costs by 38% and therefore represents good value for money in economic terms

Present Value of Benefits (PVB)	£275 million
Present Value of Costs (PVC)	£199 million
Net Present Value (NPV)	£76 million
Benefit Cost Ratio (BCR)	1.38

The information, particularly the NPV, is analysed in a different manner to the financial basis in the rest of this Preliminary Financial Case and the two should not be confused.

In addition, an assessment has been made of the economic activity and location impacts (EALIs), including quantification of the impacts in terms of employment gains and losses, as well as income / GDP. This has indicated that there will be a small net increase in the amount of residential, retail, office and industrial floors pace created as a result of the tram project but would have little discernable impact on property rental values in those sectors

4 Risk

4.1 Introduction

Risk is a significant factor is all major capital projects and a key element of this Preliminary Financial Case has been to examine the risks inherent in the project and identify how to mitigate these. In order to manage risk in a structured manner, **tie** have appointed a full-time Risk Manager to develop and apply a framework of risk analysis and evaluation to assist in decision making, and identified the following prime objectives:

- Mitigate all identified risks to a 'medium' significance or less;
- Pass all identified risks to the parties best capable of managing the risk;
- A culture of risk awareness (not risk averse) and management be created;
- Delivery within budget and on time;
- Provide a fully functioning operational service; and
- Obtain support from all key stakeholders.

tie has appointed experienced advisers covering legal, financial, technical, operational, environmental, public relations and communications, land and property, insurance, project management and specialist procurement advisers to realise a successful project. These advisers contribute to risk matters via a Risk Management Working Group. In addition to these advisers, **tie** is seeking to substantially mitigate risk through the involvement of a tram operator at an early stage of project development. The intention is to select an Operator in early 2004.

Optimal risk transfer dictates that risk is allocated to the party best able to manage that risk. This in turn requires the terms of any contract to be negotiated in order to achieve the optimal risk spread amongst the participants in the project. A key element in determining how best to manage and mitigate the risk has been the evaluation of the appropriate procurement route and the conclusion of this analysis which is set out in section 5 below, is to separate the Operator and Infrastructure and equipment supply contracts. The consequence of adopting this approach will be to allocate the appropriate risks to the Operator contract and similarly the appropriate risks to the Infrastructure and equipment supply contract. This separation is believed to offer a more attractive commercial package to bidders for the respective contracts and should, as a consequence, deliver a better value for money solution to **tie** and the Council. **tie** and the Council will retain certain risks, notably a large proportion of revenue risk. A focus for further work on the infrastructure procurement route will be to ensure appropriate risk transfer to the Infrastructure Company (INFRACO).

In developing this Preliminary Financial Case, **tie** and its advisers have considered the implications of the new Green Book Guidance as issued by HM Treasury and have discussed

the application of this guidance to the Line Two project with PUK and the SE. Further detail on how this has been applied and its impact on the financial models is set out below.

In addition a number of sensitivities have been run within the financial modelling exercise, designed to simulate certain key financial risks, such as variations in inflation and interest rates. These sensitivities are designed to test the overall financial robustness of the project, and to give an indication of impact of key project risks on the financial structure proposed. The results of this exercise are set out in section 9.

This section sets out the work undertaken to date on risk, which has consisted of a review of the various risks which are perceived as having the potential to impact upon the successful implementation of the project. All risks identified during this process have been discussed in detail between **tie** and advisers, and are each subject to a risk mitigation strategy to minimise, where possible, their likely impact on project delivery and operation.

4.2 Approach to the Identification and Mitigation of Risk

tie has adopted a structured approach to identifying, assessing and controlling risks that have emerged during the course of the design development. **tie** has ensured the use of defined processes to manage risk and adopted industry recognised methods to identify, classify, categorise, prioritise and measure progress, as outlined below.

4.2.1 Risk Identification

tie and it's advisers have identified project risks through workshops, strategic reviews, experience of other UK tram projects and recording of risks throughout the development process. These risks have been recorded on a register which has been further developed from checklists contained in the following published industry guidance.

- RAMP: Risk Analysis and Management for Projects;
- CIRIA: Funders Report: developing a risk communication tool (RiskCom); and
- HM Treasury Review of Large Public Procurement in the UK.

4.2.2 Timing of Risks

In order to review timing, the risks have been categorised in order to identify the risk level of each of the following five stages of the project and to ensure risks are reviewed and mitigated for each stage of the project:

- Planning – STAG2 Appraisal and Preliminary Financial case preparation;
- Application for Powers – Private Bill preparation;
- Procurement – Operator and Infrastructure/Equipment supply contracts;
- Construction; and
- Operation.

4.2.3 Categorisation

tie and its advisers identified all potential risks. These risks were categorised into the following groups in accordance with HM Treasury guidance:

- Procurement;

- Project Specific;
- Client Specific;
- Environment; and
- External Influences.

4.2.4 Risk Impacts

Each of the project risks have been assessed against the following principal impacts:

- Capital Costs;
- Operating Costs;
- Revenue;
- Programme;
- Quality;
- Functionality; and
- Approvability.

Of these areas, capital costs, operating costs and works duration (programme) have been shown to lie within Optimism Bias considerations. Two strategies have been adopted to quantify the impact of risk, in accordance with Green Book guidance. The first, has been to calculate the Optimism Bias to be applied to Capital Costs and Works Duration. The second, has been to appraise the risks associated with operating costs and revenue through sensitivity analysis.

4.2.5 Risk Significance

The significance of each risk has been classified by means of a 5-point [AS/NZS] (Australia/New Zealand) system for combining likelihood and impact of each risk. The scoring was conducted on the basis of an allocation of a numerical weight ranking from 1 to 5 with 1 ranking low and 5 ranking high. The numerical allocation for likelihood and impact were multiplied to generate a ranking of that particular risk's overall importance to the project. These risks were allocated to the categories above and risk was then "scored" by **tie** and its technical and financial advisers in order to assess both their likelihood and impact on the project. This has been assessed for each risk prior to mitigation and following mitigation in order to rank and prioritise activity. The following definitions of likelihood have been consistently adopted.

Level	Likelihood
1	Remote
2	Unusual
3	Possible
4	Probable
5	Expected

The following definitions of severity have been consistently adopted.

Level	Impact	Capex / Lifecycle(£)	Opex/ Revenue (£ per annum)	Programme
1	Insignificant	Up to £25k	Up to £25k	Up to 1 week
2	Minor	>£25k to £100k	>£25k to £100k	>1 week to 2 weeks
3	Moderate	>£100k to £500k	>£100k to £500k	>2 weeks to 1 month
4	Significant	>£500k to £1m	>£500k to £1m	>1 month to 3 months
5	Major	>£1m	>£1m	>3 months

When combined the likelihood and severity of the risks have been evaluated and prioritised as follows.

Significance	Range	
Negligible Risk	>=0	<4
Low Risk	>=4	<8
Medium Risk	>=8	<12
High Risk	>=12	<16
Very High Risk	>=16	

4.2.6 Mitigation Factors

The extent to which risks have been mitigated is assessed and measured by a mitigation factor, that is, 0.0 means that risks in a project risk area are not mitigated and 1.0 means all the risks in a project risk area are fully mitigated.

4.2.7 Mitigation

Responsibilities were allocated amongst **tie**, various Working Groups and advisers for each risk and, in particular, to develop a risk mitigation strategy. The risk mitigation strategy sets out an understanding of the risk identified, the actions to be taken to minimise the impact of the risk, by whom and to an agreed timescale. Furthermore, the list of risks was reviewed to identify the "critical path" risks, being either fundamental in principle, or time critical to the success of the project. These risks have been managed by **tie** to ensure risks are addressed in an ongoing positive manner. It is intended that the risk register will be updated regularly as the project progresses, and will be a utilised by **tie** as a live risk management tool.

4.3 Key Risks

tie has developed clear and active processes to prevent and mitigate project risks in accordance with industry best practice.

4.3.1 UK Light Rail Projects Risks

A number of lessons have also been learnt from previous and current UK light rail projects including the identification of key risks as described in section 5 below. The following key risks which have arisen on other UK light rail projects have been recognised and duly mitigated through **tie**'s procurement strategy, consultations and design and cost assumptions.

- Revenue – reduction in tram capacity, negative PR, bus competition (fares and coverage) and overestimated revenues;
- Capital Costs – underestimated costs due to utility diversions, compliance with planning, traffic management and bid costs;
- Approvability – planning issues and negative PR; and
- Operating Costs – lack of tram priority and reduced operational performance.

4.3.2 Project Specific Risks

Utilising the ranking process identified above the principal very high risks arising from this exercise can be summarised as follows:-

- Adequacy of funding - **tie** have mitigated this risk through review of alternative funding options and discussions with potential lenders;
- Passenger numbers are lower than forecast – **tie's** technical advisers have established a base model and reviewed the factors affecting revenue, assumptions and sensitivities. Further information will be gained through early involvement of an experienced Operator;
- Delay and cost increases due to the Council Planning requirements – **tie** have significantly mitigated this risk through convening a Planning and Environment Working Group who have met with Planning Department and sought approvals of Design Manual and proposals to account for the World Heritage Site;
- Inclusion of CETM influence on the Project – **tie** and their advisers have considered the influence of CETM and discussed this with the Council;
- Delays due to lack of Parliamentary time with other Bills under consideration, Bus Operator Objections or changed priorities adopted by (or changes of) the Transport Minister, **tie** and their Parliamentary Legal Advisers have discussed protocol with Parliamentary Bills Unit and commenced procurement of a tram Operator to bring about integration with local bus operators;
- Capital costs associated with land purchase, contractor's area and compensation, Network Rail, unforeseen ground conditions, vehicle costs, Council /**tie** instructed changes and utility diversion costs in excess of current forecasts; and breaches in the contingency level included within the model. This collective risk should be mitigated through the level of work undertaken to date by the technical advisers;
- Programme overrun, market appetite, competing projects and bidder fatigue; **tie** has taken market soundings on operator interest and four strong candidates have submitted DPOF bids. **tie** continues to monitor the progress of other UK light rail procurements;
- Operating costs exceed current projections due to lack of tram priority at junctions. The DPOF process will identify cost issues but not until after completion of considerable further work by the selected partner. This could be influenced by specification issues, such as staffing levels.

The risks listed above represent, in some instances, those considered as most serious to the development of the Preliminary Financial Case in the short term and also certain ongoing risks which will require management as the project progresses.

4.4 HM Treasury Green Book

The Green Book sets out the HM Treasury guidance on how to evaluate projects and the risks inherent in developing these projects. The Green Book has been recently revised and the methodology contained within it is still subject to development and testing to understand fully

its impact. For the purposes of this Preliminary Financial Case there are two key issues to consider:-

- Optimism Bias-This provides a methodology to determine what level of additional cost and programme delay should be applied to a project given its particular stage of development. A project in its early stages of development is inherently less certain, in terms of its cost envelope, than one which is close to contract signature. The Optimism Bias adjustment allows a theoretical factor to be applied to the capital costs of a project to reflect this and the costs involved in mitigating the impact of this. Standard factors are given dependent upon the nature of the project based on analysis of previous projects. This Optimism Bias adjustment ignores any specific contingencies identified for the particular project. It is not therefore a predictor of where the costs might finally end up. No Optimism Bias adjustments exist at present to cover operating costs, lifecycle costs or revenue.
- Unbundling of the discount rate - Prior to the revision of the Green Book all capital projects were discounted at a rate of 6% plus RPI. This however has been superseded in that projects are now discounted at 3.5% plus RPI to establish the NPV of the project.

4.4.1 Optimism Bias Applied

The Preliminary Financial Case has taken as a starting point the fact that the project under consideration represents a Standard Civil Engineering Project, due to the number of other UK projects that have been developed, and as a consequence the maximum Optimism Bias adjustment to capital costs and works duration is 44% and 20% respectively. In determining the appropriate level of Optimism Bias to apply to this project account has to be taken of the rigorous capital costing methodology employed by **tie**'s technical advisers, that is, determining the cost based on a detailed engineering analysis of the alignment and utilising the out-turn costs of a number of recent tram projects. As noted in this section the capital and operating costs have been subject to a cross-checking process between the Line One and Two technical advisers and subject to benchmarking against other light rail projects. It is therefore considered by **tie** and its advisers that the specified Capital Costs (including identified contingency) have been developed based on the latest available market knowledge.

The project has now been in development for some two years since its original promotion in the ITI PBC. As a consequence of the stage it has reached, the analysis, cross-checking and benchmarking of cost estimates, together with the amount of mitigation that has been carried out across the range of risk areas identified above, it is considered appropriate to use lower factors of 31% for Capital Cost Optimism Bias and 14% Works Duration Optimism Bias. It should be noted that this compares to a capital cost contingency of 8.5% identified by Faber Maunsell (and Mott MacDonald for the shared section) for Line Two. The difference between this figure and the Optimism Bias Capital Cost adjustment of 31% adds a theoretical £58million of capital cost to the project costs at this stage. As the project scope and specification progresses the risk mitigation exercise should assist in reducing this number.

4.5 Conclusions

tie's risk management process has identified a comprehensive package of risks surrounding the development of the project and initiated a related mitigation strategy. The risk documentation is subject to regular review and updating in order to manage proactively the identified risks.

tie has adopted a rigorous approach to risk management. This has identified a comprehensive package of risks surrounding the development of the project and has resulted in a

comprehensive mitigation strategy. The risk documentation is subject to regular review and updating in order to manage proactively the identified risks.

An incremental Optimism Bias factor of 23% has been applied to base capital costs and 14% to works duration using HM Treasury methodology. This represents an increase in Specified Capital Costs of £58 million and a prolongation of the construction period by 5 months compared to the base case provided by **tie's** consultants. The contingency costs included above have been advised to **tie** by their professional consultants, based on their detailed evaluation of the underlying costs and the remaining project risk. **tie** operate rigorous risk management procedures, which have supported the development of the project scope and costs. For the purposes of the assessment of the required funding the costs do not include the element captured within the Optimism Bias concept which is designed to accommodate more general contingent risk based on non-project specific factors.

5 Procurement Options

5.1 Issues on Other Projects

The purpose of this section is to outline the consideration that **tie** has given to the procurement options available to deliver the tramlines. The analysis that has been undertaken has been based primarily on assessment of the experience of procuring similar projects elsewhere in the UK.

In recognition of the importance of the procurement approach to the success of the project, **tie** established a working group as part of the overall stream of work undertaken to consider how best to achieve the procurement of the tram network. The remit of this group is to analyse the issues which have arisen in other light rail projects and to determine the optimum route for the procurement of the light rail network for Edinburgh. The group contained representatives of **tie**, the Council, Mott MacDonald and Faber Maunsell (the technical advisers for Lines One and Two), DLA, Grant Thornton and Partnerships UK.

Over the past ten years, numerous public transport infrastructure projects have been developed across the world through an approach that in some measure involves the introduction of the private sector in a risk bearing capacity. In airports, ports and roads, it has been possible to develop relatively straightforward funding models where a concession company takes responsibility for the design, build, financing and operation of the project, in return for the right to the real or shadow revenue streams generated by the enhanced infrastructure. In urban and inter-urban rail and transit systems, while a number of projects have indeed been developed, their funding structures have generally been significantly more complex.

This complexity follows from a number of features commonly associated with light rail and other transit projects . A summary of the issues which have arisen on other projects is set out below:

Revenue generation:
• Light rail projects do not, generally, generate sufficient revenue from the farebox to meet both the capital and operating costs associated with the project. The public sector therefore maintains a major role, contributing all or substantially all of the capital costs either by way of up front capital grant or through a long term service related payment. Over optimistic projections by the public sector on farebox receipts have been the cause of difficulties on projects seeking full transfer of this risk to the operator.
Social benefit and system quality:
• The public sector has a real interest in ensuring that, in design and operation, the

project meets its wider social agenda as well as the necessary commercial requirements of the system operator and funders. This has resulted in tension in projects as to control over design and specification and affordability;
Integration:
* Much of the benefit of a public transport service is only generated through integration with the other parts of the transport system, be that bus, heavy rail or car. This has significant impact on the way the project can be structured, with the design and operation of the system constrained, and the revenue collection ability of the project under inevitable influence from the alternative modes of transport. Additionally, there is conflict between the practicality of integrated transport and UK Competition Law requirements. Equally, direct competition from other public transport modes has damaged the ability of light rail schemes to attract and sustain patronage, particularly during the start-up period. ;
Risk Transfer:
* Previous UK projects have pursued risk transfer to the private sector as an objective without necessarily focussing on the detailed commercial implications of what that means. As a consequence some projects have suffered from overly aggressive risk transfer proposals resulting in unsuccessful negotiations, inappropriate funding structures and consequentially commercial structures which are not robust.;
Procurement models:
* A variety of procurement models have been utilised for light rail projects within the UK with varying degrees of success. While many projects have progressed relatively smoothly some projects have suffered from factors such as inadequate early development with resultant affordability issues, system integration technical problems, insufficient early involvement of an operator/contractor, lack of foresight regarding future extensions and unwanted procurement delays.

tie has reviewed its advisers' recommendations as to lessons to be taken from the UK experience on the issues outlined above and also sought information from other current UK schemes in order to seek to avoid some of these pitfalls. To that end the **tie** team have visited the scheme teams for Leeds, Nottingham, South Hampshire, Croydon and Docklands light rail schemes, as well as schemes overseas. This has provided additional useful insight into the optimal scheme management route for the development of the proposed light rail network.

A number of recurring themes arose from these other projects. These can be summarised as:

- Failure to recognise that the banking market appetite for certain light rail project risks has evaporated;
- Over-optimistic revenue projections causing difficulties for the concessionaire and funders;
- Poor project development leading to significant cost escalation;
- Timescale delays during procurement and construction;
- Aggressive competition from other transport modes;
- Loss of integration potential; and
- Inflexible procurement routes and poorly analysed risk transfer implications.

tie has sought to address each of these issues .

5.2 Evaluation and Assessment Process and Conclusions

Given the issues identified above the Procurement Group sought to identify a means of mitigating the procurement risks which have arisen on other projects. A procurement strategy evaluation exercise was undertaken against an agreed set of evaluation criteria and measures.

The key elements in the criteria are as follows:

- Fit with the Local Transport Strategy: this assessed key issues such as integration, social inclusion, economic growth and congestion reduction;
- Cost and Affordability: project costs, sources of funding and risk transfer
- Deliverability: this assessed timescale, third party issues, fit within the city environment, funding issues for the private sector and practicality;
- Incremental network: this was concerned with how best to deliver the extensions to the network within procurement law constraints;
- Effective competition: this assessed the ability of bidders to participate in the procurement exercise and the maximisation of bidder commitment; and
- Bidder configuration: this was focussed on the achievement of a strong technical solution and the sourcing of a strong operator.

The Procurement Group then identified a number of options to address the issues identified above. The options identified were as follows:

- Early consortium involvement: under this route the Group envisaged the appointment of a partner with all the necessary skills to assist in the development, design, construction and operation of the project. Finance was not considered necessary as part of this route as it was felt this could be tendered separately. A similar approach is currently being adopted by Merseytravel for the procurement of the Mersey Light rail project. The partner would be appointed post STAG 2 completion with the view to working with tie on the refinement of the project;
- Early operator involvement: this would be a similar process to that envisaged above but would only require the involvement of a tram operator. It was felt that this would assist with the issues of integration and network development but not preclude the tendering on a competitive basis of an infrastructure and equipment supply contract;
- Development group/preferred partner: this was the route which was followed in Croydon and while beneficial to the process the partner there ultimately was not the chosen partner for the project; and
- Post enabling legislation procurement: this has been the classic route for UK projects of this nature and the bidders would be offered a developed project specification against which to bid. It involves the longest delivery lead time and little private sector involvement in development phase with consequent heightened project risk.

The Procurement Group also considered a number of different procurement structures in order to analyse what would be the optimum route. The following were identified as the principal options.

Design Build Finance and Operate/PFI/PPP (DBFO)

Under this method of procurement the private sector would be responsible for the design, build, finance and operation of the project over the contract period, normally 25 to 35 years in the case of major transport infrastructure. The private sector would form a consortium of construction companies, rolling stock provider, operator, maintenance provider and finance providers. Typically the consortia would create a Special Purpose Company (SPC) with the specific aim of bidding for the project. It is likely that most if not all, of the equity and debt funding for the project would be procured through the SPC. Throughout the operational period the SPC would retain the farebox revenue generated from the operation of the system, although as noted above this has caused major difficulties for funders on other similar projects. If this revenue is insufficient to allow the SPC to meet its operating costs, service its debt incurred in respect of the capital costs of the system and achieve a reasonable return on its equity a subsidy payment would require to be made to the SPC by the public sector. The payment could be made by way of a Unitary Charge tied to the performance of the system or, as considered by the Procurement Group, a hybrid arrangement consisting of milestone payments during construction and an annual service payment.

Design Build Operate and Maintain (DBOM)

This procurement method is similar to the DBFO, however it would be **tie**/the Council that retains responsibility for raising the finance for the project. Again the consortium would form an SPC with the expertise required to design, build, operate and maintain the preferred option. The consortium members may be required to provide funding to the SPC which would operate the project for a specified contracted period. Under this option the public sector contribution would be paid against the capital costs or through an annual service payment linked to the performance of the system. With the exception of the funding element this option is largely similar to the DBFO route. It has advantages in that it removes the issues which commercial funders have with these projects but as a corollary it removes the diligence and discipline which commercial funders bring to the process.

Design Build and Maintain (DBM) / Design Build Finance and Maintain (DBFM)

The principal difference between this option and the DBOM route above is to separate the construction and maintenance element from the operation of the project. Again funding would be for **tie** to source under this route although this could be procured by the infrastructure provider as part of the design, build and maintain element, the model then becoming Design Build Finance and Maintain. The perceived benefit of this route was to separate the issues which the operator faces from those faced by the infrastructure and equipment provider. This allows the respective parties to focus on the issues which they are best capable of managing but does create the need for effective interface management. This option, with the addition of commercial funding in the private sector options, equates to the INFRACO DBFM option identified as optimum by the Procurement Group.

Joint Venture

The Procurement Group wanted to consider the potential for **tie** to enter into a joint venture arrangement with partners to build and operate the system and to determine whether this offered a better solution for **tie** than the alternative models being proposed. The joint venture

structure also offered the opportunity to bring in other transport operators to try to generate a commonality of interest with an objective of enhancing the integration benefits from the system. This option does, however, have the potential to transfer a significant amount of risk back to **tie** and entails both competition law and procurement regulation difficulties. While it scored best in the valuation against the criteria set, on further explanation it was concluded that it offered a number of significant disadvantages in terms of the potential for additional risk retention by the public sector.

Traditional Procurement

The Procurement Group reviewed a structure based upon traditional procurement whereby **tie**/the Council obtains funding from the SE for the project. Under this structure all the construction contracts would be managed directly through **tie**/the Council. **tie**/the Council would set its own performance standards in terms of customer satisfaction, delays and self monitor its performance against these criteria.

tie/the Council would also have the ability to pursue more freely the public sector aims and objectives of social inclusion and economic development through setting the fares and making allowances for concessionary travel. However during the operational phase any excess or shortfall in revenues would require to be accounted for by **tie**/the Council. The capital costs would require to be fully sourced from the public purse during the construction and operation phases and any revenue surpluses or deficits would also have to be directly accounted for. This option does not provide any degree of cost certainty during the operational period. Concerns over the potential risks arising from cost overruns led to this route not being considered as part of the evaluation process. However, if **tie**/the Council were able to construct a rigorous contract management structure traditional procurement could still be effective for elements of the project.

The Procurement Group analysed the various options identified above against the criteria and measures which had been set. Members of the Group scored the options against a range of 1 to 5 to determine best fit with the criteria. A summary of the results is presented in the table below. As noted above the joint venture route produced the best score in the evaluation but was felt on further evaluation to offer a number a number of disadvantages. The Design, Build Finance and Maintain contract with separate operating contract was regarded as the best option when considered against the objectives set.

Rating of Procurement Options

Route	Score
DBFO/PFI/PPP	54
Hybrid Part PFI/PPP/Part grant	56
DBOM	53
DBFM & separate Operation	61
Joint venture	62

Timing

The Procurement Group also evaluated timing issues against the same criteria.

Route	Score
Early consortium involvement	69
Early operator involvement	72
Development group/preferred partner	62
Post Bill procurement	55

It can be seen from the above table that there was a clear preference from the Procurement Group for an early operator involvement. It was felt that this was the best way to bring into the project the necessary expertise to assist **tie** and its advisers in the further development of the project and to maximise the potential for integration of the tram system with other transport modes in the city. It was recognised that separating the operating contract from the infrastructure and equipment supply contract left operational and financial interface issues to be addressed but it was felt that the funding structure would be simplified on this basis. The analysis of how best to procure the infrastructure and equipment supply contract is ongoing but for the purposes of this Preliminary Financial Case it has been assumed that this will be undertaken through a DBFM structure, with funding to be sourced from public or private sector sources. This is also the emerging preference of other Promoters.

5.3 Information Exchange with The Council and SE

A series of briefing sessions have been held by representatives of the Procurement Group and **tie** with both the Council and the SE in order to keep both of these parties fully abreast of the project developments and **tie** decision points. These briefings have covered various issues including the following key areas:

- procurement approach to explain and explore the Procurement Group's analysis of the DPOF approach and recommendations to the Board;
- details of the commercial implications of the DPOF approach, including issues of risk transfer and payment mechanism; and
- a review of residual public sector risks associated with the DPOF approach and how **tie** and the Council intend to mitigate these risks.

Both the Council and SE are also represented at the **tie** Board meetings and are aware of the strategic implications of the decision to proceed with DPOF.

5.4 Summary of the Main Provisions of the Operator Agreement

Following approval from the **tie** Board on 3 March 2003 to proceed with early operator involvement, the Procurement Group has been progressing the procurement process following the negotiated procedure as required by European Legislation. An ambitious timescale was set by the **tie** Board to bring the preferred partner on board by early 2004 in order to fully capture the benefit of such a partnering arrangement.

It is **tie**'s primary objective that this process will forge the basis for a strong and mutually beneficial long-term partnering relationship with the Operator of the Edinburgh Tram Network. It is considered that this relationship will assist in the promotion of integration between the

different transport modes within the City, assist in developing and delivering the optimal project for Edinburgh, and also assist in managing costs and bringing first hand experience to revenue projections in order to deliver a robust project and avoid unnecessary cost creep.

Prior Information Notice discussions

Following the issue of a Prior Information Notice, initial meetings were conducted with the following respondents in May 2003. It should be noted that these informal discussions did not form any part of the evaluation process to select the preferred partner, rather they were used to assess market appetite for such early operator involvement, to test private sector views on a number of key issues and to assist in scoping out the role of the DPOF partner :

- Alstom;
- First Group;
- HTM Consultancy;
- Keolis;
- Serco; and
- Transdev.

These meetings covered a set agenda of the following topics:

- Bus-tram integration;
- Remuneration;
- Operations;
- Infrastructure/ equipment provision;
- Risk allocation; and
- Timing/ resourcing issues.

The main conclusions flowing from these discussions were the market's enthusiasm for **tie**'s innovative procurement proposals, and a willingness of the operators to get involved at the outset of the process in order to avoid some of the pitfalls of other recent projects. Further detail as to the outcomes of the discussions are set out below and were used to inform the scope and shape of the procurement.

Bus Tram Integration

Generally the operators were comfortable with the framework outlined by **tie** for the development of a services integration plan which would form a key element in the assessment of bids received and the eventual selection of the preferred partner. A strong recognition of the importance of successful integration was evident.

Remuneration

An outline of the proposed payment mechanisms was shared with the Operators setting out the milestone basis during the initial phases and a "pain/ gain" sharing mechanism based on target costs and revenues during mobilisation and operations. No major issues regarding the proposals were noted.

Operations

The question of fares policy and the Operator's degree of control over these has a major impact on their attitude to revenue risk. The Council policy has yet to be developed in relation to tram fares, however it is likely a substantial degree of control will remain with the public sector which detracts from a full revenue transfer as noted above.

In terms of operating franchise length, the Operators had varying ideas as to their preferred initial contract period, renewal opportunities and break points. The preferred option of the Procurement Group, endorsed by the **tie** Board, is an initial 15 year operating contract, with an option for **tie** to extend the contract for a further 5 years (this complies with current applicable EU legislation).

Infrastructure/ Equipment Provision

The main feature of discussions held in relation to infrastructure and equipment provision surrounded the ability and willingness, or otherwise, of the Operators to couple the provision of maintenance as an element of the operating contract, or the infrastructure and equipment supply contract. Various parties had opposing views. The preferred option of the Procurement Group is to proceed on the basis that infrastructure maintenance best fits with the infrastructure provider. This aspect remains under detailed development.

Risk Allocation

In relation to risk sharing, it was apparent that although Operators have contemplated and in some cases accepted revenue transfer elsewhere, this was not necessarily considered an optimum solution for either the public or the private sector. Factors such as control over fare setting, control over integration, and the required risk premium in light of the lack of confidence in patronage modelling all detract from full farebox revenue transfer at the outset. Particular concern over revenue risk transfer during the initial operational ramp up period of two to three years was also highlighted.

Timing/ Resourcing Issues

tie highlighted their requirement for a compact focused team during the development phases, with involvement of senior individuals who have live tram operating experience. Long term commitment to the Edinburgh project was also highlighted as key, with a focus on the continuity of the senior team who will lead the actual management and operations of the project throughout the process. The Operators were made aware of the importance of the team proposed in **tie**'s overall evaluation of bids when received.

Prequalification Process

Following an Official Journal of the European Community (OJEC) notice issued by **tie** on 11 June 2003, six potential bidders submitted pre-qualification questionnaires. The six bidders are set out below:

- First Group;
- HTM;

- Keolis Via GTI UK limited in association with Parons Brinkerhoff;
- National Express;
- Serco; and
- Transdev.

The pre-qualification questionnaire included a series of technical questions designed to elicit the demonstrated experience and capability of candidates in providing these services. It also contained a series of financial questions developed to allow an assessment of the financial and economic standing of each of the candidates in relation to the DPOF approach. Candidates were also asked to return signed Bid Conditions, dealing with rules of tendering.

Following the evaluation process, **tie** invited four bidders (First, Keolis, Serco and Transdev) to respond to the Invitation to Negotiate issued on 25 September 2003. Bid submissions from the four parties were received on 18 November 2003. Following bid clarifications and negotiations, **tie** are aiming to select their preferred partner by end March 2004.

The DPOF approach is designed to permit flexibility for incremental development, construction and delivery of the three line core network and its planned expansion. The DPOF approach is also designed to allow for the early involvement of an Operator so that **tie** can benefit from that Operator's experience and expertise during the parliamentary process and to develop the system design capacity, expansions, performance and integration. The DPOF approach covers four distinct Edinburgh Tram Network Project Phases creating a framework with an equitable balance between responsibilities and rewards. The proposed term of the DPOF franchise is 15 years, with the option for **tie** to extend for a further 5 years. An outline of the activities associated with each Project Phase is given below.

Development (Project Phase A)

During this Project Phase, the Operator would be engaged with **tie** and its advisers to deploy its operational and commercial expertise to complete development of **tie's** requirements for the system infrastructure.

Infrastructure, Equipment and Vehicle Procurement (Project Phase B)

This Phase will be concerned with preparation for infrastructure, vehicle and equipment procurement (following Royal Assent to the enabling legislation) for the three core network lines.

Design, Build and Commissioning (Project Phases C1 and C2)

After award of a contract for infrastructure, vehicle and equipment delivery, it is envisaged that the Operator would be a member of **tie's** project management team. The Operator would undertake system mobilisation during this phase in order to prepare for full operation and complete arrangements on service integration.

Operations (Project Phase D)

During Project Phase D, the Operator would run Line Two, accepting further core network incrementally. The Operator would continue Project Phases A, B and C development

partnering functions, as required by **tie**, in relation to further Lines and expansion beyond the core network.

5.5 Risk Transfer Issues

The issues noted below are to be examined further as part of the DPOF contract development process.

Operation and Performance Risk

The Operator of the Line will ultimately be in day to day control of project performance and hence the quality of service provided to the public. However, the foundations for the project's development lies with **tie** and its advisers. One of the main factors involved in bringing on an Operator during the early phases of the project is to inject their perspective to the development of the network, and hence to facilitate the evolution of the optimal delivery platform for the tram project, within affordability limits. It is anticipated by **tie** and the Procurement Working Group that this approach, which has been endorsed by the Council and supported by operators interviewed at the PIN stage, should allow the delivery of the project which meets both the Council and **tie** requirements.

To address issues of performance during the operating phase of the contract, the DPOF approach will be structured to incorporate a Payment Mechanism which **tie** believe offers the Operator an appropriate risk/reward share. **tie**'s proposed payment mechanism is set out below, however in summary, the Operator will be penalised under a Key Performance Indicator regime for not delivering service to the required specification, whilst being incentivised to minimise costs and maximise revenue to take advantage of the proposed pain/gain sharing mechanism. The final strand of the payment mechanism, namely the Vision Achievement Incentive, is a longer term goal for the Operator to aspire to. This will only be payable in circumstances where the tram project's financial performance exceeds expectations, and where the quality of service delivery also exceeds a pre-agreed challenging target level.

Pricing and Revenue Risk

A key element of retained risk for the public sector surrounds the actual revenue and costs of the project. One of the factors influencing the decision to proceed with the DPOF arrangement and separate infrastructure procurement was the underperformance of a number of the full PFI/PPP structures where 100% farebox risk has been transferred to the private sector. In particular, due to the lack of confidence in patronage modelling, the revenue stream associated with such projects can be heavily discounted in agreeing a final price, and attracts a significant risk premium in terms of funding margins.

In order to achieve the benefits associated with the DPOF structure, full revenue and operating cost risk will not be transferred to the private sector. Rather a degree of control over the public sector's exposure to operating costs and revenues has been built into the DPOF approach via the development of a pain/gain sharing mechanism.

This regime, which compares actual costs and revenues with pre-agreed targets, has the joint benefit of incentivising the operator to minimise costs, and maximise revenue, whilst limiting the public sector's risk.

The success of the pain/gain sharing mechanism will be driven not only by the outturn performance of the project in terms of actual costs and revenues, but also the agreement of appropriate targets. In order to introduce a control mechanism to target cost setting at this early stage of the process, the four short listed bidders have been requested to submit their costing assumptions for each cost element of the project. These assumptions will be used to create a costing framework or template, which will be refined by discussion with **tie** and the successful Operator over the development phases, where it is required as the detail of the Line is crystallised. This information will be used in the Outline Business Case which contains a formal funding request and which will be submitted following the development of project specification with the Operator. Revenue targets will also be developed during the early phases of the DPOF and fixed prior to the development partner's confirmed status as Operator. In the instance where agreement surrounding target setting cannot be achieved between **tie** and the Operator, **tie** have a termination right to step out of the contract. It is envisaged that the target costs will be reviewed and reset on a three yearly basis.

5.6 Payment Mechanism

tie's proposed payment mechanism over the four Phases is summarised below. This is subject to the responses received from the bidders and negotiation with them prior to selection of the DPOF partner. To facilitate this, the potential Operators have been requested to supply details as to their assumptions and breakdown of costing data as an integral part of their bids.

During Project Phases A to C1 the four short listed bidders have been invited to supply capped fee estimates, based on the scope of work set out in the output specification. Payments will be made on a quarterly basis with the fee based on the cost of the Operator's expert personnel. A retention of 25% will be remitted upon the completion of each individual phase.

During mobilisation, Phase C2, the Operator will be paid on the basis of a pain / gain sharing arrangement around agreed target costs for the phase. These target costs will be developed and agreed prior to completion of Phase B.

tie's proposed Payment Mechanism for the Operator during Project Phase D comprises the following discrete elements:

- Operating Costs and Profit Element;
- Performance Regime;
- Pain/gain share mechanism; and
- Vision Achievement Incentive.

Each element is described in turn:

Operating Costs and Profit Element

The operators would be paid preset operating costs and a fixed profit element monthly on the basis of the target operating costs and a fixed profit element. The annual target operating costs would be agreed with the Operator prior to completion of Phase B, and the profit elements are being bid as one of the ITN submission requirements.

Performance Regime

This is the day-to-day mechanism through which **tie** will monitor and incentivise the Operator to deliver the high quality tram project that is envisaged for Edinburgh.

tie has selected seven weighted Key Performance Indicators (KPIs), which it considers as most important to ensure the effective operation of the tram system and a service quality responsive to the Council's aspirations.

Pain/Gain Share Mechanism

This is the key element of the mechanism which achieves mutuality of interest in the financial performance of the Line. The intention of this mechanism is to offer the Operator and **tie** the opportunity to share in savings on Operating Costs generated from operating the system more efficiently and in the generation of any additional revenues above targets. The mechanism also offers the Operator an element of protection against downside revenue risk and cost escalation.

The comparison of target and actual costs and revenues, and the ensuing payment to or from the Operator will be performed by **tie** semi-annually. It is proposed that the targets are reviewed during the course of the contract on a three yearly cycle and if necessary reset by agreement between **tie** and the Operator.

Vision Achievement Incentive (VAI)

The principle underlying this would be to reward the Operator for the added value created in the tram system through sustained high quality performance as measured under the KPI Regime and a greater than forecast surplus of revenues over costs, having taken account of the pain/gain share mechanism.

6 Funding Options

6.1 Assessment of Public and Private Funding Options

The purpose of this section is to examine the various funding methods which can be used to finance the tram project. The analysis of funding options has been based partly on the work undertaken by the Procurement Group in reviewing the problems encountered by other projects, which have been developed in the UK. As a result, private sector funders are concerned with the risks being pushed towards them and the operators on these projects.

In order to progress the development of this case, discussions have been held with major project finance banks to ascertain the issues they face in funding such projects. The funders views on risk, particularly the acceptability of revenue risk transfer, are therefore very pertinent. These discussions have confirmed the interest of funders in structuring appropriate funding models, be that debt or leasing, to meet the needs of the project.

A significant number of light rail projects have been developed across the world, including a number in the United Kingdom, utilising a variety of funding structures driven partly by the procurement route and partly by the transfer of risk. Each of the different funding structures has been developed to meet:

- the particular financial situation facing the project;
- the objectives of the public sector sponsor;
- the operating rules of the existing transport system; and
- government rules for triggering central subsidy.

The DPOF contract, given its nature and the anticipated operating surplus arising from the project, is effectively self-funding. The surplus will require to be financially linked to the INFRACO funding structure. This interface will be addressed in the preparation of the Outline Business Case containing the application for funding support from the Scottish Executive.

The key purpose of this section, therefore, is to describe funding solutions for the infrastructure and equipment supply contract which fit the requirements of **tie,** the Council and the Scottish Executive.

6.2 Public Sector Capital Grant, Milestones, PFI/PPP

Light rail projects typically require a significant element of public support in respect of their capital costs if they are to be commercially viable; farebox revenue is generally not sufficient to deliver the income streams required to support the levels of debt service necessary to construct and operate the project. The question then is what level of public sector support is required for the project and how best to provide this support to the project, whether by capital grant or

through a service payment tied to project performance. The answers to this will partly be driven by a policy decision and the availability of funds and also by the preferred procurement route. Traditional public sector procurement would suggest an Up-Front Grant while a PFI/PPP solution requires a payment for services tied to the delivery of a functioning light rail system. There is a hybrid option between these two whereby an element of the public sector contribution could be by way of milestone payments against construction completion with the balance through a PFI/PPP structure.

The Preliminary Financial Case considers three possible options for public sector support: capital grant to fund construction; a PFI/PPP structure; and a hybrid option. The funding requirements of each of the options have been modelled.

Based on the Specified Capital Cost a full capital grant would require the Scottish Executive to contribute funding of £279 million over the envisaged three-year construction programme for the project. First draw down of the construction funding is envisaged in mid 2006.

If there is a constraint on the availability of short-term funding by way of capital grant then it might be appropriate to fund the project on the basis of a PFI/PPP structure. The latter may also be preferable in that it allows for a greater degree of risk transfer to the private sector. A consequence of following this route will be a requirement for the infrastructure and equipment supply contractor to source commercial funding to deliver the system, reinforcing cost control and efficiency disciplines within the INFRACO. The options for this commercial funding are considered below.

The hybrid structure model uses 70% public sector up-front funding and 30% commercial funding. The results of each of these funding options are set out in section 9 below. The principal benefit of pursuing a public sector funding route is that this does not create any direct third party funding cost for the project. Another potential advantage would be the reduced cost and time involved in arranging such funding. The procurement route would be considerably shortened and contract documentation would not be required of the nature of a commercial funding proposal. It is also likely that the diligence exercises undertaken by commercial funders would not be required as this would have been undertaken during the Preliminary Financial Case preparation process. The disadvantage of public sector funding is that, however tightly drawn the contracts, ultimate risk for cost increases and delays is retained by the public sector as the sole provider of funds.

6.3 Private Sector Funding

In the event that public sector support is not available to fund the totality of the project by way of capital grant in the necessary timescale, commercial funding will be required. The remainder of this section considers the various sources of private finance that would be available to fund the project. These would be sourced by the private sector partner chosen in the INFRACO tendering process.

Private Sector Funding for a project of this nature will be channelled through a company. Normally this is a SPC which has the sole aim of delivering the project. The aim of this is two-fold: firstly, to keep the project funding off balance sheet for the private sector sponsors and secondly to ring-fence the project risks within that company.

Equity

Typically commercially funded project finance deals involve an element of risk capital in the SPC. In the context of large infrastructure and equipment supply contracts this is normally in the region of 8%-10% of the total project cost. This is risk capital and as a result it attracts a higher return than senior debt funding. The providers of this element of the funding will be the contractor and other parties to the infrastructure and equipment supply contract possibly with the assistance of third party equity funds. The funding is normally structured by way of a minimal amount of pure equity capital with the balance through a more tax efficient subordinated debt line. The equity capital will receive its return through a dividend payment as and when the resources are available within the SPC to pay these. Interest payments on subordinated debt can normally be made during the project life subject to the requirements of the senior debt providers.

Bond Finance

This has been used on a number of infrastructure projects and can have advantages over a bank debt option. The general principles of bond finance are that the borrower would receive a lump sum on issue of the bond and would require to pay an interest charge (either fixed or variable) over the bond period. At the maturity of the bond, which may be 20 to 30 years, the borrower would require to repay the principal amount. The funder would typically require security against the bond repayments over the term of the bond.

Bond finance would require fixed repayments over the bond term, although some bonds are linked to RPI. The total liability which would be payable would be known and therefore would allow **tie** to incorporate these fixed payments in its budgeting process. The ultimate price paid for bond finance will also be dependent on the borrower's credit rating which requires an assessment by a rating agency such as Standard & Poors or Moodys of the underlying credit. The more creditworthy the lower the interest rate on the bond. Credit enhancement options are available for bond packages by utilising the services of monoline insurers to "wrap" the bond issue. Effectively these large financial institutions put their balance sheets behind the bond for a fee. This makes the bond issue more attractive to bond purchasers.

Pricing for bonds is based on a reference gilt which reflects the maturity of the bond. The margin applied over the base cost of funds will be a reflection of the perceived credit risk of the bond which tends to be lower than the margins applied to project finance debt in a range 65-85bps. With long gilt yields at around 5.0% this offers an advantage over project finance debt where the base cost of funds would be around 5.1% to 5.5% at the current time. The competitive advantage of bond over debt funding will be dependent upon the market conditions at the time the deal is concluded, as well as the cost of the wrap and credit assessment of the transaction.

While bond financing is on the face of it cheaper than bank debt, it is both more time consuming and costly to arrange. It produces a lump sum which is inefficient as money requires to be placed on deposit until required to fund construction. It is also less flexible because of the nature of the bond holders and as a consequence if there are difficulties during the project it can be difficult to get agreement to project changes.

Project Finance (Senior Debt)

Senior debt funding provided by one or more banks is a well-developed product which has been used to finance a wide variety of infrastructure projects. Typically it will be priced at a margin above fixed cost of funds which involves the funder entering into hedging arrangements to protect their funding cost risk. Senior debt funding will in most market conditions tend to be more expensive than bond funding as it is based on LIBOR or a similar rate, with base cost of funds currently around 5.1%-5.5%. Margins will be dependent upon a credit assessment of the borrower and the underlying project. Current market conditions would suggest margins over the underlying cost of funds ranging from 110 bps to 150 bps. The margins achieved will depend on the market conditions and the risk profile of the particular project at the time of agreeing the loan. The margins will vary during the life of the project as the risk profile changes. Funders perceive the construction phase as being the most risky and consequently this attracts a higher margin. Once into the operations phase margins can drop by 10 to 20 bps.

The project finance market has changed over recent years with the lengthening of maturities in order to meet competition from the bond market and this can be beneficial in terms of debt servicing costs.

A further important factor to be considered is that bank funding offers far greater flexibility than bond funding. It is easier to draw down bank funding in phases around a construction programme and to structure a variable repayment schedule. This would serve to minimise the financing costs and optimise the utilisation of the available cash flows. However this requires a good budgetary process and effective treasury management.

Leasing

Leasing offers a further funding solution which provides a tax efficient structure but this is subject to the SPC not being able to use capital allowances itself but it is suitable for items of plant and equipment. In the case of the trams project this could cover the vehicles control signalling and passenger information equipment, overhead lines and gantries and the tram track itself.

European Investment Bank (EIB)

The EIB, because it is funded by European Governments, provides funding for projects at a rate lower than that of commercial banks. However, dependant on market conditions the base cost of funds may not always offer significant differential. Margins do, however, tend to be significantly lower than commercial funding. EIB only fund up to a maximum of 50% of the project cost but would make this funding available to all bidders as part of the Infrastructure tendering process.

The EIB have been approached and have indicated their interest in considering this project. They are currently involved in a number of other tram projects in the UK and are well aware of the funding issues involved in these projects. The benefits of EIB funding have not been factored into the model.

6.4 Structural Funds and Scottish Enterprise Contributions

Given the economic conditions within Edinburgh grant funding and European Structural Fund support have not been considered. Scottish Enterprise have indicated an interest in supporting the development of the project but have indicated that any financial contribution would not be material.

6.5 Development Gain

It is widely recognised that the introduction of a tram or light rail network has a positive effect on the value of property in near proximity to the routes. **tie** has examined how best to exploit this feature and develop additional funding for the tram project. Colliers CRE were engaged to provide professional support. It should be noted that the publication of reasonably definitive routes and the extent of public sector financial support have limited **tie's** negotiating leverage. However, potentially valuable opportunities have been identified.

6.6 Commercial Income

There are a number of potential sources of incremental commercial income, primarily advertising related.

The operator contract which will be negotiated under the DPOF structure leaves control over the development of these sources of income under the control of **tie** and accordingly all revenues less direct costs of delivery will flow to the tram project.

6.7 Funding Strategy

No funding is required for the operator contract beyond the development and mobilisation costs which are estimated by the technical advisers to be £3.2 million. The DPOF contract, given its nature and the anticipated operating surplus arising from the scheme, is effectively self-funding. The surplus will require to be financially linked to the INFRACO funding structure. This interface will be addressed in the preparation of the Outline Business Case containing the application for funding support from the Scottish Executive.

In looking at the appropriate funding strategy for the infrastructure and equipment supply contract for Line Two three options have been modelled:

- Full PFI/PPP option.
- Hybrid solution of part Scottish Executive grant and part private sector funding through a SPC; and
- Up-Front Capital Grant from the Scottish Executive;

For the purposes of the private sector funding of the INFRACO the prudent option is to use a mixture of equity, subordinated debt and senior debt. The proportion of equity and subordinated debt to senior debt has been split in the normal market ratio 10:90. A senior debt solution has been modelled as this offers the greatest degree of flexibility albeit with a cost implication; this is therefore regarded as a conservative structure. No benefit has been included that might arise from an EIB route or a bond structure. A bond financing option while possible is more likely to be used as a refinancing option once the construction period is over. The contract with the INFRACO should be structured in a way to capture a share of any refinancing benefit. This funding strategy represents a conservative approach based on current market practice and reflects current market conditions for infrastructure projects.

6.8 Conclusions

The way in which the public sector funding is input to the project, whether by way of grant or support for a private sector Unitary Charge, needs to remain under consideration until submission of the Outline Business Case. A commercial funding solution would utilise a mix of equity and commercial debt funding through a PFI/PPP contract. A bond solution may be more effective but this will largely be dependent on rates pertaining at the time of financial close and will be a decision for the INFRACO. Leasing is an option which will remain under consideration as a means by which to capture the maximum tax benefit possible.

7 Revenue & Cost Analysis

7.1 Capital and Operating Costs

Source of Costs

The capital costs for the line have been prepared by Faber Maunsell and are based on the preferred route alignment agreed with **tie** and the Council in September 2003. These costs include the infrastructure, vehicles and the start up costs associated with the project. The costs are based on the outturn costs for other systems in the UK and have been subjected to a benchmarking exercise by the technical advisers and **tie**.

The original costs provided were the "base costs", i.e. the consultants estimate of the actual cost of the work based on the analysis to date. A contingency is added as there is the potential for elements arising that may result in cost overruns. The overall contingency in the final figures was 8.5% when applied to the total capital base cost amounting to £21.8 million. The base costs, together with the identified contingency, represent the Specified Capital Costs. The technical advisers have applied the contingency at different rates across the cost captions depending on the perceived potential for capital cost overrun.

The cost estimate breakdown for Line Two is as follows:

Capital Costs

Description	Line Two (£)*
Civil Works	34,756,000
Electrical	27,812,000
Stops	7,083,000
Depot	18,436,000
Track	41,511,000
Land and Property	30,263,000
Vehicles	20,150,000
Utilities Diversions	30,096,350
Prelims	24,580,144
Design	8,602,650
Consent and Co-ordination	3,590,104
Project Costs	9,848,072
Base Cost	**256,728,320**
Specific Contingencies	21,792,000
Specified Capital Costs	**278,520,320**
Optimism Bias	57,793,779
Grand total	**336,314,099**

*All prices at Q2 2003.

Operating Costs

The operating costs are those associated with the day-to-day running of the tram system including staff wages, electricity and insurance. These costs have been provided by Faber Maunsell sub consultant Semaly based on run times and frequencies of the service. In addition a profit margin has been added to the operating costs based on an analysis of operators returns from published information. This margin is similar or more than that submitted by bidders in their responses to the DPOF tender.

The operating costs are forecast to be £6.42m per annum in Q2 2003 prices.

Lifecycle Maintenance

Lifecycle costs have been estimated from the capital cost data. As noted above the capital costs have been derived from a comprehensive database compiled from analysis of costs for the infrastructure works of completed and proposed LRT schemes throughout the UK. The estimated lifecycle costs relate to replacements and renewals necessary over a 30-year operational period and exclude running costs and routine maintenance costs.

The total spend, in Q2 2003 prices undiscounted, is £51.7m.

Farebox Revenue

Farebox income projections have been provided by the Line Two technical consultants Faber Maunsell, based on the detailed exercise undertaken by their sub-consultants Semaly. The

forecasting models provide demand and fare data for 2011 and 2026. To produce a 30 year profile, it is necessary to apply the average annual growth between 2011 and 2026 (the modelled forecast years). The existing revenues are assumed to remain constant from 2026 to the end of the contract. For the period between 2009 and 2011, a backwards extrapolation is applied, subject to appropriate ramp up of demand and revenue.

7.2 Explanation of Methodology used by Technical Advisers to Project Farebox Revenue

This section describes the work undertaken by **tie** and its specialist consultants to develop the revenue projections for the tram project.

Analytical Framework

In December 2000 consultants were commissioned by **tie** to develop an integrated land-use/ transport interaction (LUTI) model to forecast the changes in farebox revenue and journey times by public transport and road. The basic functionality and geographic coverage of the model is now described below (for full details reference should be made to the model development reports).

The model comprises a hierarchical structure. At the top level, there is a strategic land use-transport interaction model, consisting of the TRAM (Traffic Restraint Analysis Model) and the DELTA land use model. This operates at an 88 zone level covering the Edinburgh, Lothian and South Fife area and models at a spatially aggregate, but temporally and functional detailed level. This covers the full range of travel responses to transport and land use changes, including trip frequency, destination, mode and time of day. The land use model operates interactively with the transport model, forecasts the levels of land use and associated population and employment levels. This is based on the baseline scenario 2001 and forward looking policy inputs (the level of allowable development permissions by zone and year).

The LUTI model is sufficiently detailed to forecast global responses to transport interventions but does not contain sufficient detail to identify individual road, junctions or public transport services. Detailed assignment models (DAM) were developed covering the same geographic area as the TRAM model. These were based on cordoned CSTM3A networks, but have additional detail in the LRT corridors. The DAM models (for highway and public transport) sit below the TRAM/DELTA models, with a disaggregation module being used to pass the forecasts down to the DAM models.

The modelling process used in the development of Tram line Two employs the full functionality of the LUTI model with the TRAM/DELTA models being used to forecast high level responses to the introduction of the tram. The DAM models are then used to forecast detailed patronage estimates for the tram and the associated impacts on the bus network and the highway networks.

The LUTI model was developed in 2001 and calibrated and validated to current data. The DAM models for public transport and highways were cordoned from the CSTM3 model which was calibrated and validated to 2000 by the Scottish Executive Term Model Consultants MVA. CSTM3A was subsequently audited by the Scottish Executive Term Model Auditor SIAS.

The original model development was subsequently enhanced in December 2002 by the development of a Local Economic Impact (LEI) model to forecast the wider economic impacts of transport changes.

The model, which has been classified as complex, consists of the following sub-models:

- Road assignment model;
- Public transport passenger assignment model;
- Mode choice model;
- Trip generation and trip distribution assumptions based on trip end data; and
- Transport and land use interactions model.

The format of the demand model is policy sensitive. Changes to the transport network (i.e. the supply) change the cost of travel and this can lead to changes in the pattern of travel demand. Conversely, changes in travel demand can lead to changes in the costs of travel on a given transport network, particularly where congestion or crowding occurs.

The model can explicitly simulate within the system the key traveller responses to different policies as follows:

- Change in trip frequency;
- Change in trip destination;
- Change in mode of travel (car, walk/cycle and public transport);
- Change in time of travel (24-hour weekday); and
- Change in route of travel.

The LUTI model consists of a suite of inter-linked sub-models as follows:

DELTA – a land-use model involving various sub-models that predict changes in demographics, car ownership, employment and economic conditions, and combines these with the travel costs impacts of new transport infrastructure to predict changes in future land-use and the corresponding changes in the demand for week-day travel (bespoke software);

TRAM (Traffic Restraint Analysis Mode) – an 88 zone strategic transport model was used to predict changes in travel behaviour resulting from the changes in transport supply and /or demand for travel (e.g. mode-choice, time-of-travel, destination choice) and to output resultant travel cost changes (bespoke software); and

Park and Ride (ADJPNR) – model to provide detailed modelling of formal Park and Ride services (by bus, rail and/or LRT) (bespoke software).

Highway DAM – detailed assignment model to predict route choice and provide corresponding predictions of traffic flows and link/junction delays resulting from these on the road network. A city centre parking model simulates the impact of parking changes. The model is used to forecast journey time changes and highway speeds, which are then passed to the PT modelling of buses;

PT DAM – detailed public transport assignment model to predict sub-mode and route choice for public transport impacts at a service-to-service level. The CSTM zones are too large for the tram scheme, so larger zones in the proximity of the tramline have been disaggregated. The model forecasts overall changes in journey times and revenue.

The model forecasts public transport patronage and revenue for the AM peak hour, inter peak hour and the PM peak hour, for 2011 and 2026. The economic benefits were assessed using TUBA (Transport User Benefit Appraisal), which is a multi-modal, variable trip matrix (VTM) economic appraisal package.

The Modelling Appraisal and Working Group (MAWG) was set up and chaired by **tie** to review all transport modelling issues and ensure consistent good working practice. Membership consisted of members of the appointed technical advisers for Lines One, Two and Three as well as the consultants appointed to assess the Network Effects due to the combined impacts of both Lines One and Two. The model developers MVA and DSC were also members of the group. A series of technical notes recording the limitations of model in terms of modes and interactions (assignment, mode split, etc) along with other factors taken into account during the course of the model were discussed at the MAWG.

7.3 Value Engineering and Cost Optimisation

7.3.1 Introduction

This note describes some of the key value engineering decisions that were taken during the development of the preferred route for Edinburgh Tram Line 2 and summarises some of the issues considered as part of the appraisal process.

It also describes the cost optimisation exercise undertaken since the preferred route was chosen. This identifies and assesses potential Capex savings that may be derived from modifying current design assumptions and specifications. It also highlights potential impacts on other planning and operational parameters if these modifications were to be adopted in the final scheme.

7.3.2 Value Engineering of the Preferred Route

The following items are discussed in the order in which they have contributed to the overall reduction in capital expenditure and the maximisation of value.

- **Roseburn to Carrick Knowe**

  Three options were presented at Public Consultation. The southern route option (A) was ruled out at an early stage due to significant impacts on residential properties. The remaining options were a northern route option (B) and a hybrid of options A & B (C). Option B was recommended as the preferred route over option C, as option C required 2 major crossings under the existing mainline railway. This would have resulted in disruptive possessions required at £750k each and significant immunisation and compensation costs. Route option C is also less direct than option B and would have had an adverse impact on operating costs and anticipated revenue due to the longer run times. Lifecycle costs would also have been greater in Option C due to the high maintenance associated with the tight radius curves, signalised junctions and highways. Option B therefore offered overwhelming benefits in terms of its Network Rail interface, maximisation of operating speed and revenue and minimisation of Opex and Lifecycle costs in addition to Capex.

- **Gogarburn**

  At an early stage in the appraisal process, a preferred route alignment was developed which avoided negotiating a new access road and over bridge to the Royal Bank of Scotland (RBS) site at Gogarburn. However, several environmental concerns were raised in connection with the preferred alignment and a value engineering exercise was undertaken to assess five alternative options which explored the feasibility of either crossing the RBS access road or modifying the

access arrangement completely. Three options which crossed the access road (A3, A4 and A5) were either found to be difficult to implement in terms of track alignment constraints or were assessed to have an unacceptable impact on traffic using access road and the A8 dual carriageway. The remaining options (A6 and A7), which remodelled the RBS access, would have required significant additional capital expense and would have resulted in considerable disruption to RBS during construction. The preferred route option (B2) was confirmed by the study to demonstrate overall savings in Capex and maximisation of all other benefits. Environmental impacts were mitigated by modifying the final alignment to avoid directly affecting Gogar Village.

- **South Gyle Access**

  A high density of public utilities apparatus are present at the junction with Bankhead Drive and a value engineering exercise confirmed that it was more cost effective to bridge over the South Gyle Access in order to minimise the cost of utility diversion works.

- **Gogar Roundabout**

  Immediately to the east of Gogar Roundabout, the preferred route crosses the A8 dual carriageway and in order to avoid compromising the flight paths of Edinburgh Airport, the alignment must pass beneath the A8 rather than bridge over it. A value engineering exercise was undertaken to confirm the preferred construction method for a tunnel in this location. Bored pile, jacked box and carry in structure solutions were assessed, particularly in terms of minimising the requirement for traffic management on the A8 and reducing capital costs. A jacked box solution was confirmed to be the cheapest option offering a saving of up to £500k over the bored pile option. However, the feasibility of this option depends on the receipt and analysis of more detailed geotechnical investigation data.

- **Other Minor Road and Track Crossings**

  The preferred route crosses several minor roads and tracks and at-grade crossings have been chosen over grade separated solutions in these locations as they offer significant capital cost savings.

7.3.3 Cost Optimisation Exercise

Following Public Consultation and the selection of a preferred route for Line 2, a cost optimisation workshop was held on 2 October 2003 to explore further capital cost savings that might be achieved in delivering the final scheme. Representatives from **tie** and Line 1 and 2 Technical Advisers discussed assumptions that have been developed during the design process and challenged the basis of agreed specifications. These included common assumptions on vehicle parameters, stop equipment, track construction and quality of street finishes.

Several suggestions were also made with respect to the reduction of route lengths, number of stops, park & ride sites and single line (bi-directional) running. The potential for Capex savings from these ideas will be assessed by the Network Effects team.

The remaining options for reducing Capex have been assessed and estimates for potential savings on Line 2 are presented in the attached table. In almost every option, the reduction in Capex leads to an impact on one or more other factors and the likely effect on Opex, Patronage, Revenue, Life Cycle Costs, Planning Approval and Public and Operator Perception have also been assessed.

Although the principal objective of the cost optimisation exercise concerns the minimisation of Capex, other suggestions to improve Opex and Revenue were discussed.

7.3.4 Conclusions

The cost optimisation exercise challenged many of the current design assumptions, particularly with respect to equipment provided at stops. It is estimated that at best £3.65 million may be saved on capital expenditure for Line Two if all the suggested changes were to be implemented. However, this represents a relatively small proportion of the overall capital cost of Line Two (approximately 1%).

It is considered that these initial savings will have a detrimental impact on the quality of service. For example the potential cost savings from deletion of stop equipment is perceived as having an overwhelming influence on patronage and revenue through the loss of the quality elements of the service. This influence is seen as being medium to high negative, despite the additional operating expenditure savings that may be gained.

The specified capital costs already reflect compromise on a range of potential options. Many of the suggestions may also impact on the ability to gain planning approval and these options may have to be ruled out on these grounds alone.

It is felt that public perception of the tram system and the views of the future operator will also be adversely affected by many of the suggestions arising from the subsequent optimisation exercise. Although the impact of the changes is difficult to quantify, a poor image of the tram system is certainly one which **tie** and their advisers would not wish to promote. Therefore at this stage none of the cost cutting options have been factored into the analysis as they are deemed unfavorable when considering the overall objectives of the project.

7.4 Benchmarking of Capital and Operating Costs and Revenue Against Other UK Tram Projects

The technical adviser team has constructed the cost profiles for the STAG submission and has brought together cost and other relevant information for each of the UK systems which have been developed. It is important to acknowledge that in various projects, significant costs and risks have been avoided through the application of a PFI/PPP contracting methodology and, as a result, reference to out-turn costs is difficult to achieve. However, taking examples from publicly quoted companies would indicate that project-wide construction cost over-runs have been up to 25% of award construction cost. **tie** will manage this cost risk by structuring an integrated construction and equipment contract. The main construction risk areas have included design initiation and scope definition, utilities diversion, scope of streetworks, land acquisition and compensation, overhead line equipment interface with streetworks and utilities, traffic management and construction delays, system integration, Network Rail interface and (significantly in all completed projects) a high emphasis upon planning risk. Completed projects have typically over-run by three to six months with minimal Promoter downside risk due to the contractual structures used.

Significant changes to the appetite of the banking, insurance and construction markets have occurred which were not recognised by other Promoters (between 2001 and 2003) and this resulted in considerable time delays and resulting price escalation on three major projects. Following discussions with current Promoters it is clear that knowledge of current market thinking would have influenced the shape of proposals sought. **tie** has the benefit of applying the lessons learned.

It is believed safe to conclude that the private sector will no longer cost-effectively absorb significant revenue risk and as a result revenue risk is best retained by the public sector. Assuming this approach most promoters would now be seeking a two-contract structure with separate infrastructure and operations contracts. Within the DPOF process outlined in Section 5, **tie** has invited the Operator to participate in a revenue pain/gain sharing methodology and will receive responses from the market to this proposal shortly.

There have been significant cost escalations in the utilities diversion budgets for all recently promoted projects. **tie's** technical advisers have taken this data into account in constructing the cost data. **tie** has determined that Promoters are now beginning to re-visit the methodology and justifications for diversions.

Tram priority is virtually universal with due consideration being given to other public transport (buses) and then to other road users.

A majority of tram projects have an AM peak hour travel time advantage over alternative public transport (bus) and this is thought to be a critical factor in the successful operation of the tram system.

Through the early engagement of the Operator and full discussions with public transport operators it should be possible to optimise the potential for an integrated transport solution.

8 Financial Model Assumptions

8.1 Summary of Assumptions in Financial Model

A financial model has been developed by Grant Thornton in conjunction with representatives of **tie** and the Council transport team in order to demonstrate the potential funding strategies for Line Two together with their financial impacts. It brings together the cost and revenue analysis from the technical advisers and reflects the procurement and funding options identified within sections 5 and 6.

One of the main objectives when designing and building the model was to keep it as flexible as possible, and allow the separation of the operating contract and the infrastructure and equipment supply contract in line with **tie**'s decision to proceed with the DPOF process. For this reason the model has been designed on two levels:

- An INFRACO model has been developed to reflect those elements of the contract, predominately infrastructure, vehicles lifecycle and maintenance costs, which may be wrapped up into the INFRACO contract and delivered using a Design, Build, Finance and Maintain procurement structure.

  The model utilises three options to fund this contract. The first option is a standard PFI/PPP funding plan of 90% senior debt, and 10% risk capital. The risk capital is injected into the project as approximately 9% subordinated debt, and 1% ordinary share capital. This model assumes that the costs of the project are funded by project loans which are repaid during the 30 year contract period. The total costs associated with the contract are reflected in an annual Unitary Charge, for the availability and maintenance of the system which would be met by the public sector over the contract period.

  A second option has been modelled to reflect a hybrid funding structure, whereby a mix of 70% public sector milestone payments and 30% private sector debt are used to finance the up-front capital costs, thereby reducing the annual Unitary Charge payment required by the SPC.

  In both the Full PFI model and the Hybrid model, loans will represent no more than 90% of the commercial funding requirement over the period of the contract, and repayments have been sculpted to optimise the cashflows within the models, whilst minimising the funding costs passed onto the public sector. The balance of commercial funding is from private sector equity.

The third principal option has been to develop a public sector model which uses up-front capital grant to finance the construction of the project obviating the need for any private sector funding.

- An operational model has been developed to sit on top of the INFRACO model and consolidate all elements of the tram project together. This incorporates the Unitary Charge payment calculated in the INFRACO model above, with the operating cashflows (costs and revenues) of the project as identified by the technical consultants. The operating elements are separate from the INFRACO to reflect **tie**'s decision to follow the DPOF procurement route as set out in section 5. This consolidation model does not assume that external funding is available to support the operating contract, rather it utilises the net surplus/deficit of the operating contract to offset the Unitary Charge calculated above to give the net public sector funding requirement over the life of the project.

Model Inflows and Outflows

The consolidated model is essentially a cashflow representation of the inflows and outflows associated with running Line Two.

Inflows

The main cash inflows to the model can be summarised as follows:

- Tram revenue streams (farebox income);
- Commercial borrowings in the Full PFI and Hybrid models (repayable through the Unitary Charge); and
- Public sector funding in the form of Unitary Charge and/or capital milestone elements.

Outflows

The main cash outflows of the model can be summarised as follows:

- Capital costs of procuring the tram line and equipment;
- Lifecycle maintenance costs;
- Operational costs representing the day to day running costs of the tram;
- Debt servicing and repayment; and
- Taxation.

Public Sector Funding

The Scottish Executive have indicated their willingness to provide funding support to assist in the delivery of the Edinburgh tram network. This could be utilised to fund either up front capital costs or over time to support the on-going costs of the tram, including debt servicing through payment of the Unitary Charge.

Assumptions Within the Model

The following are the key assumptions that have been made within the financial model. These assumptions have been discussed with **tie** and the appropriate expert advisers.

Inflation

Operating costs: indexation on operating expenditure is assumed to be 2.5%. This is assumed to be the same as the RPI figure, based on the benchmarking analysis completed by **tie** into other tram networks.

Capital costs: indexation on capital expenditure is assumed to be RPI + 1.25%. This is above the assumed RPI figure of 2.5% to reflect the current market conditions within Edinburgh, and also the wider impact of the buoyant construction industry.

Farebox Revenue: Farebox indexation is assumed to be 2.5%. At the current stage of development there is no fares policy agreed with a potential operator; this will emerge from the DPOF process and discussion with the Council. It is therefore deemed appropriate that the fare revenue will have an inflationary factor of RPI, in the absence of any other guidance.

Private Sector Funding Assumptions

Within the Full Private Sector and Hybrid models there are a number of assumptions made regarding the funding arrangements. These are made on the basis of the market conditions at present and have been benchmarked against similar projects.

Interest

The interest rate on commercial funding is assumed to be at current market rates. This reflects a conservative estimate of medium/long term rates going forward and includes a risk premium associated with the nature of the project.

The interest rate on cash deposits is assumed to be at current market rates.

Equity Bridge

This is a normal project finance cost-effective funding method. It is a senior debt bridging facility injected at the start of the project, which is replaced by the subordinated debt at the start of operations. As a result the equity bridge is at a lower margin than the senior debt as it is repaid earlier.

Subordinated Debt

As mentioned above the subordinated debt will replace the equity bridge at the start of operations. This is a form of equity funding and will be provided by the sponsors of the project and/or third party interests. The interest and capital payments will be paid, if there is cash available once the senior debt repayment obligations have been met. The rate is based on current market parameters. The capital repayments are limited to the lower of the proportion of senior loan repaid in the prior 12 months or the cash available.

Equity

The equity will be provided by the sponsors of the project and/or third party investors. The equity injection represents 1% of the total funding requirement. This is pure equity, however

the return on the equity has been combined with that of the sub-debt to achieve a blended rate for the risk capital portion at current market levels. The return on the equity is in the form of dividends, which will not be paid until the INFRACO has positive reserves.

Timing Assumptions

Actual construction is scheduled to commence in July 2006, although there will be initial expenditure in the six months prior to that date relating to design fees and land purchases. This initial expenditure will not be part of the INFRACO contract.

8.2 Tax/VAT Issues

VAT Assumptions

The models have been prepared on a VAT neutral basis, i.e. it assumes that the INFRACO will recover all the VAT charged to it, on the basis that it will be making taxable supplies (i.e. charging VAT) to the Council. The Operator will be collecting zero rated fares (acting as an agent) and as a result will be in a VAT neutral position.

8.2.1 Capital Allowance Assumptions

The capital expenditure will be incurred by the INFRACO, which will be a limited company, and within the charge to corporation tax.

Based upon the guidance set out in the Capital Allowances Act 2001, capital allowances are claimed on various aspects of capital expenditure in Line One. A prudent approach has been adopted on the amount of capital expenditure eligible for capital allowances. The capital allowances are based on the inflated capital cost at the start of construction, excluding the cost of land and design fees.

Expenditure on electric, track and vehicles have been deemed allowable for plant and machinery capital allowances. Industrial buildings allowances are claimed for the depot, the actual stops, and an element of the civils work.

The lifecycle maintenance may also be allowable for capital allowances.

9 Financial Model Output

9.1 Introduction

This section draws together the information contained in the previous sections of this Preliminary Financial Case. The section utilises the information provided by the Line Two technical consultants on revenues, capital expenditure, operating costs and lifecycle costs. These are based on the core assumptions agreed between **tie** and the Line Two and Two technical consultants as summarised in section 8.

The models have been developed to reflect the conclusions of the Procurement Group and the proposed separation of the operating and infrastructure elements of the contract.

The section illustrates the funding cost implications of procuring Line Two using three different funding assumptions, Full PFI, a Hybrid or Up-Front Grant funding. The models include, where relevant, commercial funding assumptions, which are considered to be achievable in the current marketplace. In the Full Private Sector and Hybrid models a Unitary Charge is identified which would be required to be paid to the INFRACO over the duration of the contract. This Unitary Charge would require funding through annual support payments to the Council from the Scottish Executive.

The Hybrid and Up-Front Grant funding receive Scottish Executive milestone funding during the construction phase. This is used to fund part or all of the construction costs as and when they are incurred.

It is assumed that land and design costs will be incurred in the period prior to the start of construction. The operations are modelled to begin in December 2009 with a 30-year operational phase

9.2 Financial Model

The model has been run to demonstrate the implications of three funding options:

- Full PFI: Reflects a Design, Build, Finance and Maintain contract for the infrastructure and equipment supply with 100% commercial funding repaid by the public sector through a regular Unitary Charge and the separate procurement of the Operating contract under the DPOF process;
- Hybrid: Reflects a similar route to that outlined above, however an element equivalent to 70% of total INFRACO funding requirement is met by public sector grant on the basis of milestones which reduces the commercial borrowing requirement. The balance of the funding is repaid, as above, by way of a regular Unitary Charge which is also required to

cover the INFRACO maintenance lifecycle costs. The operating contract is procured separately following the DPOF route as above; and

- Up-Front Grant Funding: Assumes the public sector fund the total initial capital element and lifecycle costs with grant support. In this scenario no commercial funding is utilised.

For each of the models the following key elements of the project cash flows are presented for comparison:

- Unitary Charge - Relates to the annual/regular payments paid to fund the INFRACO where applicable;
- Lifecycle Costs - planned maintenance and refurbishment costs, to be met by the INFRACO;
- Revenue - the annual income from the project in the form of fares;
- Operating Costs - the day to day running costs of the tram system; and
- Public Sector Grant Funding - relates to capital or lifecycle expenditure that is funded by public sector grant. Some of this may be enabling works;
- Total - represents the net cashflows from the model on a real (April 2003) basis

Application of Optimism Bias to Detailed Financial Model

The detailed financial models described in this section have utilised the full extent of the identified level of Optimism Bias for this project. This has been done to demonstrate a "worst case" scenario. As noted earlier **tie**'s risk procedures, together with the DPOF approach, have been developed to mitigate the impact of this.

The section below sets out a summary of the key results from the financial models.

Full PFI

This model assumes that the infrastructure is fully funded with commercial finance with the exception of certain enabling works which are delivered through Public Sector Grant Funding. The INFRACO is paid through a regular Unitary Charge over the length of the contract, which meets both its funding obligations and annual costs.

(1) The NPV of the cashflows of the model including payment of a Unitary Charge, system operating surplus and public sector grant funding for enabling works is £435 million

(2) The Unitary Charge in cash terms in the first full year of operation, ending 31 March 2011 would be £39.9 million.

(3) Public Sector Grant Funding is utilised in this model to finance certain land acquisition and initial design costs in the six months prior to commencement of construction

Hybrid

This option assumes that the capital funding requirement is met 70% by Public Sector Grant Funding with the balance from commercial funding. The INFRACO is paid through the milestones and the Unitary Charge.

(1) The NPV of the cashflows of the model including payment of a Unitary Charge, system operating surplus and public sector grant funding for enabling works is £347 million

(2) The Unitary Charge would be reduced in this model as the utilisation of public sector funding through milestone payments to the INFRACO reduces the commercial funding requirement. The Unitary Charge in cash terms for the first full year of operation, ending 31 March 2011 would be £14.5 million.

(2) Public Sector Grant Funding funds the milestone payments made up-front to the INFRACO for construction and installation of the system together with land acquisition and initial design costs noted above.

Up-Front Grant Funding

This option assumes that Public Sector Grant Funding is available to pay for the infrastructure as it is installed, therefore commercial funding is not required, and hence there is no Unitary Charge. The lifecycle is therefore not included within a Unitary Charge but funded as and when it is performed, either through an operating surplus, or additional Public Sector Grant Funding if necessary. It should be noted that these figures do not include any allowance for differential risk allocation for the risks retained by the public sector under this option. This will follow detailed analysis of the infrastructure procurement contract.

(1) The NPV of the cashflows of the model including construction costs, lifecycle costs, system operating surplus and enabling works is £297 million.

(2) No Unitary Charge is payable in this model as all funding is by way of Public Sector Grant.

(3) All lifecycle costs are met by Public Sector Funding or available operating surplus.

9.3 NPV Analysis

In order to progress a discussion with the Scottish Executive on the optimal funding strategy, the results of the model must be examined. The table below illustrates the total Public Funding requirement after taking into consideration all costs and income for each of the three outlined options. The Net Present Value calculations have all been taken back to a base date of April 2006. This analysis gives a comparison of the relative cost of the three schemes by discounting the cashflows. This represents a cost in present day values but is not the actual cost of the scheme. No account has been taken, at this stage, of any analysis of the impact of different risk allocations across the options. The public procurement route implies that significant risks could be retained by **tie**/the Council and this will have an impact on the NPV analysis. This analysis will be undertaken following completion of the DPOF process and development of the INFRACO contract. At that point a detailed risk matrix for Line Two with allocation and pricing of individual risks will be completed and factored into the models to facilitate a Value for Money assessment. Such an assessment may produce a different NPV result to that shown below.

	NPV £'000
Full PFI	435,063
Hybrid	346,665
Up-Front Grant Funding	297,188

The Full PFI route has the highest NPV of the three options. This is because it has to fund the cost of borrowing private funds and also the tax burden of the INFRACO. The main advantage of this option from a funding perspective for the Scottish Executive is that the payments are made over a period of time (30 years in this case). In addition, there may be risk transfer benefits from such a solution.

The Hybrid option is similar to the Full PFI option except that part of the capital expenditure is met by Public Sector Grant Funding. This is attractive in that it lowers the NPV, but does mean that the Scottish Executive will have to find significant funds to fund an element of the initial capital expenditure.

The above analysis clearly indicates that the Up-Front Grant funding option carries the lowest NPV of the three options subject to a further risk analysis. This however assumes that the Scottish Executive is able to provide the funds required for the capital expenditure over the proposed three year construction programme.

9.4 Sensitivity Analysis

Sensitivities have been run within the financial modelling exercise, designed to simulate a number of the key financial risks regarding inflation and interest rates. These sensitivities are not designed as a comprehensive review of risk as it relates to each individual project, but rather to test the overall robustness of the Line Two financial structure. As there is still some two years before financial close is reached on any INFRACO contract, the sensitivities indicate how the model could differ due to changes in market conditions.

A change in the interest rate will only affect INFRACO through its cost of funding. The risk of a change in interest rate will be with **tie**/the Council until the INFRACO contract is let. At that point the INFRACO should fix its interest rate for the duration of the loan term effectively hedging against any exposure to future rate changes. The effect of a 1% increase in interest rates results in an increase in overall NPV of 9% in the Full PFI model and 4% in the Hybrid model. In the Up-Front Grant funded model there will be no effect on the NPV due to interest rates as there is no commercial funding.

The effect of inflation is more complex and affects all 3 models directly. Changes in the assumptions concerning the future inflation rate will result in changes to the capital amount to be funded and hence impact on all procurement routes. A plus or minus 1% change on the rate of inflation changes the Full PFI NPV by circa 13%, Hybrid by circa 6% and Up-Front Grant funded route by circa 1.4%.

9.5 Sources and Applications of Funding

The financial models developed to support this Preliminary Financial Case contain revenue and cost inputs based on **tie**'s technical consultants analysis of the project. The models also contain assumptions regarding commercial funding parameters based on current market conditions.

The capital costs of construction, life-cycle capital costs and operating costs are based on best advice from the technical consultants. These costs will be proven only when contractually binding bids are received and as yet no legal commitment has been entered into by **tie** or the Council. Revenue estimates have been prepared by the technical consultants using standard industry methodology, but these will also be further informed by dialogue with the operator selected through the DPOF process. Contributions from property development and other commercial sources depend upon transactions which have yet to be fully developed and the additional funding sources identified in section 6 above represent reasonable estimates of income from the identified sources, but these have not yet been the subject of any formal commercial negotiation process.

In order to identify the funding requirements of the Line in the context of the proposed Edinburgh Tram Network the Scottish Executive support has been allocated by **tie** to this Line based on a proportion of its capital costs compared to Line One. The table below utilises the Up-Front Grant funded model and sets these against the potential funding sources. The table has been set out on the basis of the Specified Capital Costs identified by the technical consultants including their identified contingency but excluding incremental Optimism Bias.

Tram Project Funding Model

Note: Figures are illustrative pending final information. All figures stated at 2003 prices

If the funding gap is assessed on the assumption that Line One and therefore the St Andrew Square to Roseburn section will have the necessary funding, this element can be removed from the Line Two funding assessment. Consequently the funding required for Line Two would be as follows:

	Project Cash Flows		**Funding Cash Flows**
Capital cost of construction	213,300,000	Allocated Executive Grant	165,000,000
Add : Contingency advised by consultants	17,100,000	Other funding	65,400,000
Total expenditure	**230,400,000**	**Total funding**	**230,400,000**

The Specified Capital Cost at the Airport to Newbridge spur is £44.8 million.

tie believes that the estimates overall represent a reasonable view at present of the sources and applications of funding for the Line. Other funding sources of between £65 million and £72 million (allowing for contingency) will be evaluated further during 2004 in development of the Outline Business Case.

9.6 Summary

The three funding options analysed above reflect the cost and revenue assumptions provided by the technical advisers and current market parameters for the commercial funding structure. More aggressive commercial funding solutions such as leasing or utilising EIB funding, could reduce the funding costs within the Full Private Sector and Hybrid options. Capital, operating

and lifecycle costs together with revenue projections will be subject to further review and refinement during the DPOF process and prior to conclusion of an INFRACO contract.

The models illustrate three options for consideration by the Council and Scottish Executive as ways in which to fund Line Two. A SE grant funding route would offer the lowest NPV, subject to an analysis of risk pricing and allocation which may impact on the VFM assessment. This route does require significant resources to be available from public funds during the construction period, 2006 to 2009. A Full Private Sector solution requires greater cash in nominal terms but spreads the burden over the contract period and could transfer a significant element of risk onto the INFRACO. The Hybrid option can be solved to balance the available public sector funding support with the consequent implications for the NPV. Risk transfer under the Hybrid should be broadly similar to that achieved under a Full Private Sector solution.

The sources of funding required in addition to the Scottish Executive Grant will be pursued and refined as the project progresses.

It is anticipated that the Council and Scottish Executive will confirm as to which of these routes is preferred and if any should be discounted from consideration at this stage.