Edinburgh Tram Network ("ETN")

Interim Outline Business Case ("IOBC"), May 2005

Appendices

Draft for Discussion

30 May 2005

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Appendix A – Previous Tram Assessment

Executive Summary to :

- **Feasibility Study for a North Edinburgh Rapid Transit Solution – July 2001**
- **Edinburgh LRT Masterplan Feasibility Study –January 2003**
- **Parliamentary Submission – STAG and Preliminary Financial Case**

Edinburgh LRT Masterplan Feasibility Study, January 2003 – Executive Summary

EXECUTIVE SUMMARY

Study Objectives

- To identify a "viable network" of LRT routes which, in conjunction with other modes, will best meet Local Transport Strategy (LTS) and other project specific objectives;
- To produce outline capital, revenue and operating costs for the LRT lines;
- To provide sufficient data on LRT routes for use in the overall assessment and prioritisation of schemes with the Integrated Transport Initiative (ITI).
- To provide inputs to the development of the road use charging scheme business case and to support applications to the government for approval and funding of the ITI.

Background

There is substantial road traffic growth across the Edinburgh area combined with forecast population and employment increases which will lead to significant growth of road congestion. CEC is examining ways to provide a comprehensive, higher quality public transport network to support the local economy and help to create a sustainable environment. The Local Transport Strategy adopted by CEC in 2000 includes the development of a light rapid transit system.

To address the need for substantial investment in transport in and around Edinburgh, CEC has developed the Integrated Transport Initiative (ITI), which includes the possible introduction of road user charging; this would allow major schemes, such as a tram network, to be financed.

Study Process

A two phase approach was devised using the Central Scotland Transport Model (CSTM) held by the Scottish Executive as the main forecasting tool. The first phase comprised a comparison of corridors and their appraisal against preliminary criteria based on Scottish Transport Appraisal Guidance (STAG) 1 requirements. This comparison led to recommended schemes for more detailed assessment at Phase 2 which forms the basis of recommendations on priorities for LRT implementation.

Phase 1

The assessment of the prospects for light rail at corridor level was based on three main considerations:

- the scale of demand;
- the alignment opportunities;
- the likely scale of new development.
- Our initial review of the scale of demand using trip data in CSTM3 reveals the following main patterns:
- the main travel markets are east-west and northwest-southeast;
- all large travel markets are radial to the central area;
- the strongest markets are Silverknowes and South Leith to the Northern Central area and Corstorphine, South Leith, Portobello and Moredun/The Inch to the Southern Central area;
- the flows between South Gyle/Stenhouse and the Central Area are of medium scale (14,000-16,000 trips/day) but, in effect, represent a larger combined movement corridor;

- flows to the south and southwest of the city centre are generally lower and offer fewer prospects for high quality public transport investment, at least initially.

Our review included corridors identified by CEC. These included most of the high demand corridors and two with lower demand: the South Suburban Line corridor, where heavy rail options have been studied in detail; and a Southern Orbital Route, which connects residential communities in south Edinburgh with employment areas to the west and south east.

The scope for LRT depends on whether viable schemes can be devised that will deliver reliable operation. Taking account of the alignment flexibility of light rail and its operating economics, each of the corridors was reviewed with the following main conclusions.

Silverknowes has one main road corridor into central Edinburgh, the A90 Queensferry Road and the former railway alignment connecting Haymarket and Granton/Davidson's Mains. There is very limited opportunity for segregated LRT alignments along the main road. However, it would be possible to install LRT on the former railway branch to Barnton as far as Davidson's Mains.

Newhaven/North Leith. These areas are linked to central Edinburgh principally via Leith Walk, a wide road offering good scope for segregated LRT. The Newhaven area might be served via Bonnington though there is little scope for segregation of LRT in this area, but some scope for use of former railways.

South Leith. The only feasible direct radial route for light rail is via Leith Walk, which is generally wide enough to accommodate it.

All three of the above travel markets would be directly served by the **North Edinburgh LRT scheme**, a 16km loop connecting Waverley and Haymarket stations with major redevelopment areas at Granton and the docks at Leith. This is the scheme developed by Edinburgh Waterfront.

Corstorphine/Murrayfield would involve an LRT route north of the Edinburgh-Falkirk railway line. There is only one radial main road that could provide an LRT alignment, the A8 Corstorphine Road. This road is heavily used but there are sections of bus priority. LRT would reallocate road space to public transport. The use of the former Corstorphine rail branch formation could be of value, but does not form a complete solution.

South Gyle/Stenhouse. The West Edinburgh Busway (WEBS) is already defined parallel to, and south of, the Edinburgh-Falkirk railway line through Saughton. Therefore, this corridor offers segregated LRT alignments with minimum impact. There are also opportunities for extension towards the Airport.

Moredun/The Inch. This area is linked to central Edinburgh by the A7, Dalkeith Road and by the A701/A772, which run parallel in from Cameron Toll. There are opportunities for segregated LRT alignments along Gilmerton Road and Old Dalkeith Road. North of Cameron Toll the situation is complex with continuous frontage development on both main road routes. Segregated LRT could use the South Suburban railway route, but this is too circuitous to be attractive. Traffic engineering solutions seem possible to create space for LRT.

Portobello. A densely developed corridor along the A1 and the East Coast Main Line. The A1 Greenway carries significant bus flows and LRT would raise significant issues of competition and of disruption during construction. Given the difficulty in finding segregated alignments, this corridor cannot be regarded as the priority for LRT unless road space can be allocated. However, the large travel market presents a key opportunity.

Each of the corridors was considered for significant proposed and committed developments. These generally support tram corridors to north, west and southeast Edinburgh.

The CEC network included possible lines serving a wider catchment area, including Fife. However, none of these could be implemented without the urban lines. Therefore, only the urban corridors were considered at this stage.

Table 1 shows the intermediate results in Phase 1 and the seven potential LRT corridors subject to STAG 1 appraisal. Only two corridors were not recommended for testing: Corstorphine/Murrayfield and Portobello. Both involve significant alignment problems that may be resolved by detailed study and, although both corridors can give access to major new development, there are alternatives in each case.

Table 1: Corridor Selection for Phase 1 Appraisal

Main Corridors of Demand	CEC Corridors	Alignment Opportunities	New Development Proposals	Select for STAG 1
Silverknowes	Queensferry	Medium	Few	Yes
Newhaven/N. Leith	N. Edinburgh Loop	Established	Significant	Yes
S. Leith	N. Edinburgh Loop	Established	Few	Yes
Corstorphine/Murrayfield	-	Poor	Some	No
S. Gyle/Stenhouse	W. Edinburgh	Good	Significant	Yes
Moredun/The Inch	S/SE Edinburgh	Good	Significant	Yes
Portobello	Portobello	Poor	Few	No
	South Suburban	Poor unless SSL	Some	Yes
	South Orbital	Poor	Some	Yes

The STAG 1 appraisal required the assessment of indicative alignments against STAG objectives.

- **Environment** – indicative scale and scope of environmental impact;
- **Safety** – indicative scale of impact on safety and security;
- **Economy** – indicative impact on access to employment, opportunity for development and the broad capital expenditure, operating costs and revenue for each route;
- **Integration** – indication of opportunities for interchange and integrated public transport, and policy integration;
- **Accessibility** – the indicative size of residential population and employment markets served.

This was coupled with a qualitative assessment against specific local objectives from the LTS:

- to improve accessibility, particularly for people without access to a car, on low incomes or whose mobility is impaired;
- to reduce pollution and environmental damage caused by traffic;
- to reduce traffic congestion;
- to make the transport system safer and more secure for both users and non-users.

Draft Appraisal Summary Tables (AST) were prepared for the long list of routes scored using the seven point STAG scale. Revenue projections were based on initial CSTM model forecasts for all corridors except the North Edinburgh Loop, for which the results from previous work by the Andersen team were used. Operating costs were assessed using average rates from British LRT schemes. Capital costs for each line were assessed also using unit rates based on costs for other LRT systems in the UK.

The unweighted AST scores are summarised in Table 2 for each LRT corridor. The best performing schemes are West Edinburgh, North Edinburgh and South East Edinburgh with Queensferry ranked fourth but with a significantly lower score. South Suburban is the weakest performer. The assessment indicates

that four of the schemes: South Suburban, Queensferry, South Edinburgh and Southern Orbital are unlikely to be cover their operating costs. However, the performance of Queensferry and South Edinburgh could be improved. The three best performing schemes were studies in more detail in Phase 2.

Table 2: Phase 1 STAG Scores

Corridor	Scores	Rank
Queensferry	+8	4
North Edinburgh Loop	+22	2
West Edinburgh	+24	1
South Edinburgh	+6	5
South East Edinburgh	+17	3
South Suburban	+4	7
South Orbital	+5	6

Phase 2

The aim for the Phase 2 appraisal was to assess the short list routes and to consider possible extensions into the SESTRAN area. This required covering: outline alignments; operations; demand and revenue; environmental constraints in more detail and preparing a restricted economic evaluation.

Alignments

The definition of alignments involved the mapping of environmental constraints, the identification of stop location having regard to topography, layout considerations, the need to serve fruitful catchment areas and travel objectives. Alignment criteria typical of light rail/tram networks were adopted:

- absolute minimum horizontal curve radius 25m;
- minimum vertical radius for slab track 250m; ballasted track 400m;
- desirable maximum gradient 6%;
- absolute maximum gradient 10%.

Also the tram services envisaged for each line were defined based on identified termini and stop locations.

The trams were envisaged to be:

- low floor vehicles with a minimum of 50-60% of the floor area at less than 400mm above rail level;
- powered by 750v dc from overhead line;
- 2.4m to 2.65m wide and 24-35m long;

We assumed that single articulated trams of 24m length would be used with capacity of the order of: 60 seated + 120 standing (total 180/car). Trams could operate as coupled pairs if demand warranted.

To assess the run times on each route, tram operation was simulated using the Arup Runtime model. Frequency of service was assumed to be 10 trams per hour (tph) for basic services in line with plans already developed for the North Edinburgh Line.

Demand and Revenue Forecasting

Demand forecasting was undertaken using CSTM version 3. This is a multi-modal model developed to represent traffic movements and mode share for a 1997 Base year. The transport networks were represented in "strategies" including LRT and complementary schemes and policies, mainly highway adjustments. The models were developed for an indicative opening year of 2011.

Each LRT route was coded to allow for interaction with other traffic. Segregated sections were modelled with a maximum operating speed of 70 kph. For street alignments this was 40 kph.

Revenue forecasts were based on sectional fares that apply on buses now. The best fit scale based on LB fares is 50p boarding charge plus 10p per kilometre. For business case preparation, it would be appropriate to include allowances for concessionary fares (an additional proportion of adult fares) and for discounts for travelcard users and child fares (a reduction on adult fares) but information on these proportions in the Edinburgh public transport market was not readily available. On the other hand, no premium was included over bus fares.

A number of **major developments** are planned close to each of the three tram corridors. These could have a significant impact on the demand and revenue forecasts for each line but are not included in the CSTM model. We followed the same general approach to assessing the travel demand to major new developments adopted for the North Edinburgh Loop.

- North Edinburgh Developments (identified and forecast in the Andersen report);
- Edinburgh Park – expansion from existing (from WEPF);
- Royal Bank of Scotland – new headquarters at Gogarburn (development trips from RBOS consultants);
- Edinburgh Airport – growth in airport activity (from WEPF/Surface Access Strategy);
- Shawfair – significant residential and community development (Shawfair Local Plan related documents);
- New Royal Infirmary and associated uses – major hospital development and adjacent medi-park development (local planning information).

A wider catchment could be attracted to tram through **Park and Ride**. However, the location of the Park & Ride sites will be particularly important in achieving significant mode shift. In calculating Park and Ride demand and revenue we assumed that no parking charge will apply. The demand and revenue arising from each Park and Ride site was based on a number of assumptions, derived from observation of park and ride sites elsewhere in the UK, and on the utilisation of the total spaces available. The mode shift forecasts from the CSTM model for the corridor were then used as a diversion factor applied to passing traffic.

Appraisal

The Phase 2 appraisal was also based on STAG with further detail under the key objectives:

- **Environment** – constraints mapping for natural features etc (inc SSSIs, historic monuments etc), issues requiring detailed investigation, areas of significant reduction in traffic-related pollution;
- **Safety** – impact on conflict points and problem locations, reduction in vehicle kilometres travelled affecting the general incidence of road traffic accidents;
- **Economy** – preliminary costs and revenues, impact on development opportunities, travel time savings, quality and reliability benefits including impact on de-congestion feeding into a preliminary cost-benefit appraisal to provide an indicative present value of costs and benefits over a typical 30 year appraisal period at a standard discount rate;
- **Integration** – summary of key interchange points, integration with existing public transport, park and ride, public transport mode share, land use integration, new opportunities for travel, policy integration;
- **Accessibility** – impact on areas of multiple deprivation, effect on social inclusion, public transport links/service provision, access to employment markets and increased opportunities.

As part of the assessment of the wider network benefits, the issues of integrated ticketing, regeneration and future network development were considered.

Outputs from the CSTM model were used to calculate the patronage and benefits arising from each tram route. There are three main benefits for quantification: user benefits arising from reduced journey time, road user benefits arising from the reduction in congestion and accident savings. These were included in a preliminary assessment of Net Present Value. These are all restrictive because some key benefits could not be fully quantified at this stage, e.g. user time savings. However, the results assist in ranking the proposals. Costs for all three schemes were assessed in greater depth and annual revenue projected for 2011 based on constant real fares (bus fare scale) and a cautious demand base assuming some decline in patronage prior to opening LRT but no congestion charging scheme. Phase 2 results are summarised in Table 3.

Table 3: Summary of Phase 2 Results

	North	West	Southeast
Patronage/year	11.6m	4.2m	3.8m
Mode Shift (increase in corridor PT trips)	+2.5%	+13.6%	+7.7%
Capital Cost	£188.6m	£187.2m	£152.0m
O & M cost/year	£4.6m	£4.8m	£3.0m
Revenue/year	£9.6m	£6.0m	£3.9m
NPV (restricted evaluation)	-£36.4m	-£85.6m	-£77.5m

SESTRAN Extensions

None of the SESTRAN area extensions into Fife, West Lothian, Midlothian and East Lothian would be viable without penetrating the centre of Edinburgh. Therefore, extensions into SESTRAN were considered as possible prolongations of the North, West and South East Edinburgh lines.

To consider these extensions on a common basis, the following approach was adopted:

- standard assessment of demand, revenue and operating costs;
- capital costs for each extension are calculated using per kilometre rates;
- that any extensions will be planned to complement rather than compete with any existing or planned public transport schemes.
- the use of existing heavy rail infrastructure assumes existing and committed rail services only;
- tram extensions were considered using the broad alignments given in the brief without investigating enhancement that could improve their viability such as dedicated interchange facilities.

The demand assessment considered trips from the immediate local catchment into central Edinburgh or to key development sites directly served by the tram.

Each extension was also reviewed against the STAG appraisal criteria using scores of positive, neutral or negative only as the scale of impact cannot be determined without more detailed study. The relative performance of each extension must also be considered in conjunction with the relevant Edinburgh LRT line to which it is connected. Table 4 gives a summary of the results.

The Dalkeith extension (F) has the lowest cost and a relatively high patronage density together with a potentially good operating ratio. Extension C (Livingston) seems to have the second best demand prospects but, because of its length, would have high capital and operating costs and is, therefore, ranked lower. Both options for Musselburgh: as a branch off the SE Line (D2) and directly via Joppa (D1) have attractive features. Therefore, D1 is preferred, although it would cost more than D2. Extension E (Penicuik) is high cost, has relatively low patronage and is unlikely to be viable in the form considered, but there may be a case for re-examining an extension via Liberton. Capacity issues on the two existing

river crossings mean Extension A is considered only as far as Dalmeny/Queensferry. We conclude that the priority for more detailed study should be for three of the SESTRAN extensions (DI, F, C).

Table 4: Summary of Key Results and Possible STAG Impacts

Extension	Key Results			STAG Appraisal Criteria							
	Annual Demand (000s)	Operating Ratio	Capital Cost (£m)	Environmental	Safety	Economy	Economic Activity	Accessibility	Transport Integration	Policy Integration	Financial Sustainability
A. Queensferry/Kirkliston	589	0.83	85	O	O	+	+	+	O	O	O
C. Broxburn/Livingston	1,817	1.51	176	O	O	+	+	O	+	+	+
DI. Musselburgh/Joppa	2,172	0.85[1]	121	+	O	O	+	+	+	O	O[1]
DII. Musselburgh /SE Line	1,206	0.60	79	O	O	O	+	+	+	O	-
E. Penicuik	577	0.40	144	O	O	+	+	+	O	O	-
F. Dalkeith	869	1.32	58	O	O	+	+	+	+	O	+

Note: (1) Assuming headways same as 'urban' routes – this ratio improves to 1.4 if the same headways as other extensions are assumed.

Key:
Positive Impact +
Negative Impact -
Neutral Impact O

Benchmarking

To check the scale of the Edinburgh LRT forecasts we compared each line with other LRT schemes in the UK. The Docklands Light Railway and the Tyne Wear Metro were excluded from this comparison because they are of a heavier nature than conventional light rail.

The busiest systems in the UK at present in terms of total patronage and density (passenger kms per route km) are Croydon Tramlink and Manchester Metrolink. In general the benchmarking exercise indicated that the demand and revenue estimates for the three Edinburgh LRT lines are within the range indicated by other UK systems. This comparison indicates that the forecasts appear reasonable although density and revenue/tram km for North Edinburgh are high compared to other networks.

Table 5: Benchmarking

System/Line	Annual Demand		Passenger km per route km (Million)	Annual Revenue (£M)	Revenue per tram km
	Passenger journeys (millions)	Passenger km (millions)			
Manchester Metrolink:					
Phase 1 - Bury/Altrincham	13.7	136.1	4.40	15.8	4.65
Phase 2 – Eccles	2.3	16.2	1.76	1.9	1.90
Croydon Tramlink	16.2	97.0	3.46	12.2	4.36
Sheffield Supertram	11.1	28.0	1.21	7.1	2.96
Midland Metro	5.4	55.8	2.74	3.1	1.63
North Edinburgh Loop	11.6	49.5	3.81	9.6	6.4
West Edinburgh Line	4.2	41.1	2.51	6.0	4.0
South East Edinburgh Line	1.8	19.6	1.94	3.9	4.3

Recommendations

We recommend that the North Edinburgh Loop be accorded highest priority among the corridors tested and that the Masterplan should include both West and South East lines as high priority schemes.

The order of implementation is not determined by technical issues or clear performance ranking. However, there is a strong case for considering the West Edinburgh Line next because of development pressure, the availability of alignments and traffic congestion. We suspect that the performance of this line in our tests was affected by CSTM3 model limitations and the demand forecasts will need careful review.

The three lines work well as a network, based on the core Haymarket-Princes Street alignment. This would achieve important economies, reducing the forecast capital cost from £528m to £468m, and improve the financial case for all lines.

There is potential for further development of all three lines: inner area branches of the North Edinburgh Loop, including to Davidson's Mains, a branch off South East Edinburgh towards Liberton. However, a branch off the West Edinburgh line to Hermiston Gait is not recommended.

Extensions into the SESTRAN area are also possible but the case for these requires more detailed consideration. None of these is likely to be attractive as stand-alone schemes and all should be considered as extensions of Edinburgh core lines. Extension of the West Edinburgh line to West Lothian (Broxburn/Livingston) and of the Southeast line to Dalkeith appear, at this stage, to have the greatest potential, followed by Musselburgh via the Portobello/Joppa corridor, but this depends on the case for the latter which needs further investigation.

The development of the three priority lines will require detailed business cases which should involve new patronage and revenue forecasts using tools developed for the task. These should also enable the likely impact of road user charging and other aspects of the ITI to be taken fully into account. It will be particularly important to resolve alignment problems and to gain a clearer picture of forecast competition between public transport modes.

Feasibility Study for a North Edinburgh Rapid Transit Solution , July

2001 – Executive Summary

Objectives of study
The remit for this report was to consider the feasibility of a rapid transport scheme linking the Waterfront development site in North Edinburgh with the City Centre with a view to submitting a bid for Preparation Pool support from the Public Transport Fund. Following discussions with Forth Ports, the remit has expanded to consider the feasibility of a North Edinburgh Loop. Waterfront Edinburgh Limited formed a Steering Group which included representatives of local businesses and the City Council to oversee progress of the study. The outcome of the report was to identify whether, having regard to Part 1 STAG appraisal criteria a feasible scheme existed which met the objectives of the Steering Group and the Local Transport Strategy. If a feasible scheme could be identified then the report was to identify the costs involved in taking such a scheme through the Part 2 STAG appraisal process.

Consultancy team
The Steering Group appointed a multi-disciplinary team comprising:

- Andersen (financial structuring, risk, procurement, consultation and project management);
- Steer Davies Gleave (demand and revenue modelling, operating costings and economic impact assessment);
- Mott MacDonald (technical feasibility, design, capital costings and environmental input).

The team has undertaken the tasks outlined above over the past six months.
This report summarises the work which has been undertaken and the appendices detail the financial, technical and demand analysis which has been conducted. Throughout the process of compiling this report regular liaison has been conducted with the Steering Group to confirm the options which have been considered with regard to route alignments, technologies, risk and procurement route.

Shortlisted options
A number of route options were considered in evaluating what would create and define the optimum scheme. It rapidly became apparent that the best-fit route alignment should utilise the former railway corridor running from Crewe Toll to Roseburn. This offers segregated running for a significant element of the scheme and avoids many of the “pinch points” which exist in the North Edinburgh area.
Three options were considered:

- An alignment from Granton Square, through the Waterfront site and then via the disused railway line to Haymarket station;
- A continuation of the first option on-street to St Andrew’s Square;
- A North Edinburgh Loop from Granton Square to Haymarket and then St Andrew’s Square, Leith via Leith Walk to Ocean Terminal and then along the foreshore to Granton Square.

Analysis has been undertaken of the different vehicle options. A workshop was held with the Steering Group which reduced the viable options to a Guided Bus or Light Rail vehicle. It was clear from the consultation process that a Guided Bus was not perceived as being capable of achieving the modal shift from cars that could be achieved by a light rail scheme. This solution was also seen to be offering segregation for only a limited element of the route. For the majority of the route length such an option would effectively be no different to the standard bus services operating in the city. The Steering Group felt that this option, whilst worthy of examination in terms of the patronage and cost implications, did not fit with either its objectives nor those of the City Council as expressed in the Local Transport Strategy. Having undertaken the patronage and cost analysis a guided bus option for the Loop makes only a

small surplus at the operating level and it is not a recommendation of this report that such a scheme be pursued notwithstanding the cheaper capital cost.

For a light rail solution, patronage and cost analysis ruled out the Haymarket-only link. The St Andrew's Square option does cover its operating costs from revenue, albeit marginally. However, the most attractive option from a financial and cost benefit perspective is the Loop scheme. An initial cost benefit appraisal has also been undertaken of the Loop which showed that the economic case for the scheme is robust and that its revenue generating capabilities are significant.

A substantial amount of work has been undertaken with regard to both the technical and patronage issues surrounding a light rail scheme on the Loop and a number of route sub-options. This analysis demonstrates that a light rail scheme operating on the Loop is capable of generating an operating surplus of approximately £5 million per annum. This would allow an operator to contribute to the capital costs of the scheme, either through an up-front payment for the right to run the franchise or an annual dividend.

Preferred option benefits

The preferred Light rail option – the Loop scheme – has been subjected to a STAG Part 1 appraisal. In addition, an initial financial assessment and economic cost benefit analysis has been undertaken. The appraisal has demonstrated that the Loop scheme fits well with each of the Government's five appraisal criteria and contributes to meeting the objectives of the Edinburgh Local Transport Strategy. Such a scheme was ranked second in the scheme approval conducted for the Local Transport Strategy; the top-ranked scheme being an Edinburgh wide LRT system.

The financial and economic analysis has demonstrated that the scheme is robust and both covers its operating costs from revenue as well as delivering monetised economic benefits that outweigh the funding gap. The key figures arising from the economic and financial analysis are as follows:

Economic Net Present Value	£275 million
Benefit Cost Ratio	2.65:1
Internal Rate of Return	10%
Annual Revenue	£10.26 million
Annual Operating Margin	£4.8 million
Capital Cost	£191.9 million

Next stage
Consideration has been given in this report to risk and procurement issues. On procurement the recommendation is that the optimum route to pursue is separate infrastructure and operating contracts. This offers the maximum flexibility to add and create extensions to the scheme in the future for South Edinburgh or to the West.

An analysis of the costs involved in taking the preferred option through the Part 2 STAG appraisal process has been undertaken as part of this report. This would be the first scheme of this nature to go through the Scottish Parliament and this, combined with the public profile of the scheme, is anticipated to add to the cost involved. The total estimate to take the scheme forward is £6.025 million and this forms a major element of the City Council's Public Transport Fund preparation pool bid.

The Steering Group consider that the Preferred Option identified in this report offers the City of Edinburgh an excellent opportunity to enhance the prospects of effective economic regeneration of the North of the City through development of an integrated, rapid transport solution. Examples exist in many other cities, including Sydney, London and Copenhagen of the benefits which can be generated from such a scheme. The Preferred Option has secured positive endorsement from the consultation process and has demonstrated a capacity to generate significant revenue surpluses. It fits the objectives of the Local Transport Strategy and offers the potential to create an integrated transport network for the City. A successful PTF application would enable the Council to progress the work required to complete the Part 2 STAG assessment and commence Parliamentary procedures with a view to procurement commencing in late 2004.

Tram Line 1 STAG2 – Executive Summary

Summary

Introduction

The City of Edinburgh 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. This is a key component of the strategy of public transport investment in Edinburgh, part of a £1.5 billion New Transport Initiative that the CEC is working in co-operation with other local authorities in South East Scotland to deliver.

In 2001, Waterfront Edinburgh Limited (WEL) commissioned a preliminary technical and economic Feasibility Study of a rapid transit system in north Edinburgh, led by a Steering Group involving the City Council. One of the objectives of this system was to provide a link between the city centre and the proposals for the Waterfront redevelopment planned at Granton.

This Feasibility Study concluded that a northern loop tram system would maximize a number of positive benefits for the area including economic regeneration and improved accessibility. The Feasibility Study and, critically, an associated preliminary appraisal, was submitted to and accepted by the Scottish Executive, and funding of £6.5m was subsequently made available for the development of the Line 1 project to full appraisal and Bill submission.

The alignment of the Line 1 route is proposed to connect the city centre with Leith, Newhaven and Granton, passing through the Waterfront development area and then along the line of the former Roseburn Railway to Haymarket.

This report sets out the justification and appraisal of Line 1 of Edinburgh tram network, the Northern Loop, linking the City Centre with Granton, Newhaven and Leith, passing through the Waterfront development area and then along the line of the former Roseburn Railway to Haymarket. This line is expected to provide a number of positive benefits for the area, including economic regeneration and improved accessibility.

Planning Objectives

The Council has a well developed transport vision with clear strategic objectives enabling projects to be categorised as part of particular strategies. This is beneficial in taking forward the projects through the STAG appraisal process. However, a further explicit process is needed for developing an option appraisal which addresses the requirements of a STAG appraisal. This process underlies the rationale for the project, by testing outcomes against objectives, assessing likely costs and value for money, and considering deliverability and fundability.

The Council has stated its vision for transport within the Local Transport Strategy (LTS) as follows:

> *Edinburgh aspires to be a city with a transport system that is accessible to all and serves all. Edinburgh's transport system should contribute to better health, safety and quality of life, with particular consideration for vulnerable people such as children, and elderly and disabled people: it should be a true Citizen's Network. The transport system should support a strong, sustainable local economy.*
>
> *The Council will seek to maximise people's ability to meet their day-to-day needs within short distances that can easily be undertaken without the need to use a car. The city should*

develop and grow in a form that reduces the need to travel longer distances, especially by car. Choice should be available for all journeys within the city.

A number of aims are stated in the City of Edinburgh Council's Local Transport Strategy:

- To improve safety for all road and transport users;
- To reduce the environmental impacts of travel;
- To support the local economy;
- To promote better health and fitness;
- To reduce social exclusion; and
- To maximise the role of streets as the focal point of local communities.

In the context of the OBC, the LTS aims were utilised as objectives. However, STAG2 comprises a more refined appraisal process and enables the appraisal of more detailed impacts, requiring higher-level planning objectives to be developed. For the purposes of STAG2 appraisal, more focused specific planning objectives were developed for the scheme, under broad categories:

- To support the local economy by improving accessibility:
  - Improve access to public transport network; and
  - Improve access to employment opportunities.
- To promote sustainability and reduce environmental damage caused by traffic:
  - Increase proportion of journeys made by public transport, cycling and walking; and
  - Reduce local and global emissions (improving air quality and reducing contribution to greenhouse gases).
- To reduce traffic congestion:
  - Reduce number of trips by car; and
  - Reduce traffic volume on key routes.
- To make the transport system safer and more secure:
  - Reduce traffic accidents and casualties.
- To promote social benefits:
  - Improve liveability of streets, maximising their role as the focal point of local communities; and
  - Reduce social exclusion, by improving the ability of people with low incomes, no access to car, the elderly or mobility impairments to use the transport system.

Problems and Opportunities in North Edinburgh

North Edinburgh has demonstrable social deprivation and in economic terms, performs below average when compared with the rest of the City. Unemployment is higher than the City average while skills and qualifications are below average. There is a high dependency on public transport, yet poor accessibility is highlighted as one of the key obstacles to residents gaining employment opportunities.

Studies examining the North Edinburgh public transport network have highlighted its apparent incoherence and the degree to which congestion affects journey times, punctuality and regularity.

Previous studies have already highlighted the potential of new and improved bus links. Connections to potential employment opportunities in Leith and the West of Edinburgh are inadequate, creating social exclusion problems. This has been identified in the North Edinburgh Public Transport Strategy and such a theme has recurred in several other studies on transport in the north Edinburgh area. Line 1 will not only improve existing connections with the north of the city but also create much needed links with the west.

The Waterfront Masterplan is predicated on the provision of high quality public transport. Studies that have preceded this one have already highlighted that additional capacity will be required to that available at present and, moreover, as well as additional capacity the development related public transport element will only occur if there is a step-change in the quality of public transport.

North Edinburgh's road network already experiences peak hour congestion and has a significant rat-running problem. Without a step-change shift to public transport, general economic and local regeneration is forecast to place increasing pressure on the road network.

Option Generation, Sifting and Development

The Outline Business Case investigated whether a feasible scheme existed which met the objectives of the study Steering Group and the Local Transport Strategy. The study considered a range of issues, including:

- Technology options – bus based systems, guided bus and rail based rapid transit;
- Alignment and route options – Granton – Haymarket, Granton – St. Andrews Square, the full Northern Loop; and
- Potential demand and revenue – demand and revenue forecasts were made for each of the three route options and for guided bus and light rail transit technologies.

The appraisal and sifting of the options was made in the context of technical, operational, patronage, cost and integration issues and in the ability of the options to satisfy the planning objectives. In general, the full loop option was considered to have the highest potential to solving the local problems, take advantage of the opportunities and address the planning objectives.

This process resulted in the Preferred Option being the full Northern Loop using LRT technology. A preliminary appraisal was produced for this scheme within the Outline Business Case (OBC) and was accepted by CEC and the Scottish Executive, from whom funding was made available to further develop the scheme. The PT network was explored further in the "Edinburgh LRT Masterplan Study" commissioned by the Council and undertaken by Arup. The study confirmed that the Northern Loop should receive the highest priority followed by the Western and South-Eastern Lines.

This option development process was revisited in the current study, which broadly confirmed the Preferred Option, subject to potential alignment variants at George Street and Telford Road. Whilst there were strong technical preferences, these options were taken forward to public consultation in order to ensure robust and inclusive decision-making.

Consultation

The consultation process has informed major stakeholders and the residents of Edinburgh about the proposals to introduce trams to Edinburgh, and it has provided the opportunity to comment in a variety of ways.

The results of the consultation show that there is broad support in Edinburgh for the tram. The considerable level of support is, however, punctuated by a range of concerns. The main concerns are in relation to the impact trams will have on properties in close proximity to the route and the requirement for CPOs in certain areas. Other concerns related to the disruption caused by the construction of the tram infrastructure, the environmental impact (particularly to local wildlife) and the impact of the tram on local traffic and parking.

The consultation process resulted in Princes Street being chosen over George Street and the former railway solum being chosen over Telford Road, completing the selection of the preferred route.

Scheme Description

Route

The preferred route will proceed on-street from Princes Street, along Shandwick Place to Haymarket. Going off-street at Haymarket, the alignment will parallel the heavy rail line, before turning north onto the disused railway solum (Roseburn corridor). Line 1 will remain on this corridor to Crewe Toll, whereupon it will run alongside the Western Access Road and enter the Granton redevelopment site. Passing through this site, the alignment will turn east and travel along Lower Granton Road and Starbank Road and enter the Forth Ports development area. Passing Ocean Terminal and the Scottish Executive, the alignment will return to the city centre via Constitution Street, Leith Walk and St. Andrews Square. The route comprises:

- 15.5 km of Double Track infrastructure (single track at St Andrews Square);
- 58% off street; and
- 22 proposed stop locations. (See also sections 7.2.1 & 7.2.2)

Wherever possible a segregated alignment has been proposed (where the tram operates on dedicated tramway or tramroad) such that the system can maintain speed and frequency and reliability of service without interference to and from other traffic. The alignment is effectively double track, clockwise and anti-clockwise running, throughout its length, with the exception of the one way loop at St. Andrews Square (approximately 520m long).

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 1 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 is generally 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 can provide a reduction in overall programme due to the ability to coordinate efficiently within the main contract. The construction period is based upon the utilities diversions being undertaken entirely as part of the main contract. However, to meet the programme the PU diversion policy, including agreed diversionary works, would require to be established prior to construction activities commence.

Capital Costs

Capital costs are estimated at £274.15m, 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.

The model forecasts a total time of 40.5 minutes around the loop, excluding any layover time allowance, equivalent to an average journey speed of 23.3 km/h. The frequency will be 8 trams per hour (i.e. a headway of 7½ minutes).

STAG2 Appraisal

Option Sifting

A restricted STAG2 appraisal was undertaken, focusing on the key objectives in order to determine the best performing route option (to be carried forward as an integral part of a full loop) between:

- George Street / Princes Street; and
- Telford Road / former railway solum.

George Street and Princes Street options have comparable capital costs. Run times are slower on George Street, there are fewer opportunities for transport integration and accessibility and greater environmental and heritage impacts. Telford Road option is more costly and slower than the railway solum, and would impact significantly on highway operations, while the former railway solum is completely segregated. Biodiversity impacts on Telford Road are recorded as neutral whilst there is a small adverse affect on the former railway solum. Given the merits of the respective options, Princes Street and the former railway solum are the preferred alternative options and have been carried forward for inclusion in the appraisal of the full loop.

Assessment Against the Planning Objectives

A key principle of STAG is that a scheme is assessed against both the planning objectives established by the planning authority and the Government's five overarching objectives. An appraisal of the scheme against the planning objectives and problems in North Edinburgh has been undertaken. Across all the objectives, Line 1 is considered to have a positive impact, notably on the level of public transport and car demand and the associated mode share and the consequent impacts on the environment. Notwithstanding some adverse impacts arising from the bus network changes, Line 1 has a positive impact on accessibility which will support the local economy and reduce social exclusion. The key findings were that Line 1 has considerable potential to:

- Contribute to improve the local economy (greater potential for regeneration);
- Facilitate access to employment opportunities (more attractive, integrated, comfortable, efficient and reliable public transport alternative);

- Reduce the adverse impacts of transport on the environment (zero exhaust emissions produced by the trams in urban areas, reduced noise levels, townscape benefits);
- Reduce traffic and congestion (greatest potential as an alternative to the private car, with decongestion benefits); and
- Reduce social exclusion (providing widely accessible, particularly to the new areas of employment and social deprivation in north and west areas of Edinburgh, and affordable transport connections for all).

Scheme Appraisal

The appraisal has followed STAG, which appraises the scheme against both the planning objectives set and the Governments five national objectives for transport:

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

Environment

Noise and Vibration

The majority of the tram route follows existing roads and the additional noise generated by tram movements is not expected to give rise to significant noise impacts in these areas. Where the tram alignment runs along the disused Roseburn to Crewe Toll rail corridor, noise barriers will be required and, provided an appropriate design can be developed, for most locations they will mitigate significant impacts that would otherwise occur. Some slight residual impacts may be unavoidable.

On the road network traffic changes resulting from the tram's operation will give rise to noise increases in some areas and noise decreases in others, but most changes will be small. Overall the effect of the scheme is predicted to be neutral on the road network with slight negative impacts along the Roseburn to Crewe Toll rail corridor after mitigation in the form of noise barriers has been taken into account.

Air Quality

The proposed Edinburgh Tram Line 1 is predicted to have a moderate positive impact on air quality in the City of Edinburgh in 2011. In 2011, there will be an increase in properties near roads with improved air quality compared to the do minimum and more properties will benefit from roadside improvements than from degradations in roadside air quality, for both pollutants. In 2026, a greater number of households will be near roads with worse PM_{10} concentrations than better (due to predicted increased congestion in 2026), but with improved or unchanged NO_2 compared with the do minimum.

There is no net change in CO_2 emissions in 2011 as a result of the tram. In 2026, there is a net predicted decrease in CO_2 emissions of 10 kilo-tonnes.

Water Quality, Drainage and Flood Defence

Overall the scheme is expected to have a minor negative impact on surface water quality and drainage in the short term during construction. Best construction practices will be adopted to minimise any

sediment laden or contaminated runoff during construction. Utilisation of existing drainage and installation of sustainable mitigation measures where appropriate will ensure that the operation of the scheme will not result in adverse impacts to drainage.

Construction and operation of the scheme will not increase the flood risks along the alignment. The contractor will consult with SEPA and CEC during detailed design to ensure that all requirements and guidelines will be adhered to. There are limited existing groundwater resources along the route and the construction and operation of the scheme is not predicted to impact on these.

Geology

Impacts to soils along the route are likely to be generic to construction activity including erosion, disaggregation, compaction and pollution. Soil erosion as a result of development is most likely to occur in the form of water erosion where the mean annual rainfall, storm intensity and frequency are comparatively high. The removal of vegetation, for example along the Roseburn Railway Corridor, will also contribute to erosion. Throughout the development, good practice will be adopted in order to prevent the occurrence of these potential impacts, particularly in sections of the route that are not on-street. Assuming that good practice measures are adopted during construction of the tram, no significant impacts on geological resources are predicted. Land take associated with the development of Edinburgh Tram Line 1 will not involve loss of any agricultural land.

Any contaminated material encountered during construction will be dealt with in compliance with best practice, current legislation and statutory guidance.

Biodiversity

Mitigation measures will be implemented to reduce impacts to the minimum necessary for the safe completion of the works. Opportunities will be sought in the design of the new structures to provide additional roosting opportunities for the species using this area and to mimic the existing habitat along the sea wall.

Construction of the tracks and walkway/cycleway will result in a significant impact to the Roseburn Railway Corridor UWS. The majority of vegetation will be removed along the embankments, affecting its function as a wildlife corridor. The impacts to this corridor will be limited to the minimum necessary through the implementation of mitigation measures, including the adoption of best practice measures during construction.

Construction of the tram will result in significant temporary and permanent impacts to badger. Mitigation measures will be implemented to ensure that works undertaken in close proximity to badger setts and foraging habitat will comply with the requirements of relevant legislation. Bats are known to forage along the Roseburn corridor and the loss of a significant amount of vegetation will reduce their foraging habitat availability. Prior to construction, all bridges and other built structures and mature and dead trees to be affected will be checked again for roosting bats and appropriate mitigation measures agreed with SNH and implemented if bats are found.

Landscape

Although the scheme provides opportunities for enhancing the local landscape in certain areas, other adverse impacts can be expected at varying degrees in different locations of the route. The key landscape impacts for each area affected by the scheme are:

- Haymarket – Potentially complex OLE support. Road alterations and demolitions weaken enclosure of junction area. Tram stop will improve Haymarket Terrace;
- West End – OLE in designed vista. Road widened into gardens.

- Princes Street – OLE in designed vista and iconic tourist views. Footway widening;
- St Andrew Sq – OLE in designed vista and iconic tourist views;
- Queen St to Picardy Pl – OLE in designed vista. Road widened and awkward level changes;
- Leith Walk – Road widening and loss of enclosure, but also improvement opportunity at top of Walk. OLE particularly visible in long views. Loss of street trees at north end;
- Leith – Distinctive small-scale local character, highly sensitive to change;
- Port of Leith – Tram a minor additional element in industrial parts, part of a much wider change elsewhere;
- Newhaven to Granton – OLE will partially enclose open sea-front sections. New footpath at Starbank beneficial;
- Waterfront Granton – Part of a much wider change;
- Pilton – Tram will be a minor addition; and
- Railway Corridor – Significant vegetation removal required.

Visual Amenity

The sensitivity of the receptors of visual impact varies according to their activity and expectations. There will be visual impacts on virtually all the properties and roads along the tram route, on public open spaces and recreational sites such as Princes Street Gardens, St Andrew Square and the Roseburn cycle route, and from important tourist viewpoints such as Princes Street and Edinburgh Castle.

Major visual impacts are caused where proposed development is clearly noticeable and affects the character or quality of view for sensitive receptors. For this reason there will be major visual impacts along much of the route because of the unavoidable visibility of much of the tram infrastructure, particularly the overhead line equipment, from houses and flats along the route and from many of the main city centre tourist locations.

Agriculture and Soils

There are no agricultural issues associated with the proposal.

Cultural Heritage

The vast majority of sites impacted upon by the implementation of Line 1 in terms of cultural heritage have a suggested Level 1 mitigation response (detailed photographic record). A high proportion of such sites comprise historic street furniture in the buffer zone, most of which are unlikely to suffer physical impact during the works, but preventive measures are required to avoid damage, particularly where the features form part of Listed Buildings.

Thirteen sites are recommended for Level 2 mitigation (detailed standing building survey). This higher level of survey has been suggested due to the physical impact on such sites expected as a result of engineering works. This includes the "B" listed bridge over Glasgow Road at Roseburn.

Level 3 mitigation (watching brief) is suggested for five sites. This includes the part of the route believed to pass through the Caroline Park designed landscape. However, it seems likely that some of this area has been rendered archaeologically sterile by modern development. The other four sites are areas of archaeological potential.

The two sites recommended for Level 4 mitigation (Detailed standing building survey and salvage) are both at Haymarket. The C(S) Listed Caledonian Ale House is likely to require demolition. The C(S) Listed Heart of Midlothian War Memorial may require relocation, unless through design this can be avoided.

Safety

Accidents

A reduction in private vehicle traffic has promoted an annual saving in the number of accidents in the road network at −7.6 (an increase) in 2011 and 51 (a decease) in 2026, considering all severity levels. The majority of accidents are accounted for in terms of damage to property. The number of fatalities saved from the implementation of the scheme would be negligible.

The total savings as a result of reduced traffic on the road network has been calculated at approximately -£80,000 per year for 2011, and £0.7 million per year for 2026. Feeding these valuations through cash flow calculations into the accident framework, which discounts the annual valuations to a present value, the NPV of these savings represent £4.8 million (NPV), considering the project life-time.

Security

While all stops will be designed to high standards, some quieter locations may require mitigation facilities designed to ensure that they offer as great a level of security as possible (including any street lighting or furniture to ensure safe approach to the stop locations). The stops have tended to be located in more accessible locations, where the level of activity is greater and hence security higher. Although the stops will be unstaffed, they will be monitored by CCTV while all vehicles will provide high levels of security with the presence of conductors.

Economy

Transport Economic Efficiency (TEE)

The TEE analysis has been undertaken in compliance with the requirements of both Guidance on the Methodology for Multi-Modal Studies (GOMMMS) and STAG. The DfT Transport Users Benefit Appraisal (TUBA) software has been employed, using model output from the LUTI modelling framework employed in the study.

The scheme costs within the TEE (2003 Q2 prices) are as follows:

- Construction cost of £274.15 million (including optimism bias at 25%). This includes construction and vehicle capital costs, land and project supervision and design costs. This cost was spread over the years 2006 – 2009 inclusive based on the cost profile provided within the cost estimate;
- Private developer contribution of £11.6 million (PV);
- Annual Line 1 operating cost of £6.3 million; and
- Lifecycle costs of £44.6 million, allocated over years when particular costs were predicted.

The table below presents the TEE analysis for the Line 1 Central Case scheme. Issues to note include:

- Total PT benefits of £116.5m;

- Total highway benefits of £111.6m;
- A negative impact on bus operations, with a revenue reduction of £40.3m exceeding the operating cost reduction of £31.1m by some £9.2m;
- A small reduction in off-street parking revenues; and
- An overall present value of benefits of £231.1m.

		STAG Code	Total	Public Transport	Road Users	
					Cars	Freight
User benefits - Consumers						
Travel time		(PV2)	£184,329	£116,749	£67,580	
User Charges		(PV3)	-£9,166	-£9,166	£0	
Vehicle Operating Costs		(PV4)	£3,105	£0	£3,105	
Sub Total			£178,268	£107,582	£70,685	
User benefits - Business						
Travel time		(PV2)	£47,717	£9,244	£21,294	£17,179
User Charges		(PV3)	-£296	-£296	£0	£0
Vehicle Operating Costs		(PV4)	£2,474	£0	£756	£1,717
Sub Total			£49,894	£8,948	£22,050	£18,896
User benefits - Total						
Travel time		PV2	£232,045	£125,993	£88,874	£17,179
User Charges		PV3	-£9,462	-£9,462	£0	£0
Vehicle Operating Costs		PV4	£5,579	£0	£3,861	£1,717
Sub Total			£228,162	£116,531	£92,735	£18,896
Private Sector Provider Impacts						
Investment (Capital) Costs		PV5	-£213,542	-£213,542		
Operating Costs	Line 1	PV6	-£108,285	-£108,285		
	Bus	PV6	£31,141	£31,141		
	Rail	PV6	£0			
Revenues	Line 1	PV6	£0			
	Bus	PV7	-£40,278	-£40,278		
	Rail	PV7	£25,514	£25,514		
	Off-street Parking	PV7	-£3,895		-£3,895	
Grant/ Subsidy		PV8	£321,827	£321,827		
	Developer Contribution	PV8	-£9,563	-£9,563		
Sub Total			£2,918	£6,814	-£3,895	£0
Total PVB			£231,080			

Notes:
1. Disbenefits appear as negative
2. All values are £000s Present Value, 1998 Values and Prices

Economic Activity and Location Impacts

The aim of Economic Activity and Location Impact (EALI) analysis is to quantify the impacts of a proposed scheme on the economy at a local or regional level and at the level of Scotland as a whole. The appraisal is undertaken in terms of employment and where possible income. The analysis is intended to identify how different locations may be impacted upon and to capture net additional economic impacts at different spatial levels. These impacts are not however additional to those captured in the standard cost benefit analysis approach; rather, they express these impacts using an alternative unit of account.

Property related impacts

The tram will comprise a strategic transport link to and from the Waterfront regeneration area. This is essential for the successful implementation of:

- A sustainable community comprising high density units, as well as housing for key workers and social housing;
- New educational institution: students will be dependent on public transport for access to their education;
- New employment uses in the regeneration area: residents from outside the regeneration area will have better access to these sites; and
- Access to potential tourism and leisure event venues.

Developments have been planned on the assumption that the tram will be implemented in 2009. While some developments are either constructed or under construction now, it is likely that any changes in the plan to implement the tram will impact on the fulfilment of all proposed developments in the longer term. It will also impact on the development of major event developments that might otherwise not be located in Edinburgh, such as the proposed casino development currently under consideration.

Planned developments where employment impacts could be claimed at the Scotland level are still very much tentative proposals and any impacts cannot be claimed at this stage. At the regeneration level, the tram will provide a strategic transport link – the benefits at the level of the regeneration areas depend upon how residents of these areas are enabled to access the jobs in the North Edinburgh sites. Based on the proximity and travel to work characteristics of people living in the regeneration areas, it is reasonable to expect that a proportion of total new jobs will be taken up by these residents as a result of better accessibility and that this will amount to between 70 and 200 jobs. Some allowance needs to be made for displacement, which is assumed to be around 50%. Accordingly the net impact ranges from 35 to 100 jobs at the regeneration area level.

Business impacts

The surveys results indicated that the tram is expected to be of very limited benefit to businesses, except in terms of providing better access to labour, primarily in the retail, financial services and health sectors. However, it is difficult to argue that location is the reason for being unable to fill vacancies. Within the health sector, vacancies currently hard to fill could be filled by having better access to the regeneration areas in North Edinburgh. This could result in filling around 20 vacancies per annum, of which half might be additional at the regeneration area level and half at the Scotland level, which represents those jobs which would not be filled without the tram.

Social inclusion impacts

The new developments will attract a significant number of service sector based businesses, which will result in a large number of low skilled jobs being created. It is likely that these jobs may be filled by residents living in deprived areas in North Edinburgh. The tram will be pivotal in providing public transport access to these jobs for these individuals.

Integration

Transport Integration

Co-ordinated and integrated transport services with convenient, simplified (and possibly through) ticketing can contribute to more "seamless" journeys across the public transport network. Travel cards, season tickets, concession passes and probably the integrated "The One" ticket system will be available for purchase at other locations. Real time passenger information at bus stops will contribute to an integrated public transport system.

The attractiveness of the public transport system as a whole in Edinburgh can be enhanced with the implementation of Line 1 by the existence and quality of infrastructure facilities at tram stops, maximising bus and rail interchange with the tram and real-time passenger information at all tram and bus stops.

Land-Use Transport Integration

Improvements in public transport brought about by Line 1 are expected to meet or support most local, regional and national policy objectives, in particular those related to sustainable travel (with increased use of public transport and reduced dependence on the car), regeneration and improving access (especially for those dependent on public transport).

Policy Integration

Edinburgh Line 1 can contribute to the following wider Government policies:

- Disability – The design of trams and stops, fully DDA (1995) compliant and with level boarding, will provide easy access to wheel (and push) chairs, facilitating thus the access not only for the mobility impaired but also the elderly and mothers with babies;
- Health – The expected modal shift from car to public transport for journeys by local residents and others travelling to local employment and recreational facilities will provide greater opportunities for increased walking and cycling trips to reach the new tram stops. In addition, the use of trams (as opposed to cars) will reduce the adverse environmental impacts of traffic, particularly harmful local emissions, with an overall positive effect on health;
- Rural affairs – The scheme does not reach rural areas and therefore it can do very little to contribute to improve rural affairs or retaining rural communities; and
- Social exclusion – The scheme fits in with policies to promote social inclusion, by enabling the socially deprived (particularly those with no access to a car) access to the public transport network.

Accessibility and Social Inclusion

Community Accessibility

Community accessibility has been measured to key local services and destinations:

- George Street / Frederick Street junction – representing the city centre (employment, shopping, leisure and access to Waverley rail station with integration with bus and rail);
- Haymarket rail station (integration, interchange with bus and rail);
- Foot of Leith Walk (employment, shopping, jobcentre);
- Leith Ocean Terminal (employment);
- Granton development area (employment, residential and education, with Telford College – amalgamation of 4 campuses – and new school on waterfront site. There is also the potential for hotels and leisure activities); and
- Crewe Toll / Western General Hospital (employment, visiting relatives).

The changes in public transport perceived travel time have been estimated by the transport model (accounting for walk time, wait time and interchange time, according to service frequencies) from all origins to each of the destinations identified above, considering the "without" (bus only) and "with"

the scheme scenarios (bus and tram). Seven time bands have been determined and the changes in the number of people with access to the selected locations within these time bands have been estimated.

Accessibility is significantly increased for travel from most zones to all the selected destinations. The most notable exception is for travel from the south-west of Edinburgh to destinations in the north-east, since these trips can currently be made by a single bus journey. With the introduction of the tram, these direct services are assumed to be withdrawn and an interchange will be required at or near Haymarket Station, making the journey longer in terms of total travel time (wait and interchange time), but probably more pleasant and comfortable on the tram section. A similar effect takes place also in parts of the south-east for travel to most of the selected destinations.

The tram provides increased opportunities for walking and cycling as access modes, but it has limitations to promote further non-motorised trips to access local services.

Comparative Accessibility

Some key benefits of the scheme will be realised by the socially disadvantaged. The distribution of accessibility impacts is relevant in that it identifies the extent to which the scheme benefits social groups or geographic locations most in need of access by public transport to essential activities. The analysis has been carried out for the locations where the local population depends most on public transport provision, that is, where there is no car availability.

The results vary considerably according to the destination under consideration. Overall, significant accessibility benefits can be realised by the introduction of Line 1 in Edinburgh, also for households without a car. Some 4 times as many households with no car benefit than disbenefit as a result of the scheme. It is important to bear in mind that any disbenefit in the accessibility analysis is a result of the changes in bus routes, when the tram is in place. Many journeys are likely to require one (or one additional) interchange, and this tends to increase the total travel time. However, the tram section of the journey will gain in quality, reliability, speed and comfort, which could become acceptable trade-offs for travellers. The accessibility impacts per selected location are:

- George Street: vast majority unaffected. Twice as many disbenefit than benefit;
- Haymarket: vast majority unaffected. No accessibility disbenefits;
- Leith Ocean Terminal and Foot of Leith Walk: many times more people/households benefit than disbenefit; and
- Granton and Crewe Toll: majority benefit significantly (i.e. reduction of more than 10 minutes in journey times).

Cost to Government

The cost to government sets out the net cost of a proposal from the public sector's point of view, which can then be compared with the overall benefits of the scheme covering all five of the main objectives (environment, safety, economy, integration and accessibility). The economic impact of Line 1 is presented in the table below, which summarises the monetised benefits of the scheme in terms of safety and economy and then compares this with the cost to government. The overall Present Value of Cost to Government is £195.5m, of which the principal component is the grant payment for the construction of Line 1. The overall PVB, including accidents, is some £235.9m. These combine to produce a BCR of 1.21 and an NPV of £40.4m. On this basis, the scheme represents good value for money. Sensitivities around this Central Case demonstrate the robustness of the case for Line 1; coupled with the benefits to the non-monetary objectives, a strong case for Line 1 has been made.

STAG Appraisal

	STAG Code	Total	Public Transport	Road Users Cars	Road Users Freight
Local Government					
Public Sector Investment Costs	PV9	£0			
Public Sector Operating & Maintenance Costs	PV10	£0			
Grant/ subsidy payments	PV11	-£108,285	-£108,285		
(Developer Contribution)		£0			
Revenues	PV12	£142,076	£116,241	£25,835	
Taxation impacts	PV13	£0			
Central Government					
Public Sector Investment Costs	PV9	£0			
Public Sector Operating & Maintenance Costs	PV10	£0			
Grant/ subsidy payments	PV11	-£213,542	-£213,542		
(Developer Contribution)		£8,563	£8,563		
Revenues	PV12	£0			
Taxation impacts	PV13	-£25,326	-£16,667	-£7,882	-£777
Total PVC to Government		-£196,513	costs appear as negative		

Monetised Summary	
Present Value of Transport Benefits (PV1-8)	
Accidents, PV1	£4,799
Transport Economic Efficiency	£240,080
Total PVB (PV1-PV8)	£244,879
Present Value of Cost to Government (PV9-13)	-£196,513
Net Present Value	£48,366
Benefit-Cost to Government Ratio	1.25

Appraisal Summary Table

The table presented below summarises the appraisal of the various impacts under STAG2 for the preferred route.

Proposal Details			
Name and address of authority promoting the proposal		City of Edinburgh Council	
Proposal name	Edinburgh Tram Line 1	*Name of planner*	
Proposal description	Introduction of a tram line circular route serving Edinburgh city centre, the two main rail stations and the regeneration areas of Granton and Leith.	*Capital Costs/Grant Revenue Support PV Costs*	£274.15m (capital cost) £6.79m/year (operating cost)
Funding sought from	Scottish Executive	*Amount of application*	N/A
Proposal Background			
Geographic context	Edinburgh is the capital of Scotland, a World Heritage city, spread over 100 square miles in area, built upon a jumble of hills and valleys.		
Social context	High population density in areas covered by the route. 39.5% of households in Edinburgh do not have a car (2001 Census), and the route will serve much of the areas of low car ownership. The north east part of Edinburgh (served by the route) is the most deprived and of lowest income levels. Unemployment is at a 25-year low. The tram services will enable non-car owners and the socially excluded increased access to the public transport network.		
Economic context	Edinburgh's regional economy is expected to be the fastest growing economy of any major UK city over the next five years, with correspondent growth in population and jobs.		
Planning Objectives			
Planning objectives	*Performance against planning objectives*		

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• Improve accessibility • Promote sustainability • Reduce congestion • Improve safety and security • Social benefits	• Line 1 will improve accessibility to employment opportunities, education, shopping and leisure destinations, contributing to improve the local economy. • The scheme will contribute to sustainable travel (zero emissions produced by trams in urban areas, reduced noise, townscape benefits) and less congestion (more public transport trips and less car trips). • The tram system will provide a safe and secure means for travel as well as a safe local environment. • The tram will provide social benefits in terms of enhanced liveability on streets and accessibility to mobility impaired and deprived segment of the population.		
Rationale for selection of proposal	George Street and Princes Street options have comparable capital costs. Run times are slower on George Street, there are fewer opportunities for transport integration and accessibility and greater environmental and heritage impacts. Therefore, Princes Street is the preferred option. Telford Road option is more costly, slower and environmentally adverse than the railway solum, and would impact significantly highway operations, while the former railway solum is completely segregated; hence chosen.		
Implementability Appraisal			
Technical	The proposed alignment is technically feasible, as no untried technology is used, run times are maintained, urban design issues are acceptable and it is integrated with buses.		
Operational	Journey times can be minimised to maximise the attractiveness of the service and minimise operating costs and rolling stock resources. The line capacity is 640 seated and 1,840 total passengers per hour (pph) in each direction.		
Financial	The costs will be met from a number of sources, including developer contributions and grant-funding from Public Transport Fund. Revenue will broadly cover operating costs.		
Public acceptability	The results of the consultation show that there is broad support for trams, despite concerns with the impact on properties in proximity to the route, the requirement for CPOs in certain areas, disruption caused by construction, environmental impact, destruction of local wildlife and the impact of the tram on local traffic and parking.		
Environment			
Mitigation options included (cost/benefit)	Noise barriers have been assumed to be installed along some sections of the Roseburn Railway Corridor to reduce noise impacts at adjacent properties.		
Sub-objective	**Qualitative information**	**Quantitative information**	**Significance of impact**
Noise and vibration	Impact of noise from tram operations on receptors adjacent to the proposed tram route	• Roseburn rail corridor: Residential properties adversely affected by tram operations. • Remaining sections of tram route: no significant impact.	• Significant (major) negative impact of tram noise on receptors along Roseburn corridor. These reduce to slight after mitigation.
	Residential receptors either side of the roads where traffic flow changes have been predicted	• 2011: Do minimum to with scheme: No change in population annoyed • 2026: Do minimum to with scheme: No change in population annoyed	• Neutral-slight negative impact on remaining route sections. • Neutral
Local air quality — PM_{10} and NO_2	In 2011 there will be an increase in properties near roads with improved air quality compared to the do minimum and more properties will benefit from roadside improvements than from degradations in roadside air quality, for both pollutants. In 2026 a greater number of households will be near roads with worse PM_{10} concentrations than better (due to predicted increased	• 70,200 households with increase in PM_{10} in 2011 (134,500 in 2026) • 174,000 households with decrease in PM_{10} in 2001 (112,050 in 2026) • 3,400 households with no change in PM_{10} in 2011 (1,000 in 2026)	Moderate positive (2011) Neutral (2026)

	congestion in 2026), but with improved or unchanged NO_2 compared with the do minimum.	• 77,950 households with increase in NO_2 in 2011 (139,550 in 2026) • 177,250 households with decrease in NO_2 in 2011 (119,100 in 2026) • 26,200 households with no change in NO_2 in 2011 (22,750 in 2026)	Moderate positive (2011) Minor positive (2026)
Global emissions — CO_2	There will be a small reduction in CO_2 emissions in the long term	• No net change in CO_2 emissions in 2011. Net reduction of 10,000 tonnes in 2026	Minor positive
Water quality, drainage and flood defence	• Potential short-term increase in sediment-laden runoff during construction due to earthworks (slight adverse but mitigation measures will reduce potential). • Existing drainage will be utilised, but where new one is required the principles of SUDS will apply (slight adverse but mitigation will prevent impact). • The scheme is not located in high-risk flood areas and is not expected to increase flood risk (neutral). • Existing groundwater and hydrogeological resources will not be impacted (neutral).	• The scheme crosses the Water of Leith twice. • Works to the seawall at Starbank Road run adjacent to the Firth of Forth for 250m. Potential for impacts on water quality during construction.	Neutral
Geology	• The route will pass south of the designated Firth of Forth Geological SSSI. No significant impacts are predicted. • The route will pass 30m west of the RIGS site at Craigleith Quarry, now a retail park. The rock outcrops will not be impacted upon.	• 1 SSSI • IRIGS	Neutral
Biodiversity	• The Firth of Forth is designated as SPA/Ramsar Site and SSSI, for supporting populations of European importance: Moderate adverse.	250m of the Firth of Forth will be affected in construction of the walk/cycleway over the sea wall, extending out by 5m (≈ 0.1ha in total).	• Moderate adverse
	• The Roseburn Corridor is designated as an Urban Wildlife Site for its function as a wildlife corridor: Large adverse.	Significant amount of vegetation lost from ≈ 3km of Roseburn Corridor between Roseburn Terrace and Telford Rd.	• Major adverse
	• Badger and bats have been recorded from the Roseburn Railway Corridor: Moderate adverse.	Badgers and habitats directly affected by works within Roseburn Railway Corridor.	• Major adverse
		Bats affected by reduction in foraging habitat along Roseburn Railway Corridor.	• Slight adverse

Landscape / Townscape	Townscape improvements at specific locations but major adverse impacts, primarily from OLE, in many sensitive areas. Significant vegetation removal and tree loss along the Roseburn corridor	World Heritage Site and Conservation Areas	Major adverse
Visual amenity	Varying range of visual impacts (mainly OLE) all along the route. Most significant in the New Town where iconic views are affected, open areas and Roseburn Railway corridor where views are opened up. Screening can mitigate in Railway corridor, but elsewhere design of tram system will need to fit to scene.	World Heritage Site and Conservation Areas	Major adverse
Agriculture and soils	No agricultural land affected. Soils addressed above under '*Geology, Soils and Contaminated Land*'.		Neutral
Cultural heritage	• One listed building, the Caledonian Ale House (Category C(S)) at Haymarket is likely to require demolition. Mod adverse. • The war memorial/clock at Haymarket (Category C(S)) may require relocation. Slight adverse • The settings of groups of listed buildings will be affected (see Townscape).	86 sites of potential significance in the swept path or buffer zone will be directly affected: • 16 sites of national importance; • 20 sites of regional importance; • 27 sites of local importance; • 23 sites of little or no importance. In addition, the setting of a further 239 listed buildings will be affected	Moderate adverse

Safety

Sub-objective	Item	Qualitative information statement	Quantitative information
Accidents	Change in annual personal injury accidents	Standard rates and methodology from NESA	Change in annual accidents: -7.6 in 2011 and +51 in 2026, for all severity levels
	Change in balance of severity	Rates by severity level: fatal, severe, slight and damage.	Annual changes (2026): Damage = 45.4; Slight = 4.8; Serious = 0.6; Fatal = 0.1
	Total discounted savings	PV 30 years	PV £4.8m
Security		CCTV system at all stops and vehicles. Good proximity of tram stops to retailers and other urban activities. Positive design. Conductors present in all vehicles. Lighting and help points at all stops.	Moderate beneficial

Economy

Sub-objective	Item	Qualitative information	Quantitative information
User Benefits	Travel Time	Public transport journey time savings: Roseburn Corridor / Pilton to Ocean Terminal / Leith 10+ min; access times to Granton development area improved by 10+ minutes from most of Edinburgh; access time to Haymarket from Granton and Leith improved by 5+ min.	£232,045m (PV)

	User Charges	Public transport fares	-£9,462m (PV)
	Vehicle Operating Costs		£3,379m (PV)
	Quality / Reliability Benefits	The higher quality afforded by Line 1 compared to the alternative public transport modes has been encapsulated in the demand modelling and appraisal through the use of differential in-vehicle time factors.	
Private Sector Operator Impacts	Investment Costs	Scheme's capital cost	-£213,542m (PV)
	Operating and Maintenance Costs	Operating cost = £6.29m pa. Bus operating costs savings = £2.2m pa.	-£77,144m (PV)
	Revenues	Reduction of bus revenue = £40,278m (PV). Rail revenue increase = £25,514m (PV).	-£14,764m (PV)
	Grant/Subsidy payments	Total grant for capital and operating costs = £321,827m (PV). Potential developer contribution of £9,563m (PV)	£312,264m (PV)
Economic activity and location impacts	Local Economic Impacts	• 5% of opportunities for low / no skill activities, some of which could be filled by residents of north Edinburgh regeneration areas. • Additional jobs at the regeneration area level.	• 35 – 100 jobs. • 0 – 10 jobs.
	National Economic Impacts	• No net additional employment is claimed at the Scotland level. • Half of extra jobs in the health sector are additional, which would not be filled without tram.	• No impacts. • 0 – 10 jobs.
	Distributional Impacts	• Not all jobs coming to North Edinburgh will be additional, as some will be relocations from other areas. Displacement assumed at 50%	• 35 – 100 jobs.
Integration			
Sub-objective	**Item**	**Qualitative information**	**Quantitative information**
Transport interchanges	Services & ticketing	Integrated transport services and ticketing contribute to more "seamless" journeys across the public transport network.	All users benefited – moderate beneficial
	Infrastructure & information	Infrastructure facilities at tram stops, greater opportunities for bus and rail interchange with the tram at key locations, real-time information at all tram and bus stops.	All users benefited – moderate beneficial
Land-use transport integration	Transport assessment	The scheme is expected to meet or support most local, regional and national policy objectives, in particular related to regeneration, improving access and sustainable travel.	Moderate beneficial
Policy integration	Fit with key policies	The scheme is consistent with national policies (beyond transport (disability, health and social exclusion).	Slight beneficial
Accessibility & Social Inclusion			
Sub-objective	**Item**	**Qualitative information**	**Quantitative information**

Community accessibility	Public transport network coverage	Accessibility is significantly increased for travel from most zones to all the selected destinations (apart from travel from the south-west of Edinburgh to the north-east).	
	Access to other local services	The tram provides increased opportunities for walking and cycling as access modes, but it has limitations to promote further non-motorised trips to access local services.	
Comparative accessibility	Distribution / Spatial impacts by social group	Significant accessibility benefits can be realised, also for households without a car.	Some 4 times as many households with no car benefit than disbenefit as a result of the scheme.
	Distribution / Spatial impacts by area	• George Street: vast majority unaffected. Twice as many disbenefit than benefit; • Haymarket: vast majority unaffected. No accessibility disbenefits; • Leith Ocean Terminal and Foot of Leith Walk: many times more people/households benefit than disbenefit; • Granton and Crewe Toll: majority benefit significantly (i.e. reduction of 10+ minutes in journey times).	N° of households without a car benefit (disbenefit): • George St: 6,366 (12,604); • Haymarket: 17,337 (0); • Leith Ocean Terminal: 82,728 (53,176); • Foot of Leith Walk: 68,547 (39,127); • Granton: 161,998 (9,856); • Crewe Toll: 124,023 (9,286).

Cost to Public Sector

Item	Qualitative information	Quantitative information
Public Sector Investment Costs		
Public Sector Operating & Maintenance Costs		
Grant/Subsidy Payments	Grant to the private sector to cover the capital (£213,542 PV) and operating costs (£108,285 PV) of Line 1 = £321,827m (PV). Potential developer contribution of £9,563m (PV).	£312,264m (PV)
Revenues	Revenue from operation of Line 1 Revenue from car parking	£116,241m (PV) £25,835m (PV)
Taxation Impacts	Reduction in tax receipts arising from reduced travel and congestion on the highway network reducing fuel and other vehicle related taxes. Increased use of public transport (non-taxed) will reduce tax take from former consumption.	£25,336m (PV)

Monetised Summary

Present Value of Transport Benefits	£235,879
Present Value of Cost to Government	-£195,513
Net Present Value	£40,366
Benefit-Cost to Government Ratio	1.21

Sensitivity and Risk Analysis

One of the critical success factors for the Tram Line project is the identification and mitigation of the risks inherent in a project of this nature. In order to manage risk in a structured manner, tie has 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 best parties 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.

Risk Management Process

Throughout the development of the tram and other ITI proposals, **tie** has initiated and continued to develop a plan for management of risk.

The proposed alignment and options have been found to be feasible, based upon a number of key assumptions (and consequent risks, associated with these assumptions):

- The design is based upon vehicle parameters. No new or innovative, untried technology is proposed, but new traction technologies will be reassessed prior to implementation;
- The run times can be maintained – this depends on achieving adequate tram priority;
- Acceptability of urban design issues – this is being addressed through the development of a detailed design manual, prior to implementation of the scheme;
- Integration with bus – the design provides opportunity for bus integration and mitigates potential adverse impacts on bus. The risk of changes in bus routes, competition and predatory bus pricing is significant and has proved to be problematic on other schemes.

In order to reduce strategic risk, **tie** has taken steps to consult with key organisations such as Scottish Executive, City of Edinburgh Council (CEC) and bus operators in the Edinburgh area.

tie established a Procurement Working Group, comprising representatives from legal, financial and technical advisors, in order to address these issues with respect to Edinburgh. The major strategic risks anticipated by the group were:

- Integration of the tram network with other transport modes;
- Delivery of the tram network within an affordable and certain capital cost;
- Delivery within an acceptable timescale; and
- Minimisation of the impact of tram costs on the finances of CEC.

The group considered a range of potential procurement methods to evaluate the performance of these methods in mitigation of the identified risks, concluding that the early appointment of an Operator as an additional specialist advisor to **tie** would be advantageous.

A sub-group was appointed by **tie** comprising legal, technical and financial advisors augmented by Partnerships UK to prepare 'Invitation to Negotiate' documentation. This has evolved into an agreement for the Development Partnering and Operating Franchise (DPOF).

Derivation of Costs and Revenues

The technical teams engaged to advise upon the estimation of costs have extensive experience in the development of tram schemes in the United Kingdom and abroad and are thus cognisant of the likely factors and risks that will impact upon outturn costs.

Cost estimates have been prepared using a combination of benchmarking, previous experience and engineering judgement to define the works elements and to obtain and refine implementation costs. Operating costs have been built up from detailed estimates of likely staffing levels, power requirements, maintenance costs and other related costs such as insurance and policing.

Line 1 boardings are comparable to existing systems, though in terms of passengers per route kilometre, Line 1 by 2026 will exceed all existing systems. Data on passenger kilometres shows a similar story. The revenue per passenger is in the centre of the range for existing systems, whilst the revenue per tram km is near the upper end of the range.

tie has undertaken a comparison with other operational tram schemes within the United Kingdom to assess the values adopted for the Edinburgh tram projections. The principal points of note are:

- Project-wide construction cost overruns have been up to 25% of award construction cost. **tie** will manage this risk by structuring and integrated construction and (potentially) maintenance contract. Current optimism bias value is at 25%;
- Completed projects have typically overrun by three to six months with minimal Promoter downside risk due to contractual structures used. Current optimism bias suggests a value of 14%, which represents an additional 5 months on a 36 month construction programme;
- **tie** has the benefit of learning from the experience of other Promoters in respect of time delays and costs escalation. This is influencing choice of procurement method and funding options;
- Based upon current practice and expectations, most Promoters would seek a two-contract structure separating infrastructure and operations, as proposed by **tie**;
- Cost escalations in utilities diversion budgets have been recognised by **tie**;
- The potential advantage to be gained from full cooperation of bus and tram operators has not always been forthcoming on other projects. **tie** has progressed the DPOF process to facilitate this; and
- **tie** continues to liase with other Promoters to obtain maximum benefit from their experiences.

Optimism Bias

tie and its advisers have considered the implications of the new Green Book Guidance as issued by the Treasury and have discussed the application of this guidance to the Line One project with PUK and the Scottish Executive. The Optimism Bias process as required by Scottish Executive for all major public transport schemes is being followed.

Optimism Bias 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. Standard factors are given dependent upon the nature of the project based on analysis of previous schemes. No Optimism Bias adjustments exist at present to cover operating costs, lifecycle costs or revenue.

Optimism Bias does not appear to account for the rigorous capital costing methodology employed by **tie**'s technical advisors, that is, determining the cost from the out-turn costs of a number of recent tram schemes. It is, therefore, considered that the capital costs (net of contingency) include for a portion of Optimism Bias. It has not been possible to quantify this portion and therefore it may be considered that the Capital Cost Optimism Bias is conservative.

Current Risk Status

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tie and its advisors have identified project risks through workshops, strategic reviews, experience of other UK tram schemes 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 published industry guidance.

A consolidated risk register has been prepared for the tram network. In order to review timing, the risks have been categorised in order to identify the risk level of each stage of the project and to ensure risks are reviewed and mitigated for each stage.

Of all areas, capital costs, operating costs and works duration (programme) have been shown to lie within Optimism Bias considerations. Strategies have been adopted to quantify the impact of risk. **tie** has developed clear and active processes to prevent and mitigate project risks in accordance with industry best practice. **tie** has also ensured that clear and tangible evidence has been observed prior to reducing the Optimism Bias.

Given the level of development the project has reached, together with the amount of mitigation that has been carried out across the range of risk areas identified by Optimism Bias, it is considered appropriate to use lower factors of 25% for Capital Cost Optimism Bias and 14% Works Duration Optimism Bias.

Sensitivity Analysis

A number of sensitivities have been tested to simulate a number of the key project risks. These sensitivities are designed to test the overall economic and financial robustness of the project, and to give an indication of the impact of key project risks on the financial structure proposed:

- Demand and Costs – The overall economic case for Line 1 will be impacted upon by capital and operating cost increases and by demand falling lower than forecast. To illustrate this, the 'switching value' of the capital cost, operating cost and scale of demand have been established where the NPV would fall to zero.
- Unchanged Bus Network – The integration of bus and tram services is critical to successful operation. Line 1 Central Case assumes that there is limited bus network restructuring, but a scenario was tested assuming an unchanged network. The analysis shows that Line 1 would add significant public transport supply, but this dilutes the available revenue to the various public transport operators. Therefore, from a financial viewpoint, i.e. the business case, this option performs noticeably worse, but from an economic viewpoint, it performs better with a BCR of 1.57.
- Mode Constant – The Central Case assumes a modal preference of 0.8 in-vehicle weighting. A test has been undertaken assuming a value of 0.9. This reduces the level of demand and benefits accruing to Line 1, reducing the BCR to 1.07.
- Tram Frequency – The current central case assumes a frequency of 8tph; however, by 2026 demand is forecast to be near or at the capacity of this frequency. On this basis, a test has been undertaken assuming 10tph, increasing the operating cost. The impact is positive on Line 1 demand and benefits, but the operating ratio of the tram is marginally worse, where the increase in revenue is insufficient to offset the increased capital and operating costs. The BCR is unchanged at 1.21, where the benefits of the frequency increase is offset by the additional operating cost.
- Tram run time – The Central case run time is some 40.5 minutes, assuming a reasonable level of priority at junctions. But, as it is possible that this is not achieved, run times of 43.0 minutes have been developed. There would be an increase in operating cost, with a larger fleet requirement, and the BCR would lower to 1.09.

- Work Split – The Central Case appraisal assumed a local work split based on Edinburgh household survey data. Using default TUBA work splits increases the PVB by some 6.3%, and the BCR to 1.28.
- Worst Credible Scenario – The results for the worst credible scenario with respect to the financial case for Line 1 indicates that the operating ratio would be substantially eroded. Thus operations would be similarly affected. This scenario produces a BCR of 1.26.

Monitoring and Evaluation

STAG guidance requires that a new project be subject to planned evaluation and monitoring, in addition to regular revalidation of the project throughout its development.

Soon after implementation, the performance of the project should be assessed against the specified objectives – the process evaluation. Recognising that certain projects require time before the full benefits can be realised, a further evaluation – the outcome evaluation – is required some time after implementation.

In addition, regular monitoring of the project is essential against specified Key Performance Indicators (KPIs) to assess the ongoing effectiveness of the scheme.

Project objectives have been set out as a more measurable and specific account of the planning objectives, and can be seen as scheme performance indicators. During future scheme development, the scheme objectives will continue to be under review and re-appraisal where appropriate.

There is a 5-6 year period required for scheme development, approval and construction. It is possible that circumstances may change within that time, which could affect the assumptions made regarding the scheme. Future changes in planning and transportation strategies as proposed or implemented by CEC will also result in a re-assessment of the tram proposals.

tie will lead a project management team comprising various advisors throughout scheme development and construction. In addition to monitoring changes in capital and operating costs and revenues, the same team will also regularly review progress against the assumed project programme, thereby evaluating any potential for changes in project costs and associated risks.

Evaluations are specific post-implementation events designed to identify whether:

- A project has performed as intended (or under or beyond expectations);
- Established objectives have been achieved (fully or partially, and the reasons for any failures); and
- The project continues to represent value for money (also considering actual cost budget).

The Process Evaluation is conducted straight after the implementation. It will draw lessons for on-going implementation and for the design, management and implementation of future projects.

It is recognised that the full potential of a new transport mode will only be realised some time (perhaps 2 to 3 years) after its introduction. It is for this reason that the DPOF contract proposes a review and possible revision of Target Costs and Revenues after such a period. The outcome evaluation will probably be undertaken as part of the process to be followed prior to agreeing any change of the targets and will be based on similar data to that collected for the baseline survey and process evaluation mentioned above.

A monitoring programme will need to be developed within the development and implementation stages of the project, in order to ensure the gathering of relevant information on performance indicators. The monitoring programme will measure the progress towards meeting the objectives through an assessment against target indicators, in particular whether the project is providing Best Value.

tie has been, is and will continue to take steps to validate and evaluate the scheme (both before and after implementation) and to monitor its performance in the operational phase.

Tram Line 1, Preliminary Financial Case, September 2004 – Executive Summary

Introduction

The purpose of this updated version of the Preliminary Financial Case is to report on progress that has been made, since the submission of the Preliminary Financial Case in December 2003, in the development of options to procure and finance Line One of the proposed Edinburgh Tram Network. This document incorporates and updates the information in the December 2003 version. Future actions described in this document reflect the need to set out a forward plan of action and do not imply any presumption about Parliament's wishes.
tie is progressing the technical and financial analysis of Lines One, Two and Three of the proposed Edinburgh Tram Network on behalf of the City of Edinburgh Council (the Council). 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 have been factored into the financial model contained within this Preliminary Financial Case. A formal application for SE 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 Case (OBC). The present estimate of the timescale for this is summer 2005.

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 Mott MacDonald. This Preliminary Financial Case has been informed by the work undertaken by Mott MacDonald in preparing an updated version of the STAG 2 document.

This document also describes:

- the need for a tram system in Edinburgh;
- the basis for the selected procurement approach;
- **tie's** proactive approach to transport service integration;
- the extensive and rigorous project risk management procedures in place (including those mitigating cost creep); and
- the impact of alternative financial structures.

tie has also assessed the National Audit Office (NAO) report into light rail schemes and Audit Scotland's recently reported findings in relation to Holyrood and believes that the principal recommendations have been embedded in the procurement and project management approach to the tram project.

Description of the Line One 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.

The preferred corridor is the "loop" project that includes a connecting line between Leith and Granton creating a circular network linking with the City Centre, Princes Street and Haymarket. The proposal includes significant street running along Princes Street and Leith Walk, together with a former railway alignment between the City Centre and Granton, and a new alignment along the riverside section. The proposal is for a double track tramway featuring extensive priorities along the route.

The Line will pass the new bus station adjacentt to St Andrew Square as well as a number of other potential development sites in the northern area.

The overall route length is 15.5km with stops at 22 locations. Stop spacing varies along the route with an average spacing of around 700m outside the City Centre.

The demand for the tram has been derived through a detailed modelling process. This has forecast the patronage to be 9.41 million in 2011, rising to 12.97 million by 2026.

The revenues and the 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 prior to financial commitment.

Summary of Costs and Revenues

Description		**Line One (£)***
Capital Costs	Base Cost	219,320,000
	Contingency	23,730,000
Specified Capital Cost		**243,050,000**
	Optimism Bias	31,100,000
	Total	**274,150,000**
Lifecycle Costs	Total	**44,624,636**
Operating Costs	Per Annum	**6,287,000**
Revenue	2011	**6,567,434**
	2026	**9,564,397**

*All prices at Q2 2003, undiscounted

The capital and lifecycle costs quoted above, with the exception of the Optimism Bias are derived from the STAG 2 analysis conducted by Mott MacDonald. The treatment of Optimism Bias is addressed in section 5.4.

The configuration of the Line is essentially the same as that identified in the Waterfront Feasibility Study in 2001 and the ITI Preliminary Business Case submitted in September 2002.

The benefits of the project against the Planning Objectives are set out in the STAG2 document. Line One will improve accessibility to employment, education, shopping and leisure destinations, particularly for the socially deprived, including those without access to a car. To the extent to which the scheme provides changes in modal share, it will contribute to

sustainable travel and less congestion (more public transport trips and less car trips). The electric trams will not produce exhaust emissions.
The tram system will provide a safe and secure means for travel as well as a safe local environment.
The tram will provide social benefits in terms of enhanced liveability on streets and accessibility to mobility-impaired and deprived groups in the population.

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 Board review and updating in order to manage proactively the identified risks. This document sets out in detail at Section 5 how risk is being managed.

An incremental Optimism Bias factor of 14.2%, over and above the defined contingency as specified by **tie's** consultants, has been applied to base capital costs and 10% to works duration using HM Treasury methodology in examining the funding options. The Optimism Bias factors have reduced since the submission of the Preliminary Financial Case in December 2003 due to a number of factors that have changed in the intervening period. The revised lower factor now represents an increase to the Specified Capital Costs of £31 million and a prolongation of the construction period by 4 months compared to the base case provided by **tie's** technical advisors. The contingency costs advised to **tie** by their technical advisors are 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.

Key Procurement Issues

A decision was taken in early 2003 on risk management grounds to separate the operator and system procurement processes. **tie** has appointed Transdev under the terms of the DPOF Agreement, to work in partnership on the development of the system which formally commenced on 28 June 2004. For reasons which are fully explained in this document, the current proposal is that the system procurement model adopted will focus on an Infrastructure and Integrator Consortium Option with separate but interfaced procurements of the system infrastructure and tram vehicles, ultimately leading to novation of the vehicle contract into a single consortium responsible for all elements of infrastructure. This is a complex issue which will be subject to further evaluation.

Given the level of uncertainties at this stage about costs and available funding on a project of this complexity and scale, **tie** is recommending the adoption of a phased approach to the procurement, construction and operation of the tram system. Prior to the formal tendering for the system, there is a need to define the configuration of the first phase ("Phase 1") of the system, bearing in mind the development of the Line Two proposals and overall network and affordability matters. The preferred procurement option facilitates such an approach as follows:

- planning for anticipated initial packages of detailed design and advance works (principally land acquisition and utility diversion works);
- Phase 1 configuration within affordability limits;
- the procurement of the tram vehicles incorporating an option on sufficient vehicles to serve the full system, but structured to allow for sequential purchase in line with the requirements of each phase; and
- the main infrastructure contract procurement scope covering the entire system.

The main infrastructure contract procurement scope will be structured to require:

- a firm, fixed price bid, potentially privately financed, for Phase 1;
- a detailed breakdown of all cost inputs to the bid so as to provide indicative pricing which would be used to build up a fixed price bid for subsequent phases on an open book/partnering basis in line with available funds; and
- a firm, fixed price bid, potentially privately financed, for Phase 2 and any subsequent phases.

The approach facilitates the option of retaining the same infrastructure provider through the subsequent phases on the basis of the initial procurement (subject to continuing affordability and VFM) which assists system integration. The approach also achieves a number of other objectives, notably:

- ensures that affordability is achieved and minimises initial capital investment;
- creates a partnering approach to construction procurement over subsequent phases, rather than an "all or nothing" contract for a single project; and
- mitigates the risk that procurement is implemented and unaffordable tenders are received (a problem common to most other UK system procurements) requiring the tendered system scope to be retrospectively curtailed.

This represents **tie**'s recommended approach based on information available now and which is assessed to be reliable. A number of key factors are undergoing further refinement, as described below. This process will continue through to formal tendering and financial close. 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.

Programme Risk

The project timetable continues to be driven toward an operational system in 2009, in line with the Council's published programme. The optimum risk management approach would involve expenditure prior to the date for Royal Assent to this Bill (anticipated end December 2005) and this is a critical matter requiring further analysis and detailed discussion with the SE. It is necessary to adopt this form of planning assumption in order to define properly the programme, **but it is not intended to imply any presumption about Parliament's wishes**. In the event that such expenditure is facilitated, the risk of abortive cost will be fully appraised before actual spending is committed; in the event that no, or only limited, such expenditure may be financed prior to Royal Assent, the implications for programme will require to be evaluated.

Service Integration

Effective integration is key to patronage stability and growth as well as to delivery of wider social policy aspirations. Uniquely in the UK, **tie** has instigated a programme of involvement of the tram operator and bus companies and will develop in due course a similar dialogue with other transport operators.

The main bus operator in the Edinburgh bus market is Lothian Buses plc (LB), owned by the Council (91%), which delivers approximately 80% of bus services in the City, with the balance primarily serviced by First Group. This market structure offers an exceptional opportunity to achieve effective integration, subject always to full compliance with competition law. **tie** has established a detailed process to maximise this opportunity for the benefit of customers, including:

- in the period to March 2004, **tie** worked with the Council and LB to design a framework for achieving sustainable integration of LB services with those of the tram;
- the process of selecting the tram operator had a specific requirement that the aspiring operators demonstrate that they would be able to deliver effective integration. Transdev have now accepted this obligation;
- Transdev have noted and agreed with the objectives and direction of the framework developed with the Council and LB; detailed dialogue is now underway;
- a holding company wholly-owned by the Council – Transport Edinburgh Limited (TEL) – has been incorporated to oversee and drive progress;
- a joint-venture financial framework involving Transdev and LB will be developed to provide balanced financial incentives for the main integration parties; and
- a draft action plan governing the next stages of the integration dialogue is targeted for commencement in September 2004, including effective integration with other operators.

The Office of Fair Trading has been notified of the proposed approach.

Results of Financial Model

It is considered that the optimum procurement and funding structure will involve the establishment of a separate private sector owned entity to construct and maintain the infrastructure and equipment (Infraco), with another private sector entity acting as Operator. For planning purposes, the project is assumed to have a 30 year operational life post construction, however, the equipment is anticipated to have a residual life beyond this period the value of which will be reflected in the initial and subsequent Infraco contracts.
tie will continue to work with its public sector stakeholders and private sector partners to design the optimum procurement and funding approach for the infrastructure and equipment 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 financial projections have been developed with extensive input from experienced advisors:

- capital costs have been prepared by **tie**'s technical advisors; Lines One and Two have been benchmarked against each other and the system has been benchmarked against other systems' actual costs. Apart from the downwards adjustment to Optimism Bias the capital costs reflected in this Preliminary Financial Case are largely the same as those in the December 2003 version, since no material matters have come to light since December 2003 which would cause them to require change. They represent a substantial increase over the original feasibility estimates which were developed in detail in 2001;
- revenue projections are based on patronage numbers drawn from a public transport model, which although complex has been independently assessed as fit for purpose; and
- operating costs are now based on the costs estimated by Transdev in developing the DPOF Agreement, and supersede those initially estimated by the technical advisors.

Accordingly, the financial projections and risk assessments are as firmly based as is possible at this stage in the procurement process.
In assessing affordability, two key assumptions have been made:

1. that there will be no indexation or further SE funding than the £375m grant which was conditionally proposed by the SE in March 2003; and

2. that the system must have a reasonable expectation of making an operating cash flow surplus over its life, avoiding the need for future subsidy from public sector sources.

At this stage of the project's development, certain variables are subject to refinement and change. On the operational and expenditure side these include:

- capital cost estimates – which will be developed further through detailed design work, advice from Transdev and then market-tested through the formal procurement process; and
- patronage and revenue projections – which will evolve to optimise the system performance with input from Transdev and most critically from the establishment of service integration plans.

On the funding side the issues under evaluation include cash flow from property development gains, developer contributions and additional commercial income that can be driven from the trams' operations.

tie has appraised these key issues and assessed the funding which has reasonable visibility and can be delivered for the scheme. This has been done both for the individual lines and for a network of Lines One and Two. In the context of this document, which is prepared in support of Line One, it is **tie's** conclusion that:

a. there is a reasonable basis for taking forward the procurement of Line One as a standalone project, given the funding which is reasonably visible;

b. when a network of Lines One and Two is assessed, it becomes more difficult to be fully confident about the adequacy of available funding and accordingly there is a need for further detailed evaluation of the system scope, including the basis for extending Line Two beyond the Airport in the initial Phase 1 system construction, in these circumstances, a clearer view of the economic development assumptions in the Newbridge area would be valuable and the work required to develop a robust business case for the extension to Newbridge should continue; and

c. the procurement of the system should be continued according to the programme timetable which will deliver an operating system in 2009. The procurement should be executed on a phased basis which ensures the construction always remains within funding which can be regarded as reasonably assured.

The models illustrate three options for consideration by the Council and SE as ways in which to fund Line One. Their impact can be illustrated by way of a Net Present Value analysis which is set out in Section 10. The principal reason for the differential between the NPV's is driven by the timing of the cashflows in the respective models.

- an Up-Front Grant funding route would offer the lowest NPV, but 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 but spreads the burden over the contract period and subject to analysis would probably offer a better risk transfer solution to the public sector; and
- a Partial PFI/Hybrid option can be put forward 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 PFI.

An analysis has been undertaken of a number of sources of funding for 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 infrastructure and equipment provider.

The format and timing of public sector funding input to the project therefore remains under consideration. It is likely to prove financially attractive to lease the tram vehicles and possibly elements of the infrastructure, which will defer the cash flow. This is a complex matter, including taxation advantages for both the project and its financial partners and has not been assessed in detail at this point. The current financial appraisals do not involve leasing options and in this regard **tie** have modelled the conservative case for the vehicle procurement.

The estimates supporting the assessment of affordability reflect the "grant-funded" case whereby the majority of public sector funding is provided during construction. This does not specifically take account of the requirement to finance the excess capital cost above the grant support in a scenario where a network of Lines One and Two is to be constructed. There are a number of variables to take account of in such a calculation – the extent and debt service cost of funding for land acquisition and utility diversion; the value of leasing arrangements; the timing of cash inflows from operations; and more fundamentally whether a PFI model would be deployed – accordingly, this feature can only meaningfully be assessed when the precise funding route is better developed. This matter is under evaluation and will be concluded upon in the OBC.

This document does not therefore conclude on the preferred funding structure, but recommends that this be the subject of further detailed analysis with the SE, taking account of the recently published HM Treasury guidance on deployment of PFI in major capital projects. It will also be necessary for the SE and the Council to agree on the relative balance of financial risk and underwriting. In summary, the assumptions in the financial models are:

- the SE will be committing to provide either a sum up to £375m in capital funding or a stream of availability payments, which will be passed through the Council to the design, construction and implementation partners;
- further dialogue will be required on funding the early stage capital expenditure above that supported by the grant drawdown if a network is to be constructed; and
- the Council will require to underwrite the contractual payments to the operator. This is assumed to be financed out of operational tram revenues, net of operating costs but augmented by other third party sources of income related to the tram's operations such as property gains and advertising income. In addition, the Council will require to meet lifecycle replenishment capital costs out of operational revenues.

Further discussion on these arrangements will take place between the Council and the SE. Taking Line One in isolation from any wider network consideration, the SE has proposed a funding contribution to progress the project. However, **tie** is progressing concurrently Lines One and Two and as a consequence the available SE funding has to be allocated between these. 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 SE Grant of £33 million in 2003 prices based on the Up-Front Grant funded solution. Additional sources of funding are being pursued by **tie** as set out in Section 7 of this document**.** 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 infrastructure contract definition and **tie** will be seeking to maximise the benefits arising from revenues and commercial income sources while minimising cost creep. The OBC seeking formal funding support will identify the totality of the funding requirement for the Line and how this is to be satisfied.

Tram Line 2 STAG2 – Executive Summary

Introduction

This STAG Report summarises the work that has been undertaken in developing the case for a Tram Line in West Edinburgh. Initially the case for a network of Tram Lines was established within the Integrated Transport Initiative for Edinburgh and South East Scotland, which was examined as part of a package aimed at addressing the congestion problems in Edinburgh. This together with the North Edinburgh Rapid Transit Solution Feasibility Study and the Edinburgh LRT Masterplan study confirmed the priority of developing a new high quality Tram in West Edinburgh. Subsequently FaberMaunsell and their sub-consultants have developed a Preferred Route and Operating System for the Edinburgh Tram Line Two. During this time the engineering feasibility, environmental impact and revenue/patronage forecasting has been undertaken for a variety of options seeking to provide a first class public transport system from the city centre to the western edge of the city.

This work has concluded that the introduction of a tram into West Edinburgh is consistent with the objectives of the City Council and will contribute to the realisation of the Vision for Edinburgh.

Planning Objectives

The Planning Objectives for this work were established from a review of the City of Edinburgh Council's own aims and objectives for transport contained within their Local Transport Strategy. The planning objectives have been used consistently throughout the process and are as follows:

- **To improve accessibility** – improvements, particularly for people without access to a car, on low incomes or whose mobility is impaired are fundamental to the achievement of both the social inclusion and economic development elements of the transport vision. Specific objectives are:
  - To improve access to the public transport network;
  - To improve access to employment opportunities: and
  - To support economic development.

- **To reduce pollution and environmental damage caused by traffic** – this is fundamental to the achievement of the environmental / sustainability aspiration and will contribute to the achievement of the safety element of the transport vision. Specific objectives are:
  - To increase the proportion of journeys made by public transport, walking and cycling;
  - To improve local air quality; and
  - To reduce emissions of greenhouse gases

- **To reduce traffic congestion** – this is fundamental to the achievement of economic development and environmental aims. Specifically the scheme should:
  - Reduce the number of private vehicle kilometres; and
  - Reduce traffic volumes and key routes.

- **To make the transport system safer and more secure for both users and non-users** – this is fundamental to the achievement of the safety and community elements of the vision and will contribute towards achieving the environmental and social inclusion elements. Specific objectives are to:
  - Reduce the number of road traffic accidents; and
  - Improve personal security when using the transport system.

Problems and Opportunities in West Edinburgh

Edinburgh's economic success as a growing region for employment and increasing population has led to many pressures arising in its transport networks. This together with increasing demands for new developments, particularly in the West Edinburgh area, will mean that this congestion is likely to increase further.

It has been estimated that traffic levels in Edinburgh will grow by 20% over the 20 years. Traffic delays, however, grow at a disproportionate rate and as a result the time lost in traffic due to congestion is expected to double. The most serious problems are expected in West Edinburgh, which has been shown to account for almost half of the additional congestion. There is a concern that the competitiveness and, thus, the dynamism of the Edinburgh and Lothian's economy will be reduced if the region's strengths are not further developed and this would have a negative impact upon Scotland as a whole. Traffic congestion is causing problems for all road users through delays to commercial vehicles, private car and bus. Traffic congestion can impede effective business and discourage the location of new or expanding businesses in or near the city. As a consequence, congestion is harming the local economy and the environment.

Project History (Option Generating, Sifting, Development and AST1 work)
Development work on the ITI initially began in the late-1990s. This final strategy contains a Vision for Edinburgh and was submitted to the Scottish Executive in September 2002. This was approved in principle and therefore provided the initial justification for a package of schemes, together with congestion charging, as the way forward to tackle the problems expected to face the City. This package included a network of Tram Lines serving the North, West and South East of the City.

This network was explored further in the LRT Masterplan study undertaken by Arup, which confirmed that the Northern Loop should receive the highest priority followed by the Western and South-Eastern lines. In addition, the Feasibility Study for a North Edinburgh Rapid Transit Solution undertaken by Andersen examined the wide range of different technologies available in the Public Transport market before concluding that LRT or Tram based technology was the best solution for a network in Edinburgh.

These studies form the basis of the STAG Part 1 Appraisal and the Part 1 Appraisal Summary Tables are included in Appendix A to this main report.

The West Edinburgh Corridor
The starting point for FaberMaunsell's more detailed work was to choose a Preferred Route Corridor for the West Edinburgh Tram route (or Edinburgh Tram Line Two as it had become known). From a wide selection of options a "Central" corridor based largely on the previous CERT corridor was chosen using the following criteria:

- Engineering;
- Traffic and Transportation;
- Safety;
- Environment;
- Economy/Development;
- Accessibility; and
- Integration.

Throughout the course of this work consultation with third parties was undertaken and key issues were fed into the corridor selection process. In some areas it was difficult to identify the preferred route within the corridor so options were carried forward in key areas such as the city-centre, from Roseburn to Carrick Knowe, near Gogar roundabout and at the Airport.

Consultation
The Preferred Corridor together with the local options was then the subject of an extensive public consultation process. This informed major stakeholders and the residents of Edinburgh about the proposals and it provided the opportunity to comment in a variety of ways.

The results of the consultation show that there is broad support in Edinburgh for the tram proposals and preferences for each of the options presented was expressed. Further technical work and focussed consultation was undertaken to address specific issues arising from the consultation before the Preferred Route was determined.

Scheme Description
The Preferred Route begins at St Andrew Square before travelling along Princes Street and 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 under the A8 to the east of Gogar roundabout, the Tram passes close to the new Royal Bank of Scotland Headquarters (albeit on the other side of the A8) before reaching the new Park and Ride site at Ingliston. At this point the line swings northwards to Edinburgh Airport where it will terminate.

A second Line (the Newbridge spur) will run between the Ingliston Park and Ride stop westwards towards Ratho Station and the new developments at Newbridge where it will terminate. The point of termination has been chosen to allow for future extension of the line. The Newbridge spur was introduced as a branch line, instead of a direct extension of the main route, as a result of the patronage estimates and planning difficulties arising from uncertainties regarding the future expansion of the Airport and its impact on Royal Highland Showground land.

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 and there will be stops located at the following locations:

Main Line
St. Andrew Square
Princes Street
Shandwick Place
Haymarket
Murrayfield
Balgreen Road
Saughton Road North
South Gyle Access
Edinburgh Park Station
Edinburgh Park
The Gyle
Gogarburn
Ingliston Park & Ride
Airport

Newbridge Spur
Ingliston Park & Ride (interchange with the main line)
Ingliston West
Ratho Station
Newbridge South
Newbridge North

STAG Part 2 Appraisal
The Scottish Executive STAG appraisal guidelines have been used throughout the process. The notable issues arising from the Part 2 appraisal of the preferred Option are summarised below.

Environment
The assessment identifies a number of positive environmental benefits associated with Edinburgh Tram Line Two. It will have a minor positive impact on air quality with reductions in CO_2 emissions of 3% and 9% in 2011 and 2026 respectively. Accordingly, the planning objective of reducing the omissions of greenhouse gases is met.

In terms of local air quality, greater benefits are expected along Haymarket Terrace and Morrison Street. Other benefits are predicted along Saughton Road. The scheme is shown

to have a beneficial impact on Oxides of Nitrogen and Particulate Matters and therefore the objective of improving local air quality is met overall.

Landscape and ecological benefits would occur along some segregated sections of the route where new planting would be undertaken. The tram would also have a number of negative impacts. The construction phase will result in short term-localised disruption to residents and businesses. Vegetation including trees will be lost in several locations including land behind Baird Drive and within the greenbelt. However, replacement planting is proposed in these areas.

The main impacts are associated with the presence of tram infrastructure within Edinburgh's World Heritage site and in the greenbelt. Negative heritage, landscape and visual impacts are predicted within these sensitive areas. Heritage impacts would also occur at Gogar and Huly Hill in Newbridge. Operational noise impacts would be negligible along much of the route but negative impacts are predicted at residential properties at Balbirnie Place, Baird Drive, and Ratho Station. A Design Manual has been produced and additional mitigation measures proposed to integrate the tram into the landscape and townscape. This will mitigate more localised impacts and, where appropriate, will enhance the local landscape structure.

The tram would also result in a loss of some high quality agricultural land and run through an area of importance for flood control south of Edinburgh Airport.

Safety
The personal security concerns of many individuals when using public transport will be dealt with through the design of mitigating facilities designed into the tram development. For example, Edinburgh Tram Line Two will have stops fitted with high quality lighting and closed circuit television. In addition it is possible to provide emergency help phones if necessary. Similarly, on board the modern tram it is possible to design a safe and secure environment. Thus it is fair to assume that Edinburgh Tram Line Two will provide a degree of improved security for potential patrons and system employees, meeting the improved security objective.

In terms of road user accidents it is not envisaged that there will be any significant change in the number of road accidents occurring during the early years of operation. The overall objective of improving road safety is not met in the later years of the scheme life. The reason for this is that the benefits of the scheme in relation to the economic life of the city lead to increased travel, much of it by car. As a result there is a net increase in car use and accidents. However, if the economic development effect was removed, for example through planning controls, there would be a reduction in road traffic and road traffic accidents. It is therefore the second order effect on the economy, rather than the scheme itself, which is leading to this outcome.

Economy
As required by STAG, this report includes consideration of the economic welfare impacts of the proposal (Transport Economic Efficiency, TEE). This 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 1.3340. This means that the overall benefits of the scheme exceed the costs by 3340% and therefore represents good value for money in economic terms

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 floorspace created as a result of the tram project but would have little discernable impact on property rental values in those sectors

Integration
The integration of the Tram with transport, land-use and wider policies has been reviewed within this report. In terms of transport integration the tram route will provide rail interchange opportunities at Waverley, Haymarket and the new station at Edinburgh Park. Bus interchange opportunities will also be possible at the Gyle Shopping Centre and at other locations.

The Finalised Edinburgh and Lothians Structure Plan 2015 makes clear that the delivery of a tram system is crucial for the successful delivery of the plan's development strategy. The Finalised Rural West Edinburgh Local Plan states that the routing of the Tram to Newbridge, and eventually beyond, is crucial to delivering a sustainable development solution in the Newbridge/Kirkliston/Ratho area.

The tram route will connect well with the Park and Ride facilities at Ingliston, ensuring that an alternative choice can be provided for motorists.

The Preferred route integrates well with land-use as it connects residential areas well with major employment, leisure and transport hubs thus contributing to sustainability and reducing the need to travel by public transport. In addition there is also greater scope for development opportunities resulting from the eventual routing of the tram route.

In terms of policy integration the tram is shown to contribute to wider Government policies on Disability, Health and Social Exclusion

Accessibility
The proposed tram line is expected to increase accessibility by public transport with key benefits realised by those who do not own a private car and by the socially disadvantaged. The higher reliability of tram, relative to bus, will particularly benefit these groups and will, in practice, increase accessibility of the public transport network. There are a number of socially deprived wards in and around the proposed route of the tram in which the tram will provide increased accessibility to employment opportunities.

In terms of access to local services it is considered, since the tram mainly runs off street, that it will have only minor adverse impacts on local accessibility.

Overall, the analysis demonstrates a general improvement in accessibility with some very significant benefits for certain movements. There are, however, some disbenefits, mainly as a result of reduced highway capacity in the city centre. In general, access to local services is improved as a result of the scheme and the more deprived areas within the corridor share in the benefits. Overall, the objective of improving accessibility is met.

Costs
The costs developed for this study include capital costs, operating costs and life cycle costs.

Capital cost estimates for Edinburgh Tram Line Two have been prepared using a combination of benchmarking, previous experience and engineering judgement.

The capital costs are estimated at £336.320.9M (including 3125% optimism bias), based on 2Q 2003 prices. 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.

Operating costs, which include the cost of operating the system, maintenance and lifecycle costs and management fee, are expected to be around £7.8 million pounds per annum.

Summary of Cost-Benefit Appraisal

Present Value of Benefits (PVB)	£288 million
Present Value of Costs (PVC)	£216 206 million
Net Present Value (NPV)	£72 82 million
Benefit Cost Ratio (BCR)	1.3340

Patronage and Revenue

The Tram is expected to carry around 5 million passengers in the opening years, which will grow to around 7 million passengers some 15 years later. The revenue expected from this level of demand will be £6 million in the early years, growing to over £8 million. These figures assume an allowance for fare evasion and a variety of ticket types.

Risk and Uncertainty

One of the critical success factors for Edinburgh Tram Line Two is the identification and mitigation of the risks inherent in a project of this nature. In order to manage risk in a structured manner, **tie** has appointed a full-time Risk Manager to develop and apply a framework of risk analysis and evaluation to assist in decision-making, and achieve the following prime objectives:

- Mitigate all identified risks to a 'medium' significance or less;
- Pass all identified risks to the best parties capable of managing the risk;
- Creation of a culture of risk awareness and management;
- Delivery within budget and on time;
- Provide a fully functioning operational service; and
- Obtain support from all key stakeholders.

tie has developed clear and active processes to identify and mitigate project risks in accordance with industry best practice. The **tie** Board takes ultimate responsibility for risk, with responsibility delegated to the Project Director.

Monitoring and Evaluation

There are five phases of the project which require consideration during the monitoring and evaluation process, namely:

- Scheme development;
- Infrastructure procurement;
- Construction;
- Testing and Commissioning; and
- Operations.

The STAG requirements for monitoring and evaluation are principally associated with the operational phase, following scheme implementation. However, it is also necessary to assess and re-appraise the project during phases prior to implementation.

tie has been, is, and will continue to take steps to validate and evaluate the scheme (both before and after implementation) and to monitor its performance in the operational phase.

Conclusions

The Integrated Transport Initiative was developed by **tie** to address the problems that currently exist, and those that are forecast to exist in the future, on Edinburgh's transport networks. It identified that failure to provide an effective solution would be detrimental to the vibrant and dynamic economy of both the city and the wider region.

At the heart of the solution identified was a network of tram routes serving the city. This was found to best meet the objectives identified in the Part 1 Appraisal process. These objectives have been used further to identify the Preferred Route for the West Edinburgh route or Edinburgh Tram Line Two. 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;
- Local air quality is expected to improve and greenhouse gas emissions reduce as a result of the introduction of the trams. 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.

Tram Line 2, Preliminary Financial Case, September 2004 – Executive Summary

Introduction

The purpose of this updated version of the Preliminary Financial Case is to report on progress that has been made, since the submission of the Preliminary Financial Case in December 2003, in the development of options to procure and finance Line Two of the proposed Edinburgh Tram Network. This document incorporates and updates the information in the December 2003 version. Future actions described in this document reflect the need to set out a forward plan of action and do not imply any presumption about Parliament's wishes.

tie is progressing the technical and financial analysis of Lines One, Two and Three of the Network on behalf of City of Edinburgh Council (the Council). 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 have been factored into the financial model contained within this Preliminary Financial Case. A formal application for SE 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 Case (OBC). The present estimate of the timescale for this is summer 2005.

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 and recently completing an updated version of the STAG 2 document.

This document also describes:

- the need for a tram system in Edinburgh;
- the basis for the selected procurement approach;
- **tie's** early and proactive approach to transport service integration;
- the extensive and rigorous project risk management procedures in place (including those mitigating cost creep); and

- the impact of alternative financial structures.

tie has also assessed the National Audit Office (NAO) report into light rail schemes and Audit Scotland's recently reported findings in relation to Holyrood and believes that the principal recommendations have been embedded in the procurement and project management approach to the tram project.

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 and 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 world 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 annual patronage to be 5.38 million in 2011, rising to 6.94 million by 2026.
The revenues and the 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 prior to financial commitment.

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	42,390,080
	Total	**320,910,400**
Lifecycle Costs	Total	**51,672,000**
Operating Costs	Per Annum	**6,097,000**
Revenue	2011	**6,360,000**
	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 treatment of Optimism Bias is addressed in section 5.4.
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 Council and will contribute well to the realisation of the Vision for Edinburgh.

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 board review and updating in order to manage proactively the identified risks. This document sets out in detail at Section 5, how risk is being managed.

An incremental Optimism Bias factor of 16.5%, over and above the defined contingency specified by **tie**'s consultants, has been applied to base capital costs and 10% to works duration using HM Treasury methodology in examining the funding options. The Optimism Bias factors have reduced since the submission of the Preliminary Financial Case in December 2003 due to a number of factors that have changed in the intervening period. The revised lower factors now represent an increase to the Specified Capital Costs of £42 million and a prolongation of the construction period by 4 months compared to the base case provided by **tie's** consultants. The contingency costs, advised to **tie** by their technical advisors, are 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.

Key Procurement Issues

A decision was taken in early 2003 on risk management grounds to separate the operator and system procurement processes. **tie** has appointed Transdev, under the terms of the DPOF Agreement, to work in partnership on the development of the system. The work with Transdev formally commenced on 28 June 2004. For reasons which are fully explained in this document, the current proposal is that the system procurement model adopted will focus on an Infrastructure and Integrator Consortium option with separate but interfaced procurements of the system infrastructure and tram vehicles, ultimately leading to novation of the vehicle contract into a single consortium responsible for all elements of infrastructure. This is a complex issue which will be subject to further evaluation.

Given the level of uncertainties at this stage about costs and available funding on a project of this complexity and scale, **tie** is recommending the adoption of a phased approach to the procurement, construction and operation of the tram system. Prior to the formal tendering for the system, there is a need to define the configuration of the first phase ("Phase 1") of the system, bearing in mind the development of the Line One proposals and overall network and affordability matters. The preferred procurement option facilitates such an approach as follows:

- planning for anticipated initial packages of detailed design and advance works (principally land acquisition and utility diversion works);
- Phase 1 configuration within affordability limits;
- the procurement of the tram vehicles incorporating an option on sufficient vehicles to serve the full system, but structured to allow for sequential purchase in line with the requirements of each phase; and
- the main infrastructure contract procurement scope covering the entire system.

The main infrastructure contract procurement scope will be structured to require:

- a firm, fixed price bid, potentially privately financed, for Phase 1;
- a detailed breakdown of all cost inputs to the bid so as to provide indicative pricing which would be used to build up a fixed price bid for subsequent phases on an open book/partnering basis in line with available funds; and
- a firm, fixed price bid, potentially privately financed, for Phase 2 and any subsequent phases.

The approach facilitates the option of retaining the same infrastructure provider through the subsequent phases on the basis of the initial procurement (subject to continuing affordability and VFM) which assists system integration. The approach also achieves a number of other objectives, notably:

- it ensures that affordability is achieved and minimises initial capital investment;
- it creates a partnering approach to construction procurement over subsequent phases, rather than an "all or nothing" contract for a single project; and
- it mitigates the risk that procurement is implemented and unaffordable tenders are received (a problem common to most other UK system procurements) requiring the tendered system scope to be retrospectively curtailed.

This represents **tie**'s recommended approach based on information available now and which is assessed to be reliable. A number of key factors are undergoing further refinement, as described below. This process will continue through to formal tendering and financial close. 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.

Programme risk

The project timetable continues to be driven toward an operational system in 2009, in line with the Council's published programme. The optimum risk management approach would involve expenditure prior to the date for Royal Assent to this Bill (anticipated end December 2005) and this is a critical matter requiring further analysis and detailed discussion with the SE. It is necessary to adopt this form of a planning assumption in order to define properly the programme, but it is not intended to imply any presumption about Parliament's wishes. In the

event that such expenditure is facilitated, the risk of abortive cost will be fully appraised before actual spending is committed; in the event that no, or only limited, such expenditure may be financed prior to Royal Assent, the implications for programme will require to be evaluated.

Service integration

Effective integration is key to patronage stability and growth as well as to delivery of wider social policy aspirations. Uniquely in the UK, **tie** has instigated a programme of early involvement of the tram operator and bus companies and will develop in due course a similar dialogue with other transport operators.
The main bus operator in the Edinburgh bus market is Lothian Buses plc (LB), owned by the Council (91%), which delivers approximately 80% of bus services in the City, with the balance primarily serviced by First Group. This market structure offers an exceptional opportunity to achieve effective integration, subject always to full compliance with competition law. **tie** has established a detailed process to maximise this opportunity for the benefit of customers, including:

- in the period to March 2004, **tie** worked with the Council and LB to design a framework for achieving sustainable integration of LB services with those of the tram;
- the process of selecting the tram operator had a specific requirement that the aspiring operators demonstrate that they would be able to deliver effective integration. Transdev have now accepted this obligation;
- Transdev have noted and agreed with the objectives and direction of the framework developed with the Council and LB; detailed dialogue is now underway;
- a holding company wholly-owned by the Council – Transport Edinburgh Limited (TEL) has been incorporated to oversee and drive progress;
- a joint-venture financial framework involving Transdev and LB will be developed to provide balanced financial incentives for the main integration parties; and
- a draft action plan governing the next stages of the integration dialogue is targeted for commencement in September 2004, including effective integration with other operators.

The Office of Fair Trading has been notified of the proposed approach.

Results of Financial Model

It is considered that the optimum procurement and funding structure will involve the establishment of a separate private sector owned entity to construct and maintain the infrastructure and equipment (Infraco), with another private sector entity acting as operator. For planning purposes, the project is assumed to have a 30 year operational life post construction, however, the equipment is anticipated to have a residual life beyond this period the value of which will be reflected in the initial and subsequent Infraco contracts.

tie will continue to work with its public sector stakeholders and private sector partners to design the optimum procurement and funding approach for the infrastructure and equipment 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 financial projections have been developed with extensive input from experienced advisors:

- capital costs have been prepared by **tie**'s technical advisors; Lines One and Two have been benchmarked against each other and the system has been benchmarked against other systems' actual costs. Apart from the downward adjustment to Optimism Bias the

capital costs reflected in this Preliminary Financial Case are largely the same as those in the December 2003 version, since no material matters have come to light since December 2003 which would cause them to require change. They represent a substantial increase over the original feasibility estimates which were developed in detail in 2001;

- revenue projections are based on patronage numbers drawn from a public transport model, which although complex has been independently assessed as fit for purpose; and
- operating costs are now based on the costs estimated by Transdev in developing the DPOF Agreement, and supersede those initially estimated by the technical advisors.

Accordingly, the financial projections and risk assessments are as firmly based as is possible at this stage in the procurement process.

In assessing affordability, two key assumptions have been made:

1. that there will be no indexation or further SE funding than the £375m grant which was conditionally proposed by the SE in March 2003; and
2. that the system must have a reasonable expectation of making an operating cash flow surplus over its life, avoiding the need for future subsidy from public sector sources.

At this stage of the project's development, certain variables are subject to refinement and change. On the operational and expenditure side these include:

- capital cost estimates – which will be developed further through detailed design work, advice from Transdev and then market-tested through the formal procurement process;
- patronage and revenue projections – which will evolve to optimise the system performance with input from Transdev and most critically from the establishment of service integration plans; and
- impact of the proposed Edinburgh Airport Rail Link (EARL) (the possibility of which is currently being appraised against STAG) on the patronage of Line Two.

On the funding side the issues under evaluation include cash flow from property development gains, developer contributions and additional commercial income that can be driven from the trams' operations.

tie has appraised these key issues and assessed the funding which has reasonable visibility and can be delivered for the scheme. This has been done for both of the individual lines and for a network of Lines One and Two. In the context of this document, which is prepared in support of Line Two, it is **tie's** conclusion that:

a. there is a reasonable basis for taking forward the procurement of Line Two as a standalone project, given the funding which is reasonably visible;

b. when a network of Lines One and Two is assessed, it becomes more difficult to be fully confident about the adequacy of available funding and accordingly there is a need for further detailed evaluation of the system scope, including the basis for extending Line Two beyond the Airport in the initial Phase 1 system construction. In these circumstances, a clearer view of the economic development assumptions in the Newbridge area would be valuable and the work required to develop a robust business case for the extension to Newbridge should continue; and

c. the procurement of the system should be continued according to the programme timetable which will deliver an operating system in 2009. The procurement should be executed on a phased basis which ensures the construction always remains within funding which can be regarded as reasonably assured.

The models illustrate three options for consideration by the Council and SE as ways in which to fund Line Two. Their impact can be illustrated by way of a Net Present Value analysis which is set out in Section 10. The principal reason for the differential between the NPV's is driven by the timing of the cashflows in the respective models.

- an Up-Front Grant funding route would offer the lowest NPV but 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 but spreads the burden over the contract period and subject to analysis would probably offer a better risk transfer solution to the public sector; and
- a Hybrid option can be put forward 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 PFI solution.

An analysis has been undertaken of a number of sources of funding for 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 infrastructure and equipment provider.

The format and timing of public sector funding input to the project therefore remains under consideration. It is likely to prove financially attractive to lease the tram vehicles and possibly elements of the infrastructure, which will defer the cash flow. This is a complex matter, including taxation advantages for both the project and its financial partners and has not been assessed in detail at this point. The current financial appraisals do not involve leasing options and in this regard **tie** have modelled the conservative case for the vehicle procurement.

The estimates supporting the assessment of affordability reflect the "grant-funded" case whereby the majority of public sector funding is provided during construction. This does not specifically take account of the requirement to finance the excess capital cost above the grant support in a scenario where a network of Lines One and Two is to be constructed. There are a number of variables to take account of in such a calculation – the extent and debt service cost of funding for land acquisition and utility diversion; the value of leasing arrangements; the timing of cash inflows from operations; and more fundamentally whether a PFI model would be deployed – accordingly, this feature can only meaningfully be assessed when the precise funding route is better developed. This matter is under evaluation and will be concluded upon in the OBC.

This document does not therefore conclude on the preferred funding structure, but recommends that this be the subject of further detailed analysis with the SE, taking account of the recently published HM Treasury guidance on deployment of PFI in major capital projects. It will also be necessary for the SE and the Council to agree on the relative balance of financial risk and underwriting. In summary, the assumptions in the financial models are:

- the SE will be committing to provide either a sum up to £375m in capital funding or a stream of availability payments, which will be passed through the Council to the design, construction and implementation partners;
- further dialogue will be required on funding the early stage capital expenditure above that supported by the grant drawdown if a network is to be constructed; and
- the Council will require to under-write the contractual payments to the operator. This is assumed to be financed out of operational tram revenues, net of operating costs but augmented by other third party sources of income related to the tram's operations such as property gains and advertising income. In addition, the Council will require to meet lifecycle replenishment capital costs out of operational revenues.

Further discussion on these arrangements will take place between the Council and the SE. Taking Line Two in isolation from any wider network consideration, the SE has proposed a funding contribution to progress the project. However, **tie** is progressing concurrently Lines One and Two and as a consequence the available SE funding has to be allocated between these. 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 SE Grant of £65 million in 2003 prices based on the Up-Front Grant funded solution. Additional sources of funding are being pursued by **tie** as set out in Section 7 of this document**.** 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 infrastructure contract definition and **tie** will be seeking to maximise the benefits arising from revenues and commercial income sources while minimising cost creep. The OBC seeking formal funding support will identify the totality of the funding requirement for the Line and how this is to be satisfied.

Appendix B – Background to Development of Procurement

Part 1 - Decision to Pursue Early Operator Involvement

Through the procurement process **tie** has sought to enhance the delivery of the Edinburgh tram system by combining best practice with lessons learned from other related projects in the UK and abroad. The outcome of this work led to the shaping of the procurement route with a balanced approach to risk transfer, and active mitigation of specific areas that have proven problematic in other projects.

The Board of **tie**, in consultation with the Council and the SE, decided in Spring 2003 to enter into a contract with a preferred operator in advance of letting the other elements of the tram project. The principal reasons for doing so were:

- separation of operations and system construction allows those bidding for each of these contracts to concentrate on their strengths, with consequent benefits to contract pricing;
- early involvement of the operator allows **tie** to use their knowledge in the design and construction phases; and
- early involvement also facilitates proper planning of an integrated service network, especially with bus operations.

Following a rigorous procurement process and detailed negotiations, which is described below, the DPOF Agreement was signed with Transdev on 14 May 2004.

It is **tie**'s primary objective that this process will forge the basis for a strong and mutually beneficial long-term partnering relationship with Transdev for the operation of the Edinburgh Tram system. 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.

DPOF Risk Transfer Issues

Two issues were seen as key to the DPOF contract development process.

Operation and Performance Risk

The Operator 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 development lie with **tie** and its advisors. 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 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 to meet both the Council and **tie** requirements.

To address issues of performance during the operating phase of the contract, the DPOF Agreement has been 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 KPI 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 the four short listed bidders were requested to submit their costing assumptions for each cost element of the project. These assumptions were used to create a costing framework or template, to be refined by discussion with **tie** and the successful Operator over the development phases as the detail of the Line is crystallised. This information will be used in the OBC which contains a formal funding request and which will be submitted following the development of project specification with Transdev. Revenue targets will also be developed during the early phases of the DPOF and fixed prior to Transdev's confirmed status as system operator. In the instance where agreement surrounding target setting cannot be achieved between **tie** and Transdev, **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.

Part 2 - Infrastructure

The Procurement Group considered alternative structures for the procurement of 'infrastructure', 'tram vehicle' and 'system integration' elements of tram system.

The Procurement Group's collective experience of procurement was used to assess options over a number of detailed working meetings. This experience is now supplemented by Transdev.

The aims of the Procurement Group are to assess the alternatives and identify the preferred route for procurement which could form the basis for market discussions. It is intended these conclusions will be tested with the market through a PIN process as the next stage.

The Procurement Group undertook the assessment of options through ranking against eight key criteria comprising the following.

1. **Risk** – in broad sense: who takes the risk of infrastructure failing to work, costing more to construct and taking longer to construct? This type of risk can be transferred to an infrastructure partner under certain procurement options, but always at a price. As a general rule, the aim is therefore to transfer risk to those best placed to manage. Considerations in deciding upon the Procurement Group's view of risk included:

- **tie's** own resources and expertise;
- timetable implications; and
- areas where **tie** may wish to maintain control for other reasons.

2. **Cost Certainty** – how important is it to have a degree of cost certainty on costs ahead of committing to contract. Considerations included:

- source of funding: how much certainty is required in advance on amounts?
- defining scope: degree of certainty is important in planning scope of different phases of infrastructure.

3. **Control** – are there areas of the infrastructure over which **tie** or the Council need greater control – for commercial or other reasons (e.g. policy and planning)? Considerations included:

- the fact that greater control will generally reduce the opportunity for risk transfer.

4. **Flexibility of contract** – how important is it to be able to change scope – add or subtract substantial elements? Considerations included:

- generally, greater flexibility will reduce cost certainty;
- flexibility may also reduce the scope for risk transfer; and
- degree of flexibility may be constrained by procurement rules.

5. **Flexibility of financing** – how important is it to keep all financing options open e.g. 'conventional' (up front or milestone payment by **tie**), private finance raised by Infraco (PFI or PFI hybrid) or others (leasing)? Considerations included:

- VFM – does opportunity for private finance allow for greater risk transfer and potentially better VFM; and
- profile of funding availability.

6. Demonstrable **VFM –** any selected option clearly must be capable of delivering VFM, but also to be able to demonstrate that the approach is likely to deliver. Considerations included:

- value of competition for largest cost elements of infrastructure; and
- possible requirement for benchmarking and competitive sub-contract tendering.

7. **Market interest** – is a procurement option likely to prove attractive to the main private sector providers in the market? (This is linked to VFM since it determines the likely strength of any competition.) Considerations included:

- familiarity of procurement route;
- balance of risks that private sector are asked to take;
- clarity on project and funding and political support; and
- market view of **tie**'s own competence and expertise as a procuring authority.

8. **Deliverability** – what is the degree of confidence that chosen procurement route will be effective? Considerations included:

- novelty of chosen option; and
- potential bidders' levels of comfort with selected option.

Following discussion by the Group a broad assessment of the relative importance and influence of the key criteria was agreed.

Importance of Criteria

The Procurement Group's views of the relative importance of the key criteria were as follows.

1. **Risk** – The general view, given **tie**'s own resources and experience (essentially a procuring body, rather than a major project management organisation) and the scale and complexity of the tram infrastructure scheme, was that **tie** should be seeking to transfer a significant majority of the major project risks to a private sector partner(s). In particular, keys risks to be transferred (at an appropriate price) should include the majority of construction risks (cost and delays) and the risk that system works (including integration). However, the Procurement Group also agreed that there was a willingness to retain elements of risk as an acceptable trade-off in order to:

   a. retain control over certain key elements (see below); and
   b. keep broadly within the overall timetable.

2. **Cost Certainty** – The Procurement Group's view was that a degree of cost certainty was important. Whilst this was not an immediate requirement, it would be a priority ahead of signing the infrastructure contract (covering the bulk of construction).
3. **Control** – The Procurement Group considered that there are at least three, and possibly four areas, over which the advantages of **tie** retaining a degree of control outweighed the possible erosion of risk transfer. These areas are:

   a.Choice of vehicles: Given the considerable consolidation within the tram supply market, allowing for a market response inclusive of tram supply will severely reduce the number of infrastructure tenderers and could compromise final selection, pricing and risk transfer. For this reason, the Procurement Group agreed that there was strong case for **tie** to separately develop a tram supply, commissioning, maintenance and spare parts supply contract. Key would be the timing of such a contract and arrangements to migrate into the main infrastructure contract.

   b.Design: Given the particular sensitivity of sections of the line within the World Heritage centre and the known concerns of the Council's planning authority, the Procurement Group agreed that there was merit in considering a preliminary package of targeted design work ahead of the letting of any main infrastructure contract. The aim would be to assist with the development of designs that are likely to satisfy planning requirements, reducing risk and wasted design work and speeding up the overall timetable. Key will be determining an appropriate level of work that will prove attractive to potential bidders, without distorting overall costs, and without delaying the letting of a main infrastructure contract.

c.Utility diversion: This is a time consuming and high risk element of the project. If **tie** were able to gain a greater level of certainty on requirements, this could assist both in achieving the timetable and in reducing risk for the main infrastructure contractor (with impact on deliverability and cost).

d.System integration: Given the importance of systems integration, and similarly limited market, the Procurement Group considered that **tie** may wish to have greater control and visibility over this aspect of any consortium. Whether this required a separate initial contract (as with vehicles) is more open to question, given the importance of transferring this risk to bidders.

4. **Flexibility of contract –** The Procurement Group recognised the trade-offs between cost certainty and risk transfer and flexibility. Nevertheless, it was agreed that the preferred procurement option, as a minimum should be potentially capable of delivering the system through a series of stages, via a single initial procurement. Defining the first, and most certain initial tranche would be essential (and would need to fit the affordability constraints) but as the most effective means of handling future integration issues, **tie** should have the option of retaining the same private sector partner for subsequent tranches, and system expansion, subject to VFM.
5. **Flexibility of financing –** The view was that it was important to maintain all financing options at this stage, in particular the option of private finance, via PFI or a PFI hybrid, given the potential for greater risk transfer and VFM, and the potential issues in relation to the profile of funding available from the SE.
6. **Demonstrable VFM –** The Procurement Group agreed on the importance, given the high profile and scale of project, in the context both of SE VFM and local authority best value obligations. Ideally, this could most clearly be demonstrated via a transparent and strong competition for the main contract. This in turn would require the Procurement Group to be satisfied on likely market interest and deliverability.
7. **Market interest** – The Procurement Group view endorsed the importance of market soundings to test options with private sector bidders.
8. **Deliverability –** The Procurement Group agreed that the option preferred by **tie** needed to build on best practice and lessons learned from other projects without introducing unnecessary novelty. Again, assessing the views of potential bidders through market testing would be key.

Procurement Options Available

Having agreed on the relative importance of the key criteria, the Procurement Group identified potential procurement options for further analysis.

1. Full Consortium Option - Under this option, **tie** would conduct one procurement exercise and the successful consortium would deliver all design, infrastructure works, and tram vehicles. The consortium would also be responsible for systems integration. The form of contract could be based on a PFI/PPP model.

2. Infrastructure and Integrator Consortium Option - Under this option, **tie** would conduct two procurement exercises. The first would be for the procurement of design, infrastructure works and systems integration. The second would be for the procurement of tram vehicles. Ultimately, the contract for tram vehicles would be novated to the infrastructure provider as part of the design, infrastructure and systems integration package of works. The form of contract could be based on a PFI/PPP model.

3. Infrastructure Consortium Option - Under this option, **tie** would conduct three procurement exercises. The first would be for the procurement of design and infrastructure works. The second would be for the procurement of tram vehicles. The third would be for the procurement of a systems integrator. Ultimately, the contract for tram vehicles and the contract for a systems integrator would be novated to the infrastructure provider as part of the design and infrastructure package of works. The form of contract could be based on a PFI/PPP model.

4. "Arranged" Joint Venture Option - Under this option, **tie** would conduct separate procurement exercises to appoint an infrastructure provider, a systems integrator and a tram vehicles supplier. These parties would then be required by **tie** to form a joint venture which would be responsible for the delivery of the project. These parties could each provide risk-bearing equity.

5. Infrastructure Development Partner Option - Under this option, **tie** would conduct one procurement exercise to appoint a private sector partner who would, under **tie** instruction, either procure contracts or be instructed to enter into contracts in relation to any advance works, the infrastructure works, system integration, design and the procurement of tram vehicles.

6. Traditional Procurement Option - Under this option, **tie** itself would conduct separate procurement exercises in relation to design, infrastructure works, system integration and tram vehicles. **tie** would remain in contract with each of these parties. Various types of contract could be used such as the Institute of Civil Engineers or Engineering and Construction Contract conditions.

The options cover the extremes of the risk spectrum with option 1 (Full Consortia) which maximises risk transfer to a minimum risk transfer at option 6 (Traditional Procurement). **tie** will review the details of risk allocation within the OBC for the preferred procurement option as part of the assessment of VFM against a public sector comparator ("PSC") as envisaged by Option 6.

Appraisal of Options

The six options identified by the Group, have been tested against the parameters established through the key criteria:

1. Full Consortia Option - This potentially provides for maximum risk transfer, cost certainty and flexibility of financing. However, **tie** would lose control of the key areas highlighted as important (vehicles, design, utility diversion and system integration). Also certain doubts about market appetite (even with separate operator contract) impacting on deliverability and VFM (especially given NAO observations on approach as used on previous schemes). Fit: elements of match with parameters.

2. Infrastructure and Integrator Consortium Option – This potentially provides for maximum risk transfer (assuming successful novation of vehicle contract and transfer of designs), cost certainty and flexibility of financing. It would allow **tie** to retain control of choice of vehicle (and to take the advice of Transdev) and to advance design work for sensitive sections of the lines. However, **tie** would not control the choice of system integrator. The opportunity for advance design and utility diversion work should increase market appeal and addresses certain NAO observations, but market consultations are required to confirm this. Fit: potentially very good match with parameters.

3. Infrastructure Consortium Option – As Option 2. However, given the importance of system integration to delivery, **tie** choice of system integrator

potentially erodes risk transfer possible in main contract. Fit: potentially good match with parameters.

4. "Arranged" Joint Venture Option – This would create flexibility on scope. But a JV with equity puts a limit on possible risk transfer, increasing cost uncertainty. PFI financing would not be possible. The route is also untested in the light rail sector, raising doubts over market appetite, deliverability and VFM. Fit: poor match with parameters.

5. Infrastructure Development Partner Option – This would provide a great deal of control and maximum flexibility. However, much reduced risk transfer and no certainty of costs up front. It would be more difficult to demonstrate VFM (due to loss of competition) and PFI financing would not be possible. Fit: elements of good fit, but significant elements of poor fit.

6. Traditional Procurement Option – This is similar to Option 5 in terms of maximum control for **tie** and maximum flexibility (but implies significant project management capability requirement). Minimal risk transfer, minimal cost certainty, and not suitable for PFI. Fit: elements of good fit, but significant elements of poor fit.

A summary of the Group's view of the options fit with the key criteria is shown below.

Key Criteria	Options					
	1	2	3	4	5	6
Risk	√	√√	?	X	X	X
Cost Certainty	√√	√√	√	X	X	X
Control	X	√√	√	√	√	√
Flexibility of Contract	√	√	√	√√	√√	√√
Flexibility of Financing	√	√	√	X	X	X
Demonstrable VfM	?	√	√	X	X	?
Market Interest*	?	√	?	?	√	√
Deliverability*	?	√	?	?	√	√

* To be discussed with market

Key: √√ = **Very good fit**
√ = **Good fit**
X = **Poor fit**
? = **Uncertain – may need to be tested**

On the basis of a comparison with the Group's assessment of the relative importance of the key criteria, the emerging current preferred procurement strategy is **Option 2: Infrastructure and Integrator Consortia (Infraco)**. The emerging preferred procurement strategy will be discussed extensively by **tie** with the Council, the SE and the DPOF partner, Transdev. In addition, targeted market testing will take place with a selection of constructors and funders in due course.

Part 3 - Options for the Infrastructure Contract

A key element of determining the overall procurement structure for the Edinburgh Tram Network is the nature of the Infrastructure Contract, and in particular how it is funded and financed.

tie's approach to this has been to start by identifying what the Infraco should do, and specifically, what risks it should carry.

Based on this, a performance and payment mechanism has been developed that effectively transfers these risks to the Infraco Contractor. Risk transfer is achieved because the contractor's payments are determined by its level of performance under the contract eg in simple terms if it does not build the system to the required specification or the system does not perform, the Infraco does not get paid or gets paid less – so it is on risk in this respect. Modelling of the cashflows and the risks in the payment mechanism enables the funding and finance requirement for the Infraco to be determined.

The risks to be transferred to the Infraco Contractor are substantial. In summary these risks are:

- detailed design;
- construction;
- commissioning of the system; and
- maintenance of the system for a period between 6 and 30 years.

Of the above, design and construction risk could be transfered using a Design and Build Contract ie the Infraco would only get paid once the system was built (or at defined milestones). However commissioning and long term maintenance risk require a more sophisticated contract and payment mechanism to ensure that the risks are effectively transferred.

Commissioning Risk

In order to effectively transfer commissioning risk, the payment mechanism must reward the contractor for commissioning. Therefore, an element of payment must be riding on the commissioning process being successfully completed.

The options which could achieve this are set out below.

Option 1: Large Final Milestone Payment

Under this option, a substantial element of payment would be withheld until the project is fully commissioned. The amount retained would have to be a degree larger than typical construction contract retentions, reflecting the potential risks involved. A figure of 15-20% of the contract value may be appropriate. Therefore the contractor would have to finance an element of the contract until the project is commissioned, which would add interest to the total system cost (albeit there would be a corresponding benefit to the public sector)

PROS AND CONS

There would be a good financial incentive for the Infraco to stay with the project until the scheme is fully functioning.

However, contractors may be unwilling to accept it because it gives the public sector a theoretical financial incentive to cause delay or argue that the system is not fully

commissioned. **tie** would need to demonstrate to bidders its commitment to timely delivery in order to avoid this risk. On other schemes, bidders were unhappy with a large final milestone at the end of the construction period (although in those cases the milestone was closer to 50% of contract value).

In addition, there are questions about what commissioning means – is it demonstrating that a single tram can meet the required output specification, or that the entire system can run without problems for a number of months? It would be possible to treat both of these as milestones – but in either case the definition needs to be clear.

Option 2: Liquidated Damages

The contract could require liquidated damages to be payable by the contractor for late delivery of the system (in addition to delaying the final milestone payment). This would represent an actual loss to the contractor rather than a timing difference, and could be a more effective incentive. This would mean that the contractor would be in a similar position to that of a PFI subcontractor. PFI subcontractors are often liable for liquidated damages, inter alia in order to compensate the PFI main contractor/SPV for costs of delay including financing costs which the SPV might incur as a result of a delayed milestone payment.

PROS AND CONS

The drawbacks of this would be that:

- It will increase the cost of the contract because bidders will price for the risk;
- Liquidated damages may be restricted to actual losses incurred by tie (which would be less than under a PFI structure, because the servicing of debt would not be included as liquidated damages). They might therefore not be an effective incentive. In fact there would be some circumstances in which **tie** might benefit financially from a delay because it could place cash on deposit; and
- If the liquidated damages included an element of compensation for economic and social benefits foregone, contractors may be unwilling to accept them because this would increase the benefit which the public sector would gain from arguing that the system is not properly commissioned. However, there is precedent, eg in the London Underground PPP for payments being related to benefits delivered so **tie** could take a robust line on this issue.

Option 3: PFI/Hybrid PFI

This approach has been successful in transferring commissioning risk on deals such as the Nottingham project and the DLR deals. This would involve a long term periodic availability payments related to the ongoing availability and performance of the system instead of or in combination with upfront milestone payments on construction and commissioning.

The main drawback with this approach is the cost of paying the Infraco to carry this and other risks which is derived from the cost of financing the portion of its costs which is not paid upfront plus the risk premium charged by the Infraco in return for bearing the risk. In most PFI schemes, the contractor will inject equity finance into the Project SPV as a cushion against the risks it has to bear and the providers of this risk capital will then wish to earn a return – which increases the cost of the capital. However, if the project is well structured, this cost should be offset by the benefit for the public sector of cost certainty as well as reductions achieved by incentivising the private sector bidders to identify cost reductions and manage their achievement.

Maintenance/Latent Defect/Whole Life Cost Risk

In order to successfully transfer these risks, payment must be linked to the ongoing outputs of the system eg availability. The alternative to this is a warranty but a warranty cannot cover issues related to ongoing maintenance so its effectiveness depends on the public sector's ability to distinguish between faults due to the original construction and those due to maintenance. This can be problematic, which is why there is an increasing tendency to place original system risks (eg latent defects) with the same party as ongoing maintenance risk.

Option 1 Long term maintenance contract

A long term maintenance contract would involve paying the Infraco an annual sum to cover the cost of its maintenance obligations plus/minus a performance related element. There could also be a retention at the end of the contract related to the condition of the assets at handback.

Assuming that no finance is included, this would be cheaper than the other options.

Potential drawbacks include:

- It may not be available at all. On PFI schemes, despite the fact that the banks insist on as much risk transfer to subcontractors as possible, life cycle risk invariably stays with the special purpose company ie the maintenance contractors will not take maintenance risk because the source of risk is partly related to original construction, the overall scale is out of proportion to their profit from the contract and there is no equity invested to provide a cushion to absorb such risks.

- If the Infraco takes the risk the limit of liability provided by the maintainer is likely to be small for the same reasons. Usually liabilities are capped at half a year's payment so full risk transfer is not achieved. In order to effectively transfer risk, the payment deductions for non-availability of the system would have to be relatively large compared with the value of the maintenance work – this will lead to additional cost in terms of a risk premium.

Option 2 Equity-only PFI

This structure would be similar contractually to a PFI scheme. PFI schemes are normally financed mainly by bank debt with a small proportion of equity related to the estimated level of risk in the PFI contract, normally provided by the principal contractor. The difference with this approach is that there would be no debt involved in the structure – there would just be a slice of equity funding and the rest of the project cost covered up by milestone payments.

This would address some of the problems with the long term maintenance contract, because the equity would be able to carry some of the risks that a long term maintenance contractor would not (eg size and cost of long term maintenance obligations). In addition, the equity invested would effectively provide a buffer for future cost over runs. At the same time, the absence of debt would reduce the total financing cost of the scheme.

To illustrate this:

If an event occurs which creates a £6m overshoot in maintenance costs, then if there is equity invested of £12m, it will still be worth the equity investor financing the £6m, because if they abandon the project, they will not get their original investment back.

Disadvantages of this are that:

- The sum of equity involved will be relatively small compared with the cost of the project. This reduces the extent to which the private sector can absorb risks of cost overruns.

- The cost of equity finance appears high (in the order of 15%) compared with public sector funding. However when comparing the two it is important to add on the public sector side the cost of risks retained which would otherwise have been borne by the equity investors.

- Without banks involved, there will probably not be the same level of due diligence on the construction project and maintenance plan as there would be on a bank deal. **tie** is seeking to address this inter alia through the appointment of the TSS Contractor.

Option 3 PFI with Milestones

This structure is very similar to a full PFI, the difference being that a substantial cost of the project is funded up front using public funds. It is similar to what is being promoted on the schemes in Leeds, Manchester and SHRT. While these schemes have encountered difficulties, and there has been some criticism of the milestone approach, a consensus has emerged on how milestones can be used. This should lead to a reduction in cost compared with a full PFI (although it will be more expensive than an Equity PFI (ignoring the value of risk)). In addition it creates a greater buffer for future costs.

The disadvantages of this approach are:

- More expensive than an equity-only PFI because of the cost of the debt finance – however the need to take account of the cost of risk retained by the public sector also applies here.

- Cannot transfer as much risk through the payment mechanism as a full PFI – however **tie** has already decided to retain certain risks eg some of those related to Utilities so it would be consistent to finance the relevant construction costs from the public sector.

Option 4 Public sector financed PFI scheme

It is possible for part of the bank debt in a normal PFI to be replaced with public sector finance. The banks would then share risk pari passu with the public sector. Effectively, the public sector becomes a bank and retains some of the interest the bank would otherwise receive but with the bank alongside to help it manage the risk eg by supervising due diligence on the project. This is different from the Government's new CGF financing scheme which involves the public sector providing debt in the same way but with a guarantee from the private sector (which has a cost).

The benefit of a public sector financed PFI scheme is that it brings all of the due diligence that one would expect of a fully banked PFI deal, but with a cost of finance which is closer to the public sector's.

The disadvantages are:

- It is a concept that has not been tried before.

- It is more expensive than a PFI with Milestones because the banks have to be paid for arranging all of the debt (including the public sector contributions), although the debt provided by the public sector will have a lower ongoing cost than the private sector debt.

Option 5 Full PFI scheme

This approach:

- Transfers the most risk;

- Creates the largest 'buffer' for unanticipated costs; and
- Is a tried and tested approach.

The principal disadvantage is cost (ignoring the value of risk)

Comparison of Capacity to Absorb Risk

Option	Capacity to Absorb Risk (illustrative - as % of capital value)	Notes
1	0%	Unclear whether it is possible to transfer any risk under this structure
2	10%	Limited to equity contribution
3	40%	Limited to equity and reduced debt contribution
4	40%	Limited to equity and reduced debt contribution
5	100%	Limited to equity and debt contribution

Sourcing of Finance for project costs (Illustrative)

Option	Public Sector	Equity	Debt
1	100%	0%	0%
2	90%	10%	0%
3	60%	10%	30%
4	60% (Provided as debt funding to private sector)	10%	30%
5	0%	10%	60%

Appendix C - Funding Issues Relating to Partial PFI Option

One of the options for funding the infrastructure contract in the proposed procurement strategy is a partial PFI. This would involve a contract being signed which looks in many ways like a normal PFI contract, but the difference would be that the availability payments would be proportionally lower than for a full PFI, and the public sector would make a contribution during the construction period.

The concept of the public sector making contributions to a PFI company during construction is not unique. It has been included in the procurement strategy on the all of the recent English light rail PFI projects, and a similar mechanism is used on the PPP roads programme in Ireland. It was also proposed as an option on the road PFI projects in Northern Ireland.

The benefits of this approach are:

- It reduces the overall cost to the public sector, by reducing the amount of the relatively expensive private sector debt; and
- Using construction contributions reduces the funding requirement, which reduces the number of banks required to fund the deal. This is especially relevant in the light rail sector, where there are only a limited number of banks willing to lend.

Experience on other schemes has shown that the key issues associated with using construction contributions are:

1 The level of contribution which is possible/optimal;

2 The events that the public sector contributions are linked to; and

3 The effect that introducing these structures has on the funding structure.

Optimum Level of Contribution

The level of contribution which is optimal is driven by a number of issues:

- Is the remaining debt amount sufficient to make the project of an attractive size to lenders? (If the amount of funding is too small, lenders returns may be too low to get sufficient market interest)
- Is the remaining debt amount of a size that can be easily placed in the market?
- Is the remaining debt amount sufficient to have effective risk transfer to the banks?
- What effect do the construction contributions have on the accounting treatment of the scheme?

For the purposes of modelling, we have assumed a construction contribution of 60% of construction cost. This represents a level which is at the upper half of what we believe will be possible. At this level, the amount of private sector funding ought to be sufficient to gain market interest, but will not be so large that there will be difficulties placing the debt in the market. In addition, with this level of private sector funding there is sufficient incentive for the lenders to ensure that the scheme is robust.

At present, we are continuing to investigate the accounting treatment of the scheme, and this may influence the proposed level of funding for the private sector.

Linking of Contributions to Events during Construction

By making contributions during the construction period, the public sector is making payments in advance of receiving a service. Therefore it is crucial that these contributions are linked in some way to the progress of the construction project.

From market precedent we have identified four possibilities for identifying the 'milestones' to which the drawdown of construction contribution can be linked.

These options for milestones are:

4 Key events during construction eg completion of key sections of line;

5 Basic metrics such as how many kilometres of line care complete;

6 The drawdowns of private sector funding; and

7 Drawdown after private sector funds are fully drawn down.

Of the above, our preference is option 3. The reasons for this are:

Option 1 requires a back ended drawdown, which increases interest cost during construction. Even more importantly, it creates a potential flashpoint in terms of conflict of interest because payment will be linked to events which need to be certified by the public sector. These concerns became clear on the English projects that attempted to link construction contributions to key project milestones. Lenders were concerned that the public sector would argue that the required conditions had not been met, in order to save releasing cash. There was concern that it may not be possible to make tests objective.

Option 2 has been used on some of the Irish road projects. Our reason for not recommending it here is that measuring progress is more complex on light rail projects than on a road, and, in addition, this option could create funding gaps and 'flash points' of conflict of interest.

Option 4 appears to be attractive. Our concern with this option is that it would require the public sector to be involved in the monitoring of progress during the latter part of the construction period, without being able to rely on the banks and their technical adviser to confirm progress.

Option 3 avoids the problems with the other options because it links the drawdown of payment to the drawdown of banks funds.

The banks will develop a drawdown protocol with the infrastructure company which will ensure that progress is being made and that funds can be released without significant bureaucratic overhead.

The public sector can rely on the banks and their technical adviser, who have no interest in providing funds to a project which is not making progress.

The infrastructure company can also take comfort that it will not have to enter into any negotiations with the public sector to get access to the funds that it requires to maintain the momentum of the construction project.

Effect on Funding Structure

A key benefit of the proposed structure under a partial PFI is that the public sector gets all of the benefits of risk transfer on maintenance and whole life cost that it would get with a full PFI.

Therefore, the infrastructure contractor will be exposed to many of the same risks. For example, the effect of a maintenance cost overrun will be the same in absolute terms whether the scheme is a full or partial PFI.

Therefore, the amount of headroom required by funders overall will be the same as for a full PFI.

For example: In a full PFI, there is £110 year net cashflow available for funders. Of this £90 would repay debt, and the other £20 would be for equity. The £20 would act as the buffer for unanticipated costs – such as maintenance cost overruns.

If in a partial PFI for the same project, there was only £50 a year of net cashflows, the lenders would still need the same buffer of £20. Therefore only £30 could be used to repay debt.

It could be argued that some risks would be reduced in a partial PFI – for example the quantum of deduction for a given availability failure. This could be true, but it is also the case that lenders to these projects look at worst case downside sensitivities, and (in the absence of revenue risk) this would normally be based on a long term maintenance sensitivity.

The corollary of this is that we would expect that the absolute amount of equity required to fund a partial PFI would be very similar if not identical to that for a full PFI. This would mean that the equity as a proportion of funds raised would be higher in a partial PFI than for a full PFI.

Summary and Conclusion

A partial PFI appears to offer some advantages compared with a full PFI.

For it to be included as an element in the final procurement structure, **tie** will need to further refine its proposals. A key element of doing so will be to gain the buy in of the market through the proposed market consultation.

Appendix D – Leasing Options

EXECUTIVE SUMMARY

tie has considered possibilities for introducing lease based financing into the financing methodology set out in the Interim Outline Business Case of March 2005, and the impact that this might have on the procurement strategy for the tram Project. **tie** have done so to assess whether leasing can help make the Project more affordable and help bridge the funding gap which exists if both Lines 1 and 2 of the Project are to be built simultaneously.

The benefits of a leasing transaction are that the tax allowances associated with assets are used by a taxpaying company to defer payment of tax owed, in a way compliant with tax law. The timing benefit of this deferral leads to a reduction in financing costs. **tie** cannot significantly benefit from these tax allowances itself because of the non-taxable status of the Council, and the lack of a taxable source of income in **tie** sufficiently large to absorb the capital allowances in the early years of the transaction.

There are two threshold issues which may constrain the benefit available to **tie** from a lease transaction:

1 Proposed changes to the taxation treatment of leasing applying from 1 April 2006 and the achievable timetable for the recommended procurement strategy set out in the IOBC; and

2 The need for some form of credit support / guarantee for the credit risk taken by the lessor in the lease.

Changes to Taxation Treatment of Leases

The proposed law change is expected to become effective on 1 April 2006, based on the Government's release of draft legislation in December 2004.

The effects of the proposed law change (which is likely to eliminate tax-advantaged lease based financing alternatives) could be mitigated by either of the following two options:

A. Accelerating the procurement (and associated lease financing) of a targeted set of assets (based around the vehicles). This would involve approximately £58m of assets being leased. The objective of this would be to achieve sufficiently mature contracts before 1 April 2006 and if achieved would bring the advantage of certainty of tax treatment. This would entail a significant change to the procurement strategy, which envisages no procurement of any part of the system prior to Royal Assent. It may be possible to structure this transaction so that it is contingent on obtaining Royal Assent and further contracts (e.g. the infrastructure contract) being signed; or

B. Entering into an umbrella agreement for the financing of relevant parts of the Project before 1 April 2006, notwithstanding that those are yet to be procured. Under this approach, £176m of assets eligible for capital allowances could be leased (plus an additional £182m of assets eligible for Industrial Buildings Allowances, which contribute relatively marginal leasing benefits). While the benefits arising from the larger leased elements appear attractive, this approach would require substantial changes to the procurement strategy which add considerable uncertainty to the drafting of the core tender documents including draft contracts. This would also effect the financing structure as it may restrict **tie**'s ability to choose between on or off balance sheet private finance structures for the remaining non-leased assets. In addition, this approach exposes **tie** to the risk of writing off the costs of establishing

the arrangement if it fails to work in practice post 1 April 2006, but it has the advantage of flexibility in timing of the procurement competitions.

Of the above two options, A is more likely to be acceptable to the tax authorities than B, because a more robust argument can be made prior to 1 April 2006 that the capital expenditure will actually be incurred. A also requires substantially less amendments to the proposed procurement strategy. On this basis, the analysis in this paper is based on option A.

Nature of Guarantee

Guarantees or some form of credit support will be required for any lease based financing, These could theoretically be provided by:

1 the Council;

2 the Executive; or

3 cash collateralising the lease payments due using new borrowings or grant funding.

Of these, the first generates no benefits to **tie**, because the rules that banks apply to local authorities mean that a lease with bank lessor will be more expensive than borrowing from the Public Works Loan Board. The second generates the most benefits, but uncertainty remains about the availability of such a guarantee. The third generates benefits, although less than the second.

Proposed Option

This analysis, which compares benefits against constraints and risks, results in the selection of a cash collateralised lease between a lessor and **tie**, for approximately £58m of trams and associated equipment.

The maximum net present value benefit available to **tie** from this structure is **£2.801m** on a £58.7m transaction, i.e. 4.77% of equipment cost, calculated at the date of signing the lease and discounted at **tie**'s alternate bank debt cost. These figures will vary with changes in the assumptions set out in this Appendix, including the cost and repayment profile of funds used to collateralise the lease which are assumed to be sourced through grant funds or borrowing from the Public Works Loan Board. Part of the benefit of this structure arises due to an arbitrage against the relatively low interest rate on such a borrowing. Eliminating this benefit does not effect its selection.

tie has also considered options where the Infraco enters into a lease guaranteed by the project lenders (as was the case on Croydon), but this generates no benefits due to the cost of the guarantee required. This is higher than a guarantee for project debt under a PFI structure because the obligation to meet lease rent payments can not be subject to availability, but Infraco's only source of solvency from which to meet those payments (receipt of the unitary payment from the Council) *is* subject to availability.

Conclusion

Notwithstanding that a cash collateralised lease may produce the benefits above, **tie** believes that leasing is not a viable financing alternative because:

1) It is unlikely that **tie** could:

   a) achieve contractual certainty of procurement of the equipment to be leased (regardless of the level of lease financing contemplated) before the 1 April 2006 tax law change;

   b) conduct an OJEC notification process and funding competition to select a lessor whilst leaving enough time before the 1 April 2006 tax law change to negotiate a financing transaction to financial close; and

   c) overcome the uncertainty surrounding the nature of the transitional provisions for the 1 April tax law change (grandfathering) given that they are unlikely to be released by the Treasury / Inland Revenue until Christmas 2005; and

2) **tie** can never be certain that a lease financing transaction would be grandfathered through the 1 April 2006 tax law change, even if contractual standards previously regarded by the Revenue as sufficient were met.

1. INTRODUCTION TO PROCESS

1.1. **tie** have considered lease-based financing structures within the context of the funding scenarios for procurement of the Project (conventional funding, full PFI and hybrid PFI), as set out in section 8.3 of the IOBC of March 2005. This Leasing Appendix to the IOBC of March 2005 outlines those lease financing structures which have been considered, along with the consequences of each for the Project.

1.2. The lease financing alternatives outlined in this Leasing Appendix have been drawn from a wider pool of possible lease financing structures as follows:

1.2.1. UK domestic lease transactions, including generic leases and the 'wasting asset' or 'partnership' type structures; and

1.2.2. UK cross border lease transactions, including:

1.2.2.1. Putative revived US Lease transaction;

1.2.2.2. French Leveraged Lease transaction;

1.2.2.3. Swedish Leveraged Lease transaction; and

1.2.2.4. German Leveraged Lease transaction..

1.3. Of the structures listed above, the two UK domestic lease transaction structures were shortlisted through discussions between **tie** personnel and PwC and subsequently 'market tested' on an informal and (in two of three cases) anonymous basis with three UK banks historically involved in providing lease and project financing for large UK infrastructure projects.

2. WHY CONSIDER LEASING?

2.1. **tie** has considered various lease financing options as a potential way of making the project more affordable.

2.2. When compared to secured debt funding, leasing can provide an additional advantage because the lessor's tax treatment of the assets (which would form the security in a comparable debt arrangement) generates cost savings which are shared with the lessee (whether **tie** or Infraco) and reduce the implicit interest cost of the lease funding below the lessee's alternate bank market cost of funds.

2.3. As detailed in Annex A to this Appendix, this additional advantage arises from the capital allowances available to a lessor due to its ownership of the assets. **tie** cannot effectively make use of these capital allowances because:

- the Council is exempt from income and corporation tax; and
- **tie** is a corporate entity which although owned by the Council technically falls within the charge to corporation tax, but currently has no taxable source of income. Whilst the tram operation may generate taxable profits, it is not clear that these would be sufficient to absorb the available capital allowances in the early years of operation.

Accordingly the value of a right to claim capital allowances is severely limited to "CEC group" companies compared to a private sector fully taxable bank lessor with other taxable income.

The net present value of the allowances to **tie**, if it had sufficient taxable income to fully absorb them, is approximately 25% of the value of the equipment i.e. £14.68m for £58.7m of equipment cost under the assumptions in this Appendix, calculated as at acquisition of the equipment and discounted at the Public Works Loan Board ("PWLB") borrowing rate.

3. THRESHOLD ISSUES

3.1. The informal market testing exercise mentioned above has illustrated that **tie** faces two threshold issues in relation to any lease financing alternative for funding the Project:

- Proposed changes to the taxation treatment of leasing applying from 1 April 2006; and
- The need for some form of credit support / guarantee for the credit risk inherent in the lease, in response to which the Council has indicated a willingness to consider providing a guarantee, and dialogue is being undertaken with the Executive in response to the same question.

Unless solutions to both of these issues can be found, no lease financing alternative is likely to be viable for **tie**.

3.2. The impending tax law change on 1 April 2006 will effectively prevent **tie** from undertaking a lease with a UK lessor unless such a transaction can be 'grandfathered' through the law change by either:

- Accelerating the procurement (and associated lease financing) of some of the leasing-suitable components of the Project so as to achieve sufficient contractual maturity of both groups of contracts before 1 April 2006; or
- Entering into an umbrella agreement for the financing of some or all of the leasing-suitable components of the Project before 1 April 2006, notwithstanding that those are yet to be procured.

3.3. With some adjustment to the procurement strategy, it may be possible to accelerate the procurement of the tram vehicles and some associated signalling and communication assets. Establishing a sufficient degree of maturity in the contracts for these assets may well be achievable within the necessary time.

3.4. Umbrella procurement & financing arrangements have been used in the past to achieve grandfathering, although the Inland Revenue has done more to prevent this in recent legislation. Here, **tie** would procure the assets to be leased on behalf of the lessor who would then lease them to **tie** or Infraco as agreed. It exposes **tie** to the cost risk associated with establishing the arrangement if grandfathering can't be achieved. Furthermore, nobody can categorically confirm to **tie** that any structure will achieve grandfathering. The benefits of this approach lie in its flexibility, both because the arrangement can be allowed to lapse (noting the associated cost) if procurement is cancelled or leasing is not used, and because it allows **tie** to lease as much of the network as desired under the current tax law treatment of leasing, regardless of contractual status on 1 April 2006. (It should be noted that assets which provide benefits under finance leases may be those which are most attractive to include in a Partial PFI structure, and the potential benefits of leases will need to be traded off against the benefits of PFI).

3.5. More detail on the reasoning behind the genesis of both of these alternatives is provided in Annex C – Effects of the 1 April 2006 tax law change on the transaction

3.6. Regardless of which of these alternatives is ultimately selected, another key issue raised in informal market testing has been the need for some form of credit support or guarantee for the payment of the lease rentals. This will reduce the cost of funds to the lessee (whether **tie** or the Infraco).

3.7. If the lessee is **tie**, then credit support or a guarantee from the Council (or even the Executive) would be required. **tie** has conducted preliminary discussions with the Council and notes that a process exists for the approval and granting of such a guarantee, and that guarantees have been issued in the past using this process. We note that the Council has expressed a willingness to consider providing a guarantee if required. Were a central government guarantee available (e.g. from the Executive), the reduction in cost of funds would be more significant, although we understand from the Executive that these are given only in extremely rare circumstances. Comfort letters will be insufficient for lessors for this type of transaction.

3.8. If the lessee is the Infraco, then credit support from the project lenders (or, more unusually, the Council or the Executive) would be required. It is highly likely that any credit support to the Infraco would erode or eliminate the ability of **tie** to freely choose between PFI structures in which the Infraco's expenditure is on the public sector balance sheet versus those in which it is deemed to be off balance sheet for accounting purposes.

3.9. In light of the above, and on the assumption that solutions to these two threshold issues exist at least theoretically, this Appendix now considers the lease financing alternatives available to **tie** and their relative risks and benefits within the wider risk transfer matrix.

4. LEASE FINANCING ALTERNATIVES

4.1. **tie** faces a trade-off between:

- the potential NPV benefit from a generic UK tax-driven finance lease (which implies almost no risk transfer to the private sector); and

- the risk transfer benefits of a project financing (within which it is extremely difficult to generate meaningful NPV benefits from a lease due to the contractual complexity involved.)

  In 1996, the Croydon Tramlink transaction achieved some risk transfer benefits (for a period) whilst generating some NPV benefit from the lease. The reasons behind this are discussed further in section 4.5 below.

4.2. To claim capital allowances which generate the lease's NPV benefit, all of the following structures will require amendment of the procurement strategy. Such amendments would grant legal ownership of the assets to be leased to the lessor via one of the two alternative methods of achieving grandfathering of the transaction discussed above. A change in ownership doesn't automatically require a change in the associated risk transfer matrix, i.e. the required ownership arrangements can be achieved without having an impact on the current risk transfer matrix. Changes to the procurement strategy would be required so that (for example) maintenance contracts would be set up to allow the service provider to provide services in respect of an asset to a party which is not the asset's owner. At present the proposed funding structure assumes that part of the capital funding will come from private and some from public sources. If lease financing alternatives were to be introduced, the Project would effectively be publicly funded to that extent. Therefore, it appears

possible that a large scale leasing transaction could be undertaken on the assets with tax allowances, and the rest would be funded privately. One potential drawback to this is that the assets on which tax allowances are available are also generally those assets with shorter lives. If these were leased (and therefore excluded from the privately financed element of the project), then **tie**'s ability to freely choose between private finance structures which are on or off the public sector's balance sheet.

4.3. **tie** have distinguished between lease financing options that involve a lease directly with **tie** as lessee which are discussed in section 4.4, and those which involve a lease with Infraco as lessee which are discussed in section 4.5. The following table groups the structures and their financial results as discussed below:

Option		Lessee IRR of cashflows	Credit Margin included in Comparable bank debt Rate	Comparable bank debt Rate (UK Gilt 4.54% + Margin)	Saving (cost) against Comparable bank debt Rate	PWLB debt cost	Saving (cost) against PWLB debt cost	NPV Benefit of lessee cashflows at signing, discounted at Comparable bank debt Rate, £ or % of £58m cost of leased equipment	NPV Benefit of lessee cashflows at signing, discounted at Comparable bank debt Rate, £ or % of £176m cost of leased equipment[1,2]
Leases with tie									
1	*Generic UK finance lease to tie with a Council guarantee*	*5.21%*	*1.00%*	*5.54%*	*0.33%*	*4.75%*	*(0.46%)*	*£1.393m or 2.37%*	*£4.181m or 2.37%*
2	*Fully cash collateralised UK generic finance lease to tie using amortising PWLB borrowing*	*4.04% to 4.08%*	*0.25%*	*4.79%*	*0.71% to 0.75%*	*4.75%*	*0.67% to 0.71%*	*£2.705m or 4.61%*	*£8.184m or 4.64%*
	Fully cash collateralised UK generic finance lease to tie using bullet PWLB borrowing	*4.32% to 4.32%*	*0.25%*	*4.79%*	*0.47% to 0.47%*	*4.75%*	*0.43% to 0.43%*	*£2.801m or 4.77%*	*£8.488m or 4.82%*
3	*UK generic finance lease to tie with an Executive guarantee*	4.01%	0.00%	4.54%	0.53%	*4.75%*	0.74%	£2.267m or 3.86%	£6.806m or 3.86%
Leases with Infraco									
4	*'Croydon' structure with a Council guarantee and public sector farebox risk*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5	*Croydon structure and public sector farebox risk*	6.78%	0.37%	4.92%	(1.86%)	*4.75%*	(2.03%)	(£7,1467m) or (12.72%)	(£22.416m) or (12.72%)

These options are discussed in turn below.

[1] These alternatives are provided for information only, as procurement practicalities, the 1 April 2006 tax law change, and accounting treatment of the lease and project financing will render a lease for this proportion of the total capital expenditure un-achievable. Please see section 6.4 for further discussion of this issue.

[2] This alternative pricing carries through the same assumption for transaction costs (1.25% of equipment cost) used in the base analysis for accuracy of comparison. In the event that the transaction size was set at £176m, we would expect the transaction costs to be lower as a percentage of equipment cost since some costs (e.g. legal fees) are fixed relative to transaction size, at approximately 1.00% of equipment cost. This would further increase the NPV benefit above that listed in each case by 0.25% of equipment cost.

4.4. Leases directly with **tie**

4.4.1. *Option 1 - Generic UK finance lease to **tie** with a Council guarantee.* **tie** could lease the assets directly from the lessor, making annual rental payments to the lessor which are guaranteed by the Council. Although this transaction would have an NPV benefit to **tie** when compared to bank market debt, since relatively low interest rate financing offered by the Public Works Loan Board should be available to **tie** via the Council, it would be more economical for **tie** to take advantage of this and finance the trams directly. **tie** has not yet confirmed the availability to **tie** via the Council of such loan funding from the Public Works Loan Board.

4.4.2. *Option 2 - Fully cash collateralised UK finance lease to **tie**.* **tie** could lease the assets directly from the lessor, making lease rental payments to the lessor from a deposit account pledged to the lessor as security. This deposit account could, potentially be funded using a PWLB loan (if this is permitted) or grant funds. The amount to be lodged in the deposit account would need to be sufficient to cover the early termination amounts payable (usually calculated to 'keep whole' the lessor on his outstanding balance and lost profits and tax allowances / payments). We have assumed:

- Credit margin charged by the lessor = 25 b.p. p.a. (lower than a non-collateralised lease);
- Interest rate earned on the deposit = 4.91% p.a.;
- Cost to **tie** of the funds used for the deposit = PWLB rate of 4.75% (applicable for either a PWLB loan or grant funding, since this is the opportunity cost of using grant funding in a lease as opposed to elsewhere).

Note that the net present value benefit of Option 2 arises partially from an arbitrage against the Public Works Loan Board interest rate, which may not be permissible. The contribution to **tie**'s net present value benefit from this arbitrage is between £0.679m to £0.949m on a £58.7m transaction, i.e. 1.16% to 1.62% of equipment cost calculated at the date of signing the lease and discounted at tie's alternate bank debt cost. The range of contribution depends on whether this benefit is eliminated by depressing the interest rate earned on the cash collateral deposit below market rates (smaller contribution), or raising the interest rate paid on the cash used to fund the cash collateral deposit above the Public Works Loan Board interest rate (larger contribution).

Eliminating this arbitrage benefit does not affect the selection of this structure because notwithstanding the interest rate arbitrage contribution, it continues to provide the highest net present value benefit to tie under the prevailing circumstances.

4.4.3. *Option 3 - UK generic finance lease to tie with an Executive guarantee.* **tie** could lease the assets directly from the lessor, making annual rental payments to the lessor which are guaranteed by the Executive. Given that the Executive guarantee should permit the lessor a 0 weighting on its commitment for capital adequacy purposes, the implicit interest rate in the lease rental payments should be sub - LIBOR. For these purposes, we have assumed the 0 weighting will give a 0% margin over gilts. Accordingly, when the capital allowance benefits are taken into account, this transaction should have a significant NPV benefit to **tie** when compared to bank market debt, and should also still have an NPV benefit to **tie** when compared with Public Sector Loan Board funding.

tie have considered whether an Executive guarantee will be available for any lease payment obligation in this Project. Under a PFI, the availability payments to the Infraco are for the provision of services, and would be supported by an Executive guarantee, but (on our current understanding) such a guarantee would only be available if the Infraco's debt was off the public sector's balance sheet. In comparison, a lease guaranteed by the Executive would require the Executive to commit to support rent payments to the Lessor which are more akin to debt service than payments for the provision of services, taking their substance over form. So, because a lease would be on the public sector's balance sheet, we expect that the Executive will be unlikely to guarantee lease payments, although we continue to make enquiries regarding whether this is a possibility.

4.5. Leases with Infraco

4.5.1. Option 4 - 'Croydon' structure with a Council guarantee and public sector farebox risk. **tie** could arrange a lease with a lessor for the equipment to be leased under either of the grandfathering methodologies discussed above, and then novate the lease to the Infraco when that contract is let at the discretion of the winning Infraco contractor. The Council would guarantee the lease rental payments to the lessor by the Infraco. The Council's guarantee would bring both the lease and the project financing for the non-leased assets on balance sheet for the Council, thus eliminating **tie**'s ability to freely choose between project financing structures which are on or off the Council's balance sheet. Therefore, this option will not be pursued further until a decision is made about whether a project financing should be on or off the Council's balance sheet. The benefits of this lease should be approximately the same as Option 1, and therefore have not been repeated here.

4.5.2. Option 5 - 'Croydon' structure with public sector farebox risk. **tie** could arrange a lease with a lessor for the equipment to be leased under either of the grandfathering methodologies discussed above, and then novate the lease to the Infraco when that contract is let (at the discretion of the winning Infraco contractor). As in the Croydon transaction, the project lenders supporting the pfi contract will guarantee payment of the lease rentals by the Infraco, in return for payment of a guarantee fee, which will be approximately 100bps of the size of the guarantee plus 50bp p.a. commitment fee. Also, if the Infraco adopts the lease, doing so will prevent it from using group relief to sell the tax losses arising from claiming capital allowances on the project assets to the sponsors which implies an added cost of approximately £0.75 per £1.00 of tax loss.

The difference in pricing of a guarantee for a lease compared to a guarantee for availability payments can be explained as follows. Project lenders take project risk, i.e. they price their yield requirement on the basis of recourse only to the Unitary Payment received by the Infraco from the Council. If the Council stops paying the Infraco (e.g. because the infrastructure is unavailable), then the Infraco is permitted to stop servicing the project debt.

A finance lease does not include any concept of an availability dependent payment; being based on bond financing term sheets, it requires that the rent payment is made "come hell or high water" i.e. regardless of the availability of the assets leased. Lessors price their yield requirement assuming this payment requirement, and so will look to the overall credit position of the Infraco. Because the Infraco's primary (if not only) source of revenue and therefore solvency is the Unitary Payment from the Council, and that payment stream is subject to availability, the Lessor faces a lessee who is potentially unable to

meet the "hell or high water" payment requirement. This is why it needs a guarantee from (usually) the Project Lenders (or more improbably) the Council.

So, because a lessor and a project finance lender are taking different risks, they price their yield requirement differently, and consequently this is why a guarantee for rent payments costs more than a guarantee of the unitary payment under a PFI structure. Therefore, regardless of whether the lessor is within or outside the project bank(s) our expectation is that they will nonetheless require a different risk premium for the finance lease than the project debt.

For the avoidance of doubt, the credit margin built into the lease in the cash collateralised lease benefit figure provided above is reduced specifically to take into account the fact that the lessor bank has the benefit of bank guarantees supporting the credit.

This option provides no benefit for two reasons: (i) the loss of revenue reasonably expected to be received by the Infraco for sale through group relief to its sponsor shareholders of the tax losses arising from claiming capital allowances on the assets itself; and (ii) the costs of the guarantee provided by the project lenders. When this structure was used in 1996 in the Tramtrack Croydon transaction, it may have shown a cost of funds saving because the loss of revenue from sale of the project SPV's tax losses may not have been taken into account, or alternatively the higher long-term interest rates, and wider PFI credit spreads at the time may have increased the underlying leasing benefit to a level sufficient to overcome this expense.

4.5.3. For the purposes of comparison, the net present value of the allowances to **tie**, if it had sufficient taxable income to fully absorb them, is approximately 25% of the value of the equipment i.e. £14.68m for £58.7m of equipment cost under the assumptions in this Appendix, calculated as at acquisition of the equipment and discounted at the PWLB borrowing rate.

4.6. Analysis

*4.6.1. Lease with **tie** or Infraco?*

- Leases with **tie** will require either a guarantee from the Council or the Executive, or an expensive cash collateral deposit. In any case, these assets will be on the Council's balance sheet.

- A lease with Infraco will require an expensive lease guarantee from the project lenders. A further cost of this approach is that it deprives the Infraco of the revenue available from the sale of tax losses through group relief. Forcing the winning contractor to accept a lease negotiated by **tie** is unlikely to provide best value for money. Therefore, any adoption of lease financing by the Infraco would need to be at its discretion which would mean that the benefit might not be achieved. If the sponsors behind the ultimate winner of the Infraco contract were unwilling to pay for, or unconcerned about the purchase of tax losses in the Infraco, and/or if the pricing on the project lender's guarantee was lower than anticipated in this document, then a lease with the Infraco becomes more viable. However, the further information necessary in relation to either possibility is unlikely to be available prior to the practical deadline for action posed by the 1 April 2006 law change.

- Given that limited potential for benefits from leasing exist in leases with **tie**, while no obvious benefit exists in a lease with Infraco, **tie** has considered further only the leases between a lessor and itself.

*4.6.2. Which lease with **tie**?*

- Option 1 is suboptimal because **tie** could borrow from PWLB at a cheaper rate than the effective cost of the lease, notwithstanding that this cost is below its bank market debt alternative. A PWLB loan would have almost the same balance sheet impact as a lease, given the need for a Council guarantee discussed above.

- Option 3 is not considered further due to the low probability of obtaining a guarantee from the Executive within the proposed timescale for the lease payments due, notwithstanding its obvious financial benefits.

- Option 2 could generate benefits. These would then need to be weighed against the impact on the viability of a project financing for other elements of the Project, and the fact that leased assets are likely to be on balance sheet for the Council.

- Accordingly, only **Option 2** is considered a potentially viable leasing alternative for financing elements of the Project. Such potential will only be realised through further investigation of the issues around allocation of the grant funding and the optimal lease / project finance mix for the Project as a whole, including the balance sheet impacts thereof.

4.6.3. For the avoidance of doubt, **Option 2** was selected as the most viable lease financing alternative because it has the highest net present value benefit to tie achievable given the assumptions made in this Appendix, the current legislative status and expected changes, current leasing and financial market environments, the availability and cost to **tie** of borrowing from the Public Works Loan Board, and the time available prior to the anticipated 1 April 2006 tax law change.

5. LEASING UNDER A PHASED CONSTRUCTION PROGRAM

5.1. For a phased construction over a 2 – 5 year timeline, the viability of lease financing alternatives will be affected by the following factors:

5.1.1. The general commercial requirement (set out below in Annex 1) is that a lessor will require some certainty of its tax treatment on the day it executes the lease transaction. Accordingly, neither **tie** nor its advisors can be certain that any lease structure will be viable in the future until the tax law applicable to leasing on that date is known. Therefore any reliance on leasing to provide benefits in the future must take into account both the benefits and the likelihood of achieving them (in particular, the risk of changes in tax law prior to execution of the lease transaction).

5.1.2. The effect of the new tax legislation applying after 1 April 2006 will make longer finance lease transactions with UK lessor uneconomic. Therefore, in order to generate any benefit from leasing, **tie** would need to be prepared to consider lease financing alternatives which comprise very short term leases (less than 4 to 6 years) in which the lessor takes substantial residual value risk. The UK lessors sampled during the market testing discussions carried out for this report expressed limited interest in the residual value risk of tram assets, Further, there are concerns that transferring residual value risk in the assets away from the public sector may not be in the public's best interest in the long term. Given these two factors, it appears unlikely (in the absence of further, as

yet unannounced changes in tax law) that UK leasing will offer any benefit to tie over the 2 to 5 year timeline being discussed.

5.1.3. Cross-border lease financing alternatives (considered and dismissed in this report) should continue to be monitored. The trend around the world appears to be towards a reduction of the scope for tax-advantaged leasing, particularly to lessees who are not taxpayers in the lessor's country of tax residence. However, leases from lessors in certain jurisdictions (e.g. Germany, France, Sweden) remain available, although at generally lower net present value benefit levels and for a much narrower class of qualifying capital expenditure than the UK structures outlined above. US lease transactions, while currently uneconomic, have shown a cyclical history of growth and decline, and should continue to be monitored closely, since they have historically produced higher net present value benefit levels, and been applicable to a wide range of classes of capital expenditure.

5.1.4. The planning necessary to permit a putative lease in the future is mainly strategic.

- If lease financing were to be used, **tie** would need to have the right to control the financing and ownership (at a minimum, legal ownership, but ideally economic ownership), of the relevant assets. This will be harder to achieve if a PFI structure has been implemented in respect of the assets, although this complexity can be minimised. This can be achieved by ensuring that any such structure permits a refinancing of the project debt using lease finance alternatives such as sale and leaseback transactions for existing assets, or does not automatically give the existing project lenders the right to finance extensions of the network. This flexibility usually finds its commercial expression in provisions governing refinancing rights, financing for add-on assets, and preserved intercreditor rights.

- In the absence of viable leasing alternatives, in order to take advantage of the capital allowances available on the assets, either **tie** or the Infraco (or their respective taxable 'group' members) would need to be generating sufficient taxable income to fully absorb those capital allowances. This might be achieved by appropriate structuring of ownership of the various businesses operated by the Council, and is the subject of further work being undertaken by **tie** and the Council.

6. ANNEX A - INTRODUCTION TO LEASING

6.1. Lease transactions generate benefit beyond simple debt financing by using the capital allowances ("CA's") available on infrastructure assets to allow a taxable party (the lessor) to defer its taxation liability on income from other business. This mechanism can be used to efficiently finance infrastructure owned by non-taxable governmental entities or corporate entities with insufficient taxable income (lessees) such as **tie**, who could not otherwise take full advantage of the capital allowances available. Since implementing such a transaction effectively allows **tie** to temporarily borrow from the Revenue in a way compliant with tax law, the non-financial implications of this should also be considered.

6.2. The level of benefit produced by a given lease structure depends primarily on the amount of deferral it can produce for the lessor, which is itself effected by prevailing interest and taxation rates, the length of the lease term, and the residual value of the leased equipment built into the financing, among other things. Another significant effect on benefit levels are transaction costs, and since these are primarily comprised of costs which are fixed relative to transaction size, they can cause a minimum effective transaction size to apply.

6.3. To make different lease transactions comparable (at least on economic terms), the measure used is normally the net present value of the lessee's cashflows, discounted at its normal cost of borrowing, expressed as a percentage of the assets' original cost, and referred to as the NPV Benefit. Lease transactions commonly generate NPV Benefits in the range of 2% to 10% of original cost, depending on many factors, some of which were mentioned above. An alternative measure (which is independent of lease term length and residual value assumption) is the reduction in the effective cost of finance to the lessee, calculated by comparing the IRR of the lessee's cashflows to its normal cost of borrowing, expressed in basis points, and referred to as the lessee's saving.

6.4. The UK tax legislation controls elements of UK lease transactions, and thus the level of benefit to be obtained from them. This analysis has been prepared on the basis of the tax law currently applicable, and highlights expected changes in tax law which may effect a transaction. However, any UK lease transaction will ultimately be subject to the tax law applying at the time of financial close, and given the likely passage of time between now and financial close, this analysis may be affected by any change in tax law that transpires.

6.5. Lease transactions are most often closed over pre-existing assets, permitting a lessor certainty of the tax treatment (in respect of capital allowances available) applicable to the transaction at the time of financial close. Where the assets to be leased are yet to be constructed, lessors must take a view on (i) their ability to absorb capital allowance deductions flowing from the leased assets once built out, and (ii) the likelihood of changes in tax law which may affect their ability to claim capital allowance deductions on the leased assets, at and after a date in the post financial close future, when construction of the assets is expected to be complete. UK bank lessors have experience of these circumstances, and transactions have reached financial close in advance of the completion of construction / delivery of assets. However, the length of time between financial close and the completion of construction / delivery of assets has a large impact on lessor market appetite and pricing for such transactions.

7. ANNEX B – PROJECT COMPONENTS SUITABLE FOR LEASING

tie OBC Capex							
			Land	P&M	IBA's	Soft Costs	Non-qualifying
Civils	Clearance	1,705,000			1,705,000		
	Structures	24,550,646			24,550,646		
	Bulk Earthworks	973,078			973,078		
	Contaminated Land	2,172,000	2,172,000				
	Highway Work	21,123,449			21,123,449		
	Accommodation Work	1,377,760			1,377,760		
	Landscaping	3,629,850					3,629,850
	Drainage / Ducting	-					
Utilities	Combined	52,596,350			52,596,350		
Electrical	Sub-stations	6,753,450		6,753,450			
	OHLE	10,682,298		10,682,298			
	Stray Current Control	1,020,000		1,020,000			
	Other Power Supply	3,248,000		3,248,000			
	Signalling	5,816,000		5,816,000			
	Communications	11,035,866		11,035,866			
Network Rail	Combined	8,060,000					8,060,000
Stops	Standard	5,279,000			5,279,000		
	Park & Ride	310,000			310,000		
	Interchange	654,000		654,000			
	Ticket Barriers	200,000		200,000			
	Ticket Machines	3,650,000		3,650,000			
	CCTV	840,000		840,000			
	Information Screens	-					
Depot	Facilities	20,454,000		2,045,400	18,408,600		
	Enabling Works	8,236,692		823,669	7,413,023		
Track	Ballasted	8,920,114		6,690,085	2,230,028		
	Slab	23,470,026		17,602,519	5,867,506		
	Grooved On-Street	31,334,478		23,500,859	7,833,620		
	Structure-borne	247,000		185,250	61,750		
	Layover Facilities	1,193,015		596,507	596,507		
	Crossover Facilities	1,572,000		786,000	786,000		
	Turnout Facilities	428,000		214,000	214,000		
Land	Route	48,950,000					48,950,000
	Depot	-					
	Access	-					
	Compensation	-					
Vehicles		41,850,000		41,850,000			
	Sub-Total	352,332,070	2,172,000	138,193,904	151,326,316	-	60,639,850
Project Costs	10 per cent	20,348,072				20,348,072	
Preliminaries	20 per cent	40,456,144				40,456,144	
Design	7 per cent	14,923,650				14,923,650	
Coordination / Consents	3.35 per cent	4,543,104				4,543,104	
	Total	432,603,041	2,172,000	138,193,904	151,326,316	80,270,971	60,639,850
	Allocate Soft costs (provisional)		597,714	38,029,670	41,643,587	- 80,270,971	
	Total	432,603,041	2,769,714	176,223,574	192,969,903	-	60,639,850
	All costs categorised?	OK	1%	41%	45%	0%	14%

7.1. **tie** and its advisors have made certain tax technical assumptions not detailed in this paper about the likely treatment of elements of the Project's budgeted capital expenditure for capital allowances purposes. Using these assumptions, **tie** has prepared the preliminary analysis set out above of the likely breakdown of capital expenditure into likely capital allowance groups.

7.2. As discussed above, the ability of a lease transaction to generate benefits is dependent upon the level of deferral of tax liability that it can produce for the lessor. When this deferral is achieved through the use of capital allowances, leases of assets which attract higher rates of capital allowances generate more deferral, and therefore more benefit for the lessee.

7.3. Conversely, including assets which attract low or no capital allowances in a lease transaction is usually counter-productive *from a purely financial point of view* because they generate negligible tax deferral for the lessor, and thus little tax benefit for the lessee, whilst adding significantly to the transactions' legal costs burden. Including them in the transaction would substantially reduce or eliminate the transaction's overall NPV Benefit as a percentage of cost.

7.4. Although there may be some affordability advantage to extending the lease financing to non plant & machinery (i.e. non - 25% capital allowance rate) assets, this would eliminate the NPV Benefit of the lease. Therefore we have performed the analyses in this Leasing Appendix on the basis of the assumption that leasing could be used to fund the following items of capital expenditure.

Vehicles	£41,850,000
Signalling	£5,816,000
Communications	£11,035,866
Total	**£58,701,866**

It is theoretically possible to lease the entire amount of capital expenditure subject to plant and machinery (25%) capital allowances, i.e. the total P&M allocation above of £176,223,574.

However, the procurement timescale makes this impractical, and if this option were to be pursued, it would be likely to eliminate **tie**'s ability to freely choose between an on or off balance sheet PFI or partial PFI option. This is because the remaining assets (not plant and machinery) are relatively long life assets, and it is more difficult to structure an off balance sheet PFI around such assets than the relatively short life assets (mainly plant and machinery) that would be subject to a lease.

8. ANNEX C - EFFECTS OF 1 APRIL 2006 TAX LAW CHANGE ON THE TRANSACTION

8.1. The first threshold issue is the draft legislation proposed in December 2004 by the government through its program for reform of corporation tax, which it intends to introduce into the Finance Act 2006. This draft legislation contains provisions which will significantly amend the tax treatment of lease transactions relevant to leasing, which will most likely apply from 1 April 2006 onwards.

8.2. The proposed law change is expected to become effective on 1 April 2006, based on the Government's release of draft legislation (excluding transitional provisions determining the commencement date of the new legislation) in a Technical Note on Corporation Tax Reform released on 9 December 2004 with the pre-Budget materials. In paragraph 4.3 of that report it was stated that "Legislation on these proposals will be included in Finance Bill 2006". The Finance Bill in any year is normally published a short time after the Budget, either late March or early April, with the resulting Act normally becoming law in July. The most likely date for the new regime, given the detailed proposals, available draft legislation and the extensive consultation process, is the date the Finance Bill becomes the Act, in July 2006. It is possible the provisions will be deemed to apply earlier, from Budget Day or the date of publication of the Finance Bill, and accordingly it has become common for the business and advisory community to consider a March or April cut off date for planning purposes. Accordingly, a 1 April 2006 application date for this law change is assumed throughout this document, notwithstanding the possibility that a date in July 2006 may be the eventual outcome. The time difference between these two possibilities is not considered to have a material effect on the recommendations of this report.

8.3. In principle, this legislation will move the entitlement to capital allowances for leased equipment away from the current basis, where the lessor is usually entitled to claim them on the basis of legal ownership of the assets. The legislative proposal is that the lessee will be entitled to claim capital allowances for all equipment leased under "long funding leases" which are a new way of classifying lease transactions.

8.4. Without detailing the differences between the current and proposed lease classification methodology, it appears likely that longer term UK lease transactions equivalent to financing transactions would be treated as "long funding leases" for which the right to claim capital allowances being denied to lessors. Since it is these capital allowances that permit a lessor to generate a tax deferral and therefore provide a benefit to the lessee, many generic tax-driven UK lease transactions will most likely be uneconomic after the new legislation is enacted.

8.5. Therefore, in order to be viable from a tax law point of view, any lease financing alternative must be 'grandfathered' through the change in tax law, i.e. it must meet a set of minimum criteria for contractual maturity which demonstrate that this transaction was substantially agreed prior to the legislative change being introduced. The draft legislation issued to date does not include these rules, although statements have been made that such rules will apply. Historically, the minimum level of contractual maturity considered sufficient for grandfathering has been a signed or 'ready-to-sign' term sheet which names all the parties involved and has no material conditions precedent remaining to be fulfilled. Of course, signed contracts should also be sufficient.

8.6. Although the draft legislation available is still in draft form, and although the process of consultation between the Inland Revenue and industry and taxpayer bodies continues (which among other things covers how grandfathering will apply), it is likely that legislation closely resembling the draft legislation will be introduced during

2006 if the present government is re-elected, and furthermore, there is no evidence to suggest that a change of government would lead to a major rethinking of this approach.

8.7. Under the procurement strategy proposed in the IOBC of March 2005, the Tram Supply and Infraco contracts are expected to be let for commencement as of 31 December 2006, **which is too late to make a lease transaction viable**. Moreover, this expectation is dependent on the requirement that Royal Assent be obtained before any contractual commitment is executed. Given that Royal Assent appears unlikely to be obtained before 1 April 2006, it is possible that this timeline may be delayed further. Even considering an earlier date when substantially unconditional term sheets preceding these contracts are likely to be available, it is still unlikely that these will exist before 1 April 2006 under the current proposed procurement timeline. For a lease transaction to be viable, two alternatives present themselves:

- Accelerating the procurement (and associated lease financing) of some or all of the leasing-suitable components of the Project so as to achieve sufficient contractual maturity of both contractual groups before 1 April 2006; or

- Entering into an umbrella agreement for the financing of some or all of the leasing-suitable components of the Project before 1 April 2006, notwithstanding that those are yet to be procured.

8.8. Considering the first option, it is entirely feasible to achieve sufficient maturity of a leasing contract with a lessor (including time for an OJEC process) by 1 April 2006, but this is only meaningful if procurement of the equipment to be leased is equally advanced. Only some of the Project components suitable for leasing (the determination of which are discussed in Annex B) could realistically be procured faster than the current procurement proposal timetable. Specifically, procurement of:

- the Tram Supply contract; and

- the Signalling and Communications elements of the Electricals package;

could be at an advanced stage by 1 April 2006. The benefit of this is that trams are a type of asset that is traditionally leased, and signalling and communications equipment could be best procured with the vehicles in order to reduce integration risk. However, this would entail procuring this equipment prior to receiving Royal Assent for the Project (which is not permitted), and given that the remaining elements of the network would then be procured much later than the trams, there would be no 'parallel running' of the tram and infrastructure procurement processes. This exposes **tie** to the risk of achieving procurement of the trams and subsequently failing to procure a network on which to operate them. Contrasting with this risk is the expected NPV benefit associated with a generic UK tax lease on those components, which is estimated at between 2.3% and 4.8% of their cost of £58.7m i.e. £1.4m to £2.8m.

8.9. The second option relies on contractual methodology which has been used in the past to benefit from grandfathering in respect of projects which would not otherwise achieve the requisite contractual maturity (due to long procurement processes) in time. This would involve **tie** conducting a funding competition with the intention that the winning lessor/bidder would enter into a contract with **tie** in which **tie** undertakes to procure (the relevant elements of) the tram Project on behalf of the lessor/bidder and then subsequently lease it from the lessor/bidder under a lease agreement appended to the procurement agreement. The putative lease would be substantially agreed between the parties, but would contain sufficient variation clauses to permit changes (e.g. to the construction term, date of the first lease payments, facility size

etc) which are likely to occur as procurement progresses. Risks associated with this approach include:

(i) the tax law risk of whether the arrangement is eventually found to be sufficient to meet the grandfathering rules eventually published and applying to the change of legislation;

(ii) the risk of costs (both out-of-pocket in terms of legal advisors for both **tie** and the lessor/bidder, and in-house management time and effort) arising in bringing the arrangement into existence if it is subsequently found to be insufficient for grandfathering; and

(iii) either the transactional risk of forcing (at least a partial) funding package onto the bidder subsequently winning a procurement competition for the Project itself, or the financial risk of losing control of the NPV benefit of the lease transaction if the winning bidder chooses not to take up the lease transaction.

The benefits associated with this approach are the flexibility to use lease financing for as much of the suitable Project components as is deemed appropriate by **tie** (noting balance sheet considerations) under the pre 1 April 2006 tax law regime regardless of when contractual close is achieved for procurement of those assets. A further advantage is that the arrangement could be allowed to lapse (noting the cost risks above) if procurement is cancelled or a lease financing solution is not ultimately used.

8.10. Given the magnitude of potential risk and benefits in both options, it is relevant to consider whether the umbrella procurement financing arrangement is likely to be sufficient for grandfathering. The Inland Revenue has shown through transitional provisions contained within recent tax law changes that it is focussing on the issue of grandfathering more closely, with the effect that **a methodology which has achieved grandfathering in the past can not be guaranteed of receiving the same treatment in the future**, even if the same transitional provisions were enacted. In the absence of further draft legislation or comment from the Treasury or Inland Revenue on the transitional provisions for the 1 April 2006 tax law change, **tie** and its advisors can only speculate on the form such provisions may take. Therefore, the best available solution is the solution which has worked in the past, i.e. the umbrella procurement arrangement, although the implicit presumptions that this assessment makes about the form of transitional provisions and the Revenue's interpretation of them must be carefully noted.

9. ANNEX D - FINANCIAL ASSUMPTIONS COMMON TO ALL OPTIONS

We have performed the indicative pricing analyses in this Leasing Appendix to guide decisions about which lease financing alternatives would produce a benefit for **tie**.

Assumptions made which were common to all options considered in producing the analysis in this Appendix were as follows:

1. Relevant Equipment – See Annex B above for an analysis of the selection of relevant components for leasing, identified as:

Vehicles	£41,850,000
Signalling	£5,816,000
Communications	£11,035,866
Total	**£58,701,866**

   Note that tax technical assumptions were made in identifying the components listed above, and that these will need to be confirmed as further detailed design work is performed by **tie**, and the capital allowance and land law characterisation of the components (particularly where the signalling and communications components may be affixed to land) becomes clearer.

2. Alternative cost of finance – In Option 1, we have assumed that this would be UK Gilts (currently approximately 4.54% p.a.) plus a margin equivalent to a AA or AA- rated borrower (consistent for the few rated UK local authorities) of 100bps. Credit margins applied for Options 2, 3, 4 and 5 are lower consistent with the different credit risk taken by the lessor in each structure. Note the discussion in section 4 above about using PWLB as a valid comparator for lease finance.

3. Tax capacity margin – This is an additional margin usually charged by UK banks in tax lease transactions for the use of their tax capacity (ability to absorb deductions). It is commonly the mechanism by which the tax deferral benefit in the transaction is 'shared' between lessee and lessor. This has been excluded from our analysis due to the need to test the market to assess how this is likely to be applied commercially.

4. Transaction costs – We have assumed that the transaction will incur legal, banking and other costs of approximately 1.25% of equipment cost. This is consistent with previous experience. Note footnotes 1 and 2 in this paper about the effects on this estimate of significantly increasing the transaction size.

5. Term – We have assumed a lease term set at 15 years based on experience within the UK light rail industry, and on the basis of our market testing discussions which showed that this is the likely maximum acceptable term for UK lessors, notwithstanding the longer life of the assets.

6. Termination – We have assumed that the equipment would be sold by the lessor back to the lessee at the end of the lease term, at the residual value expected at financial close, probably by way of a remarketing agreement.

7. Residual Value – We have made a prudent assumption that the residual value of the trams and signalling and communications equipment be 0% of the equipment's original cost after 15 years. Increasing the assumed residual value 'priced into' the lease rentals will increase the NPV Benefit in the transaction, but without transferring residual risk in the assets to the lessor. As a result, there is a practical limit to the upper level at which this practice is acceptable to the Inland Revenue.

8. Stipulated Loss Value – This is the payment that the lessee would owe to the lessor in the event that the lease was terminated at any point prior to the end of its 15 year term. It decreases over the term of the lease, and is calculated in accordance with market conventions which keep the lessor whole on its margin, and take into account the tax effects on the lessor of selling the leased equipment. This requires that a view be taken on the 'market' residual value, which differs from the residual value priced into the lease (see 7 above). We have assumed that this 'market' residual value of the trams and associated signalling and communications equipment would follow a straight line depreciation over an expected 30 year life e.g. the 15 year 'market' residual value would be 50% of the original cost. These Stipulated Loss Values (one for each year of the lease term) are relevant to the analysis in this paper only in respect of:

   Option 2 where they determine the size of the deposit required to cash collateralise the lease; and

   Option 5 where they determine the cost of the arrangement and commitment fees paid by Infraco to the project lenders to guarantee payment of the lease rentals to the lessor.

9. Rent escalation – Commonly, UK lease transactions incorporate an escalating lease rental payment, in the order of up to 5% p.a. Escalating the lease payments increases the NPV Benefit percentage and lessee saving over cost of funds by exaggerating the deferral effect of the transaction. We have assumed a 3% escalation rate, although it should be noted that the Inland Revenue is actively considering limits on this practice.

Defeasance – With the exception of Option 2, all analysis has been conducted on the basis of fully funded (i.e. non-collateralised) lease transactions. As noted in the discussion in section 4 above, an economically defeased or collateralised transaction such as that considered under Option 2 would ordinarily be subject to the 'drag' between the cost of funding in the lease and the deposit rate at which it earns interest over the life of the lease. However, being connected to a local authority, **tie** could borrow from PWLB at an interest rate below that which it can earn when depositing the borrowed funds with a bank as collateral for the lease payments, which slightly enhances the lease returns. This enhancement is included in the figures shown for Option 2, but **tie** will need to confirm whether this is permissible.

Appendix E – Funding Options cashflow Summary

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Appendix F – Risk Management Background

Risks Identified by the Feasibility Study

Andersen, Steer Davies Gleave and Mott MacDonald published their ***"Feasibility Study for a North Edinburgh Rapid Transit Solution"*** in July 2001. This report, which established the overall feasibility of a tram system in Edinburgh, identified the following areas of risk that continue to be relevant to the present day scheme. The majority of the risks identified related to scheme development and construction activities, as shown below.

Impact	Risk Area	
Capital Expenditure	Utility Diversions	On-Street Interface
	Procurement Strategy	Technical Issues – Stray Current
	Land Acquisition	Level of Service: Frequency
	Planning Requirements	Depot Location, Scale & Function
	Frontage Access/ Trade Access	Route Length - % on or off street
	Environmental Issues	Fleet Costs
	Railtrack Interface	HMRI and other Approvals
Operating Expenditure	Procurement Strategy	Maintenance / Lifecycle Costs
	Level of Service: Staffing / Security	Depot Location, Scale & Function
	Revenue Protection	Route Length - % on or off street
	Consultation	Ticketing
	Level of Service: Frequency	
Revenue	Patronage/ Revenue Forecasts	Revenue Protection
	Procurement Strategy	Competition – Bus
	Level of Service: Staffing / Security	
Programme	Utility Diversions	Railtrack Interface
	Land Acquisition	Consultation
	Planning Requirements	HMRI and other Approvals
	Frontager Access / Trade Access	

tie and their advisers have considered each of the above issues in their development of the scheme.

The ongoing risks of operating the tram system will require to be monitored and managed through the life of the scheme. Particular attention and effort to address the correct commercial and contracting basis to best contain and allocate responsibility will be a key focus through the bidding and negotiating process.

1.1.1 Risks Identified by the Preliminary Financial Cases

tie's Preliminary Financial Cases for the Trams, originally published in December 2003 and updated in September 2004, reported on **tie**'s structured approach to identifying, assessing and controlling risks that have emerged during the course of the design development. **tie** reported the significant efforts to ensure application of defined processes to manage risk and use of industry recognised methods to identify, classify, categorise, prioritise and measure progress.

The Preliminary Financial Cases took due cognisance of the risks previously identified during scheme development through the analysis, planning and implementation of mitigations. A further number of significant risk areas and mitigations to the scheme were reported as follows.

- **Adequacy of Scottish Executive funding - tie** have mitigated this risk through the review of additional funding options and commencing initial discussions with potential lenders in support of PFI routes;
- **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 assurance and commercial focus is being gained through involvement of Transdev;
- **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 regularly with the Planning Department, sought approval of a Design Manual and discussed the proposals to account for routing through the World Heritage Site. **tie** will also control the process of targeted initial design work covering the most sensitive areas of the route. **tie** have subsequently achieved approval of the Design Manual from the Planning Department;
- **CETM influence on the Project – tie** and their advisers have considered the influence of CETM and discussed this with CEC;
- **Delays** due to lack of Parliamentary time due to other Bills under consideration, bus operator objections or changed priorities adopted by (or changes to) the Transport Minister – **tie** and their Parliamentary Legal Advisers continue to discuss the protocol and programme with the Parliamentary Bills Unit;
- **Capital cost** increases associated with land purchase and compensation, Network Rail, unforeseen ground conditions, vehicle costs, CEC/**tie** instructed changes, utility diversion costs in excess of current forecasts, and breaches in the contingency level included within the current risk reserve – these risks should be mitigated through the level of work undertaken to date to determine robust cost estimates by **tie**'s advisers;
- **Programme overrun** due to loss of market appetite, competing projects and bidder fatigue – **tie** has taken **market soundings** on operator interest and this resulted in four strong candidates submitting DPOF bids. **tie** continues to monitor the progress of other UK light rail procurements. The preferred Infraco procurement option was also partly a reflection of recent market experience, and will be further tested through a PIN process; and
- **Operating costs** exceed current projections due to lack of tram priority at junctions – the DPOF process has provided further certainty on operating costs and will identify cost issues but not until after completion of considerable further work by the selected partner.

1.1.2 National Audit Office - UK Light Rail Projects Risks

The Preliminary Financial Cases reported a number of lessons that have been learnt from previously constructed and currently operational UK light rail projects. The following key risks which have arisen on other UK light rail projects have been recognised by **tie** and their advisers, and duly mitigated through **tie's** procurement strategy, consultations and design and cost and programme assumptions:

- **Capital Costs** – increased capital costs due to support necessary for scheme promotion through Parliamentary process, underestimation of utility diversions, compliance with planning, increased land and compensation costs, additional traffic management measures, lack of industry product standardisation, and increased bid costs due to inefficient procurement methods;
- **Operating Costs** – increased operating costs due to lack of tram route optimisation and priority within the existing road network resulting in increased runtimes and reduced operational performance, increased market cost of insurances, and underestimation of staffing levels;
- **Revenue** – reduced revenue yield due to reduction in tram capacity due to vehicle breakdowns, negative PR, competition responses from existing and emerging bus operators (fares and coverage), overestimated revenues due to overvaluing of inherent attractiveness of tram as a 'superior' commodity over buses, and underestimation of changes in demographics and land use; and
- **Approvability** – delays in approvability due to issues relating to achieving planning approval, doubts over the value for money of the systems, and negative PR due to inadequate performance.

The National Audit Office (NAO) published its report **"*Improving public transport in England through light rail*"** in April 2004. A detailed review of this report has been conducted by **tie**. This report is a timely and comprehensive overview of the successes and failures experienced elsewhere in the UK in recent years. Although the report is mainly focussed on the role and responsibilities of the Department for Transport ("DfT") it contains useful guidance for **tie** and the Council. A principal lesson learned from previous projects reported as the need to **"**Adopt a proactive approach to risk identification, analysis and mitigation."

NAO identified a number of barriers to the successful future development of light rail systems in the UK and highlighted the issues which need to be addressed to overcome the barriers, which included the poor financial performance of existing schemes leading to higher risk-driven cost of new schemes, and recommended:

"Better 'risk-sharing' and 'new' procurement contract structures be developed that enhance private sector involvement"

As a consequence, the NAO made a number of specific recommendations to the Department, which included the following procurement related issues.

- **Seek better standardisation** in design of systems, vehicles and methods of construction using experience from existing systems and partnering with promoters of other new schemes;
- **Seek ways of managing risk** and reducing the costs of utility diversion including questioning the need for specific diversion; and
- **Identify the most cost-effective procurement methods** and contract structures as a means of controlling cost.

tie's procurement and risk management strategies reflect the conclusions and recommendations of the National Audit Office.

1.1.3 Optimism Bias

In accordance with HM Treasury (2003) Green Book: Appraisal and Evaluation in Central Government, **tie** has assessed the Optimism Bias contingency for the tram system.

> *"**Optimism Bias** is that 'percentage' by which the actual capital, operating expenditure or time of works duration exceeds (or, in the case of benefits, is less than) that expected at the business case stage."*

HM Treasury guidance was supported by a Mott MacDonald study that has highlighted the **significant inadequacies** of historic government schemes getting approval on the basis of '*very poor*' quality outline business cases. **tie** consider that Optimism Bias captures the following three areas of risk that will need to be managed throughout the project lifecycle.

- **Market risks** - the tender returns being at variance with our advisers' estimates;
- **Known risks** - the risks that we have identified and are managing; and
- **Unknown risks** - the issues that will emerge during scheme development and construction.

The guidance recognises the trend that, as a project progresses, overall capital expenditure and programme risk exposure reduces as fewer unknown risks emerge and market commitment to established work packages is secured. In this sense a more proactive approach to the management of risk as adopted by **tie** (and recommended by NAO) will result in a reduction in Optimism Bias.

1.1.4 Lessons from HM Treasury Optimism Bias

tie support the need to address the issues giving rise to Optimism Bias and have identified a number of potential reasons for reducing the 'starting values' estimates of Optimism Bias compared with experience on previous schemes, as follows:

1. Previous schemes show a **historic poor government track record** where schemes were procured on a 'traditional' basis, and did not have the wealth of **OGC, 4Ps and PUK** scheme development and procurement guidance that is currently available. Historic schemes had limited experience of alternate forms of contract. HM Treasury's view of Optimism Bias therefore takes no account of emerging best practice **procurement methods**.

   tie are at the cutting edge of developing the latest industry thinking for light rail procurement. This procurement strategy seeks to optimise risk transfer on the basis of lessons learnt from previous tram schemes, and brings early operator involvement, in order to benefit from commercial and innovative insight. **tie** have additionally complemented their team with the involvement of **Partnerships UK** to ensure that latest industry guidance is applied.

2. There appears to have been a **lack of rigour** in the historic approach to scheme estimation (including risk portion), with estimates prepared largely based on 'unit rate' derivation with little examination of risk. Poor risk allocation in **traditional procurement** has undoubtedly contributed to Optimism Bias.

   tie's advisers have developed their capital expenditure estimates against the out-turn costs of other schemes, thereby greatly improving cost certainty and incorporating Optimism Bias. In addition, **tie** have adopted a high degree of risk transfer to the private sector and have adopted private sector protocols and personnel in the management of costs.

3. Mott MacDonald's study reports the methodology for estimation of **reduced Optimism Bias** from recommended 'starting values' for traditionally procured schemes. This reduction is feasible where a demonstrable appraisal of risks has been undertaken and evidence of implementation of mitigation is sought.

4. Mott MacDonald's study has tended to report higher "**starting values**" than previous similar HM Treasury studies.

   - HM Treasury Supply Estimates study indicates a significantly **lower average Optimism Bias** on capital cost estimates for schemes in the transport sector.
   - HM Treasury Central Unit of Procurement study identified a trend of significant **reduction in Optimism Bias** over the early 90s (Optimism Bias

on capital costs reduced by a third and Optimism Bias on works duration reduced by a half) that is not reflected in Mott MacDonald 'starting values' (averaged over 20 years).

tie have sought comfort in the estimates provided by advisers and undertaken benchmarking against 'previous' and 'planned' light rail schemes in the UK.

5. Mott MacDonald's recommended starting values are **potentially skewed** by the degree of innovation in some schemes which could have been considered 'leading edge' at the time.

   The significant **UK and European experience** in development of tram schemes over recent years shows a good **track record** for the delivery of tram schemes. At present, a total of twelve schemes have been delivered in the UK since the early 1980s with three extensions planned and a further four new schemes (including the Edinburgh tram system) being proposed.

6. It is difficult to quantify the positive impact on potential Optimism Bias of certain key aspects of **tie**'s approach.

   - Rigour of scheme development to satisfy scrutiny and audit within the Parliamentary process;
   - Rigour in partner/contractor selection;
   - Substantial development investment to date;
   - Strategy of procurement to assemble the optimal delivery consortia;
   - Good understanding of industry best practice and conditions in the light rail sector;
   - Experience of the **tie** project management team; and
   - Significant breadth and depth of contributing adviser input including Operator.

7. The guidance notes that the recommended Optimism Bias starting values are based on sample of schemes that may **'double count' risk contingencies**, as in some cases information was not available.

8. The guidance supports the need for greater **early investment** as required for PFI schemes for greater scheme 'gestation', as being proposed by **tie**.

It is concluded that the 'starting values' reported in HM Treasury guidance are high estimates and can be reduced during project lifecycle with the application of procurement, project and risk management best practice.

1.1.5 Lessons from the Management of the New Scottish Parliament Building

Audit Scotland ("AS") published its report "***Management of the Holyrood building project***" in June 2004. This report highlighted a number of observations, features and lessons that are appropriate to all schemes, in its key findings. **tie** has conducted a detailed review of this report. The key recommended lessons to be implemented by **tie** are summarised as follows.

- Ensure that an **agreed project budget** is defined with a practical and robust set of key performance indicators, to be monitored during the life of the project and work towards joint responsibility for delivering the scheme on time and within budget;
- Develop and agree a 'realistic' design and construction **programme** that accounts for all critical project assumptions that could delay the scheme;
- Ensure **adequate contingencies** are made for 'expected' programme delays and cost increases that may influence the project, for all 'major' risks;
- Give adequate consideration to the available procurement options. Take appropriate care in the choice of form of contract to be employed based on a sound understanding of the risks and benefits of each option. Select a **procurement**

strategy that optimises the transfer of 'design risk' and 'construction risk' to the private sector and is appropriate for the complexity of the scheme;

- Maintain **market interest** through promotion of the scheme, to ensure competitive interest from bidders;
- Engage project managers, project negotiators, consultants and contractors with **appropriate experience** in the procurement route selected. Also, seek confirmation of **resource availability** to accommodate peak loading of key resources;
- Ensure that 'detailed design' is initiated at the **earliest opportunity** to avoid variations;
- Aim to examine options to **cap, fix and agree fees** at the earliest opportunity and ensure that the available incentives adopted **do not include scaleable fees** related to the outturn capital expenditure on the scheme;
- Develop a **governance model** that provides the appropriate controls over the project as follows.
    - Empowerment and support to 'single point' of **leadership** for the project, namely, the Project Director;
    - Ensure **clear responsibility** for an 'approved cost ceiling' and application of rigorous change control procedures including 'sign off' responsibilities for potential additional costs arising from design development;
    - Have an auditable and rigorous **change control process**; and
    - Unambiguous **lines of communication** and roles and responsibilities through all project organisations and individuals;
- Develop clear **specification requirements** for the scheme including explicit **indicators** of quality and material selection prior to going to market;
- Ensure that all parties have a shared understanding of the **quality, cost and programme objectives** for the project;
- Establish criteria for **unacceptable performance** and contractual facility to recover costs for poor performance, against a backdrop of 'comprehensive' reporting of current spend and forecasts. Ensure regular updates are provided on a 'systematic' basis within a robust framework of project financial control;
- Ensure that a **clear scope of works** are defined for all proposed Contracts and **value for money** tests are established prior to placement;
- Ensure that all parties contribute to a consistent framework for **risk management** including ability to contribute to definition of mitigation throughout the project lifecycle;
- Ensure that the project team and the private sector providers communicate issues and problems to achieving the project delivery dates and a **'partnering' relationship** is fostered to ensure individuals are free to express any reservations; and
- Consider the use of **project reviews** to provide assurance that it may move to the next stage of development.

It is recommended by Audit Scotland that these lessons and any further emerging lessons are adopted in full. **tie**'s procurement strategy, governance and project management approach and proposed payment mechanisms reflect these recommendations.

1.1.6 Department for Transport Optimism Bias Studies

Department for Transport ("DfT") published its guidance ***"Procedures for Dealing with Optimism Bias in Transport Planning"*** in July 2004, supported by new studies by Bent Flyvbjerg in association with COWI. This guidance builds on previous studies reported by Mott MacDonald, on behalf of HM Treasury, with recommended Optimism Bias adjustments for application to full business cases.

The guidance identifies the following four categories for the causes of Optimism Bias.

- **Technical causes**: imperfect information such as unavailability of data, new or unproven technology; scope changes such as changes in relation to speed, road width, routing, safety and environmental norms; and management issues such as inappropriate calculation approach, procurement issues and risk sharing;

- **Psychological causes**: the tendency for humans and organisations to favour optimism; and appraisal of optimism;
- **Economic causes**: construction companies and consultants having interest in advancing projects; and
- **Political-institutional causes**: interests, power and institutions; and actors may deliberately lie in order to see their projects or interest realised.

The guidance highlights potential errors due to a shortage of data sources used to determine the recommended uplifts. The guidance recommends Optimism Bias increases of 40% to 57% to capital estimates for light rail schemes, depending on the desired degree of certainty required. The Mott MacDonald study now reflected in HM Treasury guidance (and followed by **tie**) recommends a comparable uplift of 44%. When Phase 1 (Line 1) is considered within the overall available grant funding of £375m there equates to a total of 54% allowance for Optimism Bias above 2Q2003 estimated base costs and specified contingencies. It is considered that this would provide a high degree of certainty for the Scottish Executive and Council for the tram as a 'standalone' project in that it would not require access to additional Grant Funding from the Scottish Executive, as discussed in Section 8

The new guidance makes a number of recommendations for the industry, including the need for improvement in risk management and project cost controls. The guidance recognises that progressive mitigation of risk will effect a reduction in Optimism Bias. **tie** considers its risk management and method of development of scheme costs meets industry best practice and this is reflected in the benchmarking results against other tram schemes.

The guidance highlights potential pitfalls of organisations abusing Optimism Bias headroom due to a lack of incentive to bring the scheme in 'on budget'. The guidance goes on to highlight that risks are now being reflected in higher 'unit costs' and that this may result in double counting of risk.

This later study recommends the use of 40% uplift to capital estimates based on the following.

- Where there is an acceptance that the scheme will be one of the 50 (out of 100 projects) that will be brought in within budget;
- Where a portfolio view of projects is taken;
- Where there is an above average appreciation of risk with supporting analysis and corresponding implementation of mitigation actions; and
- Where there is a desire to drive tighter cost control within projects.

tie have applied a 'starting value' of 44% uplift to capital estimates, in accordance with the 2003 HM Treasury guidance. Through effective risk mitigation, this is now assessed at **24%** and it is this level of contingency which is incorporated in the prudent case estimates. The underlying justification is set out in Section 6.4.3.

The new guidance stresses that there may be a need for an 'outside view' of schemes as it is not really appropriate for the project team to take definitive views on Optimism Bias. Accordingly, it is recommended that the Scottish Executive consider their 'portfolio' of projects and decide if additional risk reserve is required at 'funder level', with reference to this guidance. **tie** will bring an 'outside view' to mitigate the 'agent/principle' problem resulting in bias to project costs, programme and revenues through the input of Technical Support Services and supplemented with a Peer Review Group drawn from independent industry experts. **tie** may seek further comfort throughout commissioning of ad hoc input of specialists to audit scheme deliverables.

1.1.7 The Holyrood Inquiry

In September 2004, the Rt Hon Lord Fraser of Carmyllie QC published his principle conclusions and summarised his main findings on the Holyrood Inquiry. Whilst this project

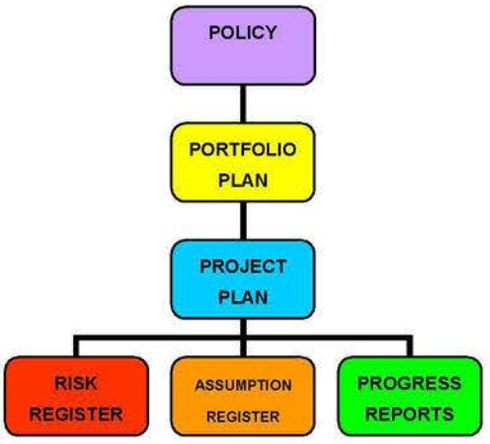
has many unique features and may not be considered to be directly pertinent to the Edinburgh Tram scheme, it is considered that there are many lessons to be appropriate to all planned public sector development and construction projects. **tie** has conducted a review of the lessons and summarise these below.

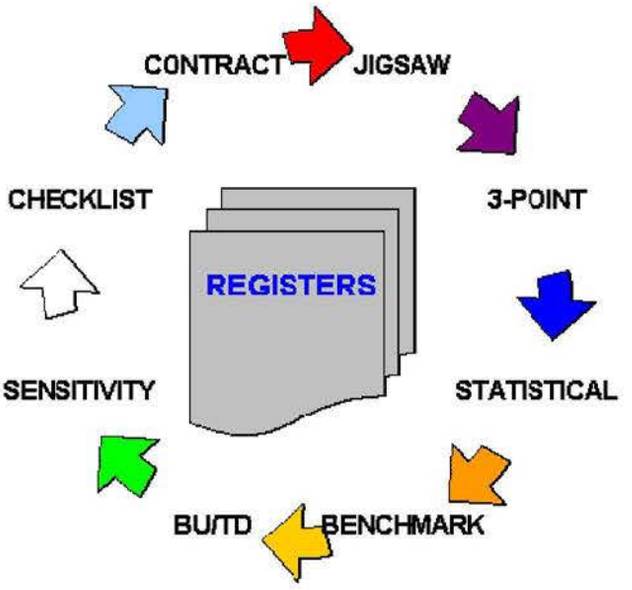
- A PFI procurement option should not be discounted on the basis of the potential delay to overall project delivery;
- Appropriate assessment of advantages and disadvantages of the proposed procurement route should be undertaken, including clear visibility on the risks to be retained by the public sector;
- Appropriate risk allowances and contingencies should be set aside for capital costs and programme to a set brief;
- Develop and maintain a Project Execution Plan throughout the project cycle;
- Ensure that estimates for capital cost are accurate and reflect the complexity of scheme proposals through the advancement of earlier design;
- Ensure that where civil servants are engaged on the project, that overall governance should be made very clear;
- Identify unambiguous priorities for cost, programme and quality tensions within the scheme during development and construction phases and communicate these to all parties;
- Project change control requires full understanding of potential impacts prior to approval;
- Project completion dates and timetable for delivery should be realistic and not be influenced by 'political' dates;
- Project Sponsors should be adequately experienced in the proposed procurement route and have suitable experience in the complexity of scheme proposals;
- Proper records of the conduct of the prequalification and tendering process should be kept to ensure compliance with EU procurement law;
- Rigorous due diligence should be conducted on any Joint-Venture Company tendering for services including review for need of collateral warranties and assessment of compatibility of working practices;
- Service providers should be procured with incentivised payment mechanisms; and
- Take up a Parent Company Guarantee from service providers where feasible.

It is considered that that above lessons and any further emerging lessons are adopted in full by **tie**'s proposed procurement strategy, practices, protocols and project management approach.

1.1.8 Risk Management Framework

tie and their advisers have identified project risks affecting the tram system through individual adviser meetings, workshops, strategic reviews and experience of other schemes and have recorded the risks identified throughout the development process. These risks have been placed on the risk register which has been further developed from checklists contained in published industry guidance. Risk management has been conducted within an organised framework utilising a range of planning and management deliverables and techniques for the management of risk, as shown below.





The risk mitigation strategy sets out an understanding of the risk identified, the actions to be taken to minimise the likelihood and impact of the risk, by whom and to an agreed timescale. Furthermore, the risks have been reviewed on an on-going basis 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 they 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 utilised by **tie** as a 'live' management tool.

The progress in completing the actions associated with the risk management strategy for each risk has been recorded as a 'mitigation factor' (effectively the measured percentage complete for each mitigation plan). The progress to mitigate risks has been tracked and used to estimate reductions in Optimism Bias in accordance with published guidance. The extent of progress is shown below in Section 6.4.3.

Finally, the Optimism Bias has been supplemented with an additional 1% allowance (approximately £4.40m for the full tram system) for the cost of implementing the proposed risk management.

For additional comfort, **tie** has obtained verification of their approach to the estimation of Optimism Bias through the 'original authors' of the Mott MacDonald guidance on Optimism Bias estimation and advice regarding project classification.

Appendix G – Risk Allocation Matrices

System Design Services Agreement
Risk Allocation Matrix

SDS Risk: Performance of the Services	Allocation		
	Public Sector	Private Sector	Shared
Failure to perform the Services and other obligations under the Agreement fully and faithfully in the best interests of **tie**		✓	
Failure to exercise a reasonable level of professional skill, care and diligence in the performance of the Services (Clause 3.2)		✓	
Failure to provide the Services in accordance with the terms of the Agreement (Clause 3.3.1)		✓	
Failure to provide the Services so as to enable the Edinburgh Tram System to be procured, constructed, installed, tested and commissioned and thereafter operated and maintained (Clause 3.3.2)		✓	
Failure to provide the Services in accordance with the SDS Provider's quality management system and plans (Clause 3.3.3)		✓	
Failure to provide the Services so as to ensure compliance with the Functional Requirements Specifications and the Technical Specifications (Clause 3.3.4)		✓	
Provision of Services in accordance with the CEC Design Manual (Clause 3.3.5)		✓	
Failure to provide Services in accordance with applicable Law and Consents, Parliamentary Undertakings, Environmental Statements and all other applicable environmental regulations and requirements (Clauses 3.3.6, 3.3.7, 3.3.8 & 3.3.9)		✓	
Provision of Services to permit compliance with the Code of Construction Practice and with the Construction Proposals from Infraco (Clause 3.3.10)		✓	
Failure to provide the Services in accordance with Good Industry Practice (Clause 3.3.11)		✓	
Ensure Edinburgh Tram Network constructability (Clause 3.3.12)		✓	
Failure to provide the Services in such manner so as not wilfully to detract from the image and reputation of **tie**, TEL, CEC, the Scottish Executive or any project related to performance of the Services (Clause 3.3.14)		✓	
Failure to provide Services in a manner that is not likely to be injurious to persons or property (Clause 3.3.15)		✓	
Failure to use the Key Personnel or persons not approved by **tie** to perform the Services (Clause 3.3.16)		✓	
Assumption, to the extent necessary for the Performance of the Services and other obligations under the Agreement, of the risks arising from ground conditions, use of land, quality of existing structures, obligations in Parliamentary Undertakings, safety requirements and environmental matters (Clause 3.4)		✓	
Ensure that the design maximises construction productivity, minimises disruption to city, safeguards efficiency in obtaining consents and optimises Infraco compliance with Construction Code of Practice (Clause 3.5)		✓	
Knowledge of current professional standards and all matters which may affect the Services at all times (Clause 3.6)		✓	
Failure by Consultant to understand the scope and extent of the Services and to satisfy himself that he has sufficient information to enable him to perform the Services (Clause 3.8)		✓	
Accuracy and completeness of Background Information relied on by Consultant (Clauses 3.10 & 3.11)		✓	
Failure to liaise with **tie**, its consultants or the Tram Supplier, to facilitate the production by them of information in order that the Services can be progressed according to Programme and properly in accordance with the terms of the Agreement (Clause 3.12)		✓	
Coordination of the Services performed by the Consultant and by other consultants appointed by **tie** in relation to the same project or other projects such that all are carried out with the greatest economy and in accordance with programme (Clause 3.14)		✓	
Failure to have regard to the budgetary constraints and Programme constraints (Clause 3.15)		✓	
Provision of all required labour, goods, materials and services required for the Services (Clause 3.16)		✓	
Failure to ensure that materials have not been specified for use or used in the provision of the Services which are deleterious or contravene relevant BSI standards or European standards, Ove		✓	

SDS Risk: Performance of the Services	Allocation		
	Public Sector	Private Sector	Shared
Arup guidance or Good Industry Practice (Clause 3.17)			
Failure to fulfil the responsibilities of a designer imposed by the CDM Regulations and to co-operate with, and supply information to, the planning supervisor (Clause 3.18)		✓	
Design compatibility with system integration (Clause 3.26)		✓	
Development of a traffic management protocol (Clause 3.27)		✓	
Development and finalisation of Deliverables required by the Agreement (Clause 4)		✓	
Consents (including planning and TROs) (Clause 5)		✓	
Cost increases or Programme delays due to Planning Permission requirements		✓	
Failure to operate a quality assurance system and comply with such system (Clause 6)		✓	
Error or omission in the performance of the Services (Clause 18)		✓	
Failure to design to brief		✓	
Responsibility for continuing development of design post novation.		✓	
Adequacy of site investigation and surveys		✓	
Constructability of the scheme		✓	
Optimisation of run-time in junction designs		✓	
Integration design between Line 1 and 2		✓	
Interface design management between all components		✓	
Adequacy of substations and supply for power demands		✓	
Inclusion of objector requirements	✓	✓	
Number of iterations to develop design		✓	
Design to required flood return period		✓	
Effects of Central Edinburgh Transport Management & Controlled Parking Zone schemes	✓	✓	
Size of system energy demand of system	✓		
Application of Design Manual aspirations introduces delay in planning approvals process or increase in design costs		✓	

SDS Risk: Progress	Allocation		
	Public Sector	Private Sector	Shared
Failure to progress the Services efficiently and without delay in accordance with the Programme (Clause 7.1.1)		✓	
Failure to update and amend the Programme having obtained **tie**'s prior approval to do so (Clause 7.1.2)		✓	
Compliance with "criticality", sequence and dates in Programme Phasing Structure (Clause 7.2)		✓	
tie instructions to stop, amend or accelerate the order of performance (Clause 7.2)			✓
Failure to mitigate delay on **tie**'s instructions where the delay results from Consultant's fault (Clause 7.4.3)		✓	
Mitigation of delay where Consultant not at fault (Clause 7.4.3)	✓		
Delay as result of Consultant's breach, negligence, wilful act or omission (Clause 7.5.1)		✓	
Delay as a result of any reason outwith the control of the Consultant other than breach, negligence, wilful act, or omission (Clause 7.5)[3]	✓		

[3] Allowing an extension of the Programme is at **tie**'s discretion.

SDS Risk: Progress	**Allocation**		
	Public Sector	Private Sector	Shared
Delay in the provision of essential information/decision from **tie** to the Consultant (Clause 7.6)[4]	✓		
Failure of consultant to fully describe and evaluate to **tie** any foreseeable consequential effect of the application of any recommendation to **tie** at the time of making the recommendation requiring the decision and agreement of **tie** to proceed (Clause 7.6.4)		✓	
Abortive work for any reason other than a fault of the Consultant and/or breach by the Consultant (Clause 7.7)[5]	✓		

SDS Risk : Key Personnel, Staff and Sub-Contracting	**Allocation**		
	Public Sector	Private Sector	Shared
Failure to have a sufficient number of staff for the provision of the Services (Clause 8.1.2)		✓	
Failure to make Key Personnel available for meetings in Edinburgh as directed by **tie** (Clause 8.2.2)		✓	
Changes in Consultant's Key Personnel and continuity of staff (Clause 8.3 and 8.4)		✓	
Key Personnel to have appropriate level of skill, experience, authority, training and supervision for the Services (Clause 8.5)		✓	
Consultant contracts with or retains as an adviser or consultant any person employed or previously employed by **tie** without **tie**'s prior approval (Clause 8.7)		✓	
Objection to and removal from the Services any person employed by the Consultant who misconducts himself or is incompetent or negligent (Clauses 8.8 & 8.9)		✓	
Compliance with regulations and instructions from the **tie** representative (8.10)		✓	
Consultant sub-lets part of the Services to a third party without **tie**'s consent (Clause 9.2)		✓	
Performance of sub-contractors (Clause 9.4)		✓	
Consultant fails to procure the execution of a collateral warranty within 14 days of a request from **tie** by any Consultant Party in favour of **tie** or such other party as may be reasonably required by **tie** and in a form reasonably acceptable to **tie** (Clause 9.5)		✓	
Acting upon an unauthorised variation of the **tie** Representative (Clause 10.5.2)		✓	

SDS Risk : Payment	**Allocation**		
	Public Sector	Private Sector	Shared
Failure to make payments to Consultant within 30 days of receipt of a valid VAT invoice / nterest on late payments (Clauses 12/12.10)	✓		
Failure to issue notice of intention to withhold payment regarding exercise of set-off at least 3 days before the final date for payment to the Consultant (Clause 13)	✓		
Failure to produce documents or provide information relevant to the Services to **tie's** auditors (Clause 14.1)		✓	
Failure to maintain proper books, accounts and records relating to the Services (Clause 14.2)		✓	
Fixed lump sum prices/milestones have been underestimated		✓	
Rates for personnel have been underestimated		✓	
Milestones are not achieved		✓	
Applications for payment in the period up to 31 March 2006 exceed £7,000,000 (applications can be made after this date)		✓	

[4] Consultant required to provide full supporting information to **tie**, including the date by which information/decision is required in order to avoid delay in continuity of the Services.
[5] **tie** and Consultant to jointly investigate the nature and extent of any abortive work. Abortive work to be determined as a variation in terms of Clause 15.

SDS Risk : tie Changes and Changes in Law	**Allocation**		
	Public Sector	Private Sector	Shared
Execution of a **tie** Change resulting in additional costs and impact on programme (Clause 15)	✓		
Failure to deliver estimate within 18 days of receipt of a **tie** Notice of Change (Clause 15.2)		✓	
Failure to agree issues set out in the Estimate (Clause 15.8)			✓
tie does not have legal power or capacity to require the implementation of a **tie** Change (Clause 15.8)	✓		
Implementation of tie Change is contrary to law, not technically feasible or would adversely affect the Consultant's ability to perform the Services or implementation is outwith the competence of the Consultant (Clause 15.8.2)	✓		
Failure to confirm in writing an Estimate within 30 days of the contents of the Estimate being agreed (Clause 15.10)	✓		
Extension of time, payment or relief in respect of **tie** change where requirement for change could be mitigated by Consultant (Clause 15.11)		✓	
Failure to notify **tie** in 10 days that an instruction amounts to a **tie** change (Clauses 15.12, 15.13 & 15.14)		✓	
Specific change in Law (Clause 16)			✓
Non-specific legislative change during design and construction		✓	
Technological obsolescence and change	✓		
Changes in VAT			✓

SDS Risk : Insurance	**Allocation**		
	Public Sector	Private Sector	Shared
Failure to procure and maintain Required Insurances (Clause 17.1)		✓	
Required insurances are not available		✓	
Escalation in insurance premiums well above anticipated rates resulting in cost over-runs		✓	

SDS Risk : Termination	**Allocation**		
	Public Sector	Private Sector	Shared
Termination as a result of the Consultant's breach of any material provision or requirement of the Agreement (Consultant default) (Clause 19.1.1)		✓	
Termination as a result of the Consultant's breach of a duty of confidentiality (Consultant default) (Clause 19.1.2)		✓	
Termination following a written warning that any member of the Key Personnel is incompetent in the opinion of **tie** (Consultant default) (Clause 19.1.3)		✓	
Termination resulting from the Consultant's conduct which **tie** considers to be incompatible with the performance of the Services and/or wilfully detracts from the image of **tie**, CEC or the SE or any project related to the Services (Consultant default) (Clause 19.1.4)		✓	
Termination as a result of any partner/director of the Consultant being expelled from or sanctioned by his relevant professional institute thus compromising the performance of the Services (Clause 19.1.5)		✓	
Termination as a result of an Insolvency Event (Consultant default) (Clause 19.1.6)		✓	
Termination for unresolved Consultant conflict of interest (Consultant Default) (Clause 19.1.7)		✓	
Termination for change in legal status or control of Consultant materially prejudicial to performance (Consultant Default) (Clause 19.1.7)		✓	
Termination or suspension of Services by **tie** where Consultant is not in default (Clause 20)		✓	
Failure to require Consultant to resume performance of Services within 12 months of notice of suspension where tie wishes the Services to resume (Clause 17.3)	✓		

SDS Risk : Termination	**Allocation**		
	Public Sector	Private Sector	Shared
Termination due to **tie** failing to make a payment of any amount of money that is due and payable by **tie** to the Consultant exceeding 5% of the value of the Services to be performed under the Agreement (**tie** Default) (Clause 21.3)	✓		
Termination due to a breach by **tie** of any of its material obligations under the Agreement which substantially frustrates or renders it impossible for the Consultant to perform its obligations under the Agreement for a continuous period of 90 days (**tie** Default) (Clause 21.3)	✓		
Failure by Consultant to issue a notice to terminate within 30 days of becoming aware of a **tie** Default (Clause 21.1)		✓	
Failure by **tie** to rectify **tie** Default within 60 days of receipt of the termination notice (Clause 21.3)	✓		
Termination due to the commission of a Prohibited Act by the Consultant or any of its employees or anyone acting on behalf of the Consultant (Clause 22.3)		✓	
Termination due to Force Majeure Event (Clause 23)			✓
Failure by Consultant to remedy a Persistent Breach following service of a Final Persistent Breach Notice under the Agreement (Clause 24.2)		✓	
No compensation on termination subject to Clause 25.3 (Clause 22.5)		✓	
Failure to pay undisputed sums and costs within 30 days of termination (Clause 25.2)	✓		
Demobilisation costs on termination for tie default or termination or abandonment by tie (Clause 25.3)	✓		
Failure by Consultant to mitigate costs, incurred as a result of termination on tie Default, termination or suspension of Services by **tie**, (Clause 25.4)		✓	
Failure by Consultant to pay to **tie** any sum due under the Agreement within 30 days of termination (Clause 22.7)		✓	
Indemnity to **tie** in event of termination for Consultant Default, Prohibited Acts and Persistent Breach (Clause 25.10)		✓	
Costs of additional services required to resume suspended Services (Clause 25.11)		✓	
Failure by Consultant to hand Deliverables and information to **tie** on termination of the Agreement (Clauses 26.4 & 26.5)		✓	

SDS Risk : Indemnities	**Allocation**		
	Public Sector	Private Sector	Shared
Negligent or wilful act or omission of the Consultant or any of its agents in the performance of the Services (Clause 27.1)		✓	
Breach by Consultant of any term of the Agreement (Clause 27.1)		✓	
Breach by Consultant of any Law (Clause 27.1)		✓	
Non-Performance or delay in the performance of Consultant obligations (27.1.4)		✓	
Indirect Loss (27.4)	✓	✓	

SDS Risk : Dispute Resolution	**Allocation**		
	Public Sector	Private Sector	Shared
Failure to refer a Dispute within 3 months of the date on which the event or matter or situation giving rise to the Dispute occurred[6] (Clause 28.7)	✓	✓	
Failure to observe time limits or timescales provided for within Clause 25 (Dispute Resolution) (Clause 28.8)	✓	✓	

[6] If the relevant party was not aware or could not have been aware with reasonable diligence that the event, matter or situation had occurred, the date of the event, matter or situation shall be taken to be the date the relevant part first became aware, with reasonable diligence of the event, matter or situation.

SDS Risk : Dispute Resolution	**Allocation**		
	Public Sector	Private Sector	Shared
Failure to resolve Dispute in accordance with Internal Resolution Procedure (Clause 28.10)	✓	✓	
Failure to resolve Dispute using Mediation Procedure (Clause 28.14)	✓	✓	
Failure to resolve Dispute using Adjudication Procedure (Clause 28.51)	✓	✓	

SDS Risk : Conflict of Interest	**Allocation**		
	Public Sector	Private Sector	Shared
Conflict of interest (Clause 31)		✓	
Termination due to Consultant's failure to resolve a conflict of interest (Consultant's default) (Clause 19.1.7)		✓	

SDS Risk : Assignation/Novation	**Allocation**		
	Public Sector	Private Sector	Shared
Consultant refuses to novate to Infraco when requested by **tie** (Clause 29.1)		✓	
Collateral warranty provided to **tie** on novation (Clause 29.6)		✓	
Consultant execution of Funder's Direct Agreement (Clause 29.7)		✓	
Consultant execution of SDS - JRC agreement (29.8)		✓	
Development, testing, validation, commissioning and deployment of transport modelling suite (Clause 29.9)		✓	
tie assigns Agreement (Clause 30)		✓	

SDS Risk : IPR	**Allocation**		
	Public Sector	Private Sector	Shared
Consultant fails to execute documents and to carry out acts as may be required in order to vest rights in the Project IPR in **tie** (Clause 32.6)		✓	
Consultant uses Project IPR for purposes other than the performance of the Services (Clause 32.8)		✓	
With regard to Deliverables are generated or maintained on a computer system, the Consultant fails to procure for the benefit of **tie** at no charge or at the lowest reasonable fee, the grant of a sub-license for any relevant Third Party Software to enable **tie** to use the Deliverables (Clause 32.9)		✓	
Back-up and storage in safe custody of Deliverables (Clause 29.9)		✓	
Third party claim of infringement of IPR in any Deliverables or other materials provided by the Consultant to tie (Clause 32.11)		✓	
On termination, the Consultant's failure to provide **tie** with the object code of any Third Party Software and the Consultant Software, a copy of the source code for the Specially Written Software, a copy of information and data relating the Third Party Software, the Specially Written Software and the Consultant Software which is reasonably required by **tie** to operate, manage and support such software (Clause 32.13)		✓	

SDS Risk : Confidential Information	**Allocation**

	Public Sector	Private Sector	Shared
Unauthorised disclosure of Confidential Information (Clause 33)	✓	✓[7]	
Breach of the terms of FOISA (Clauses 33.8 to 33.12)[8]	✓		

[7] This is a reciprocal obligation

[8] **tie** will be responsible ultimately under FOISA but the Consultant is contractually required to assist and co-operate with **tie** to enable **tie** to comply with its duty under FOISA.

Technical Support Services Contract
Risk Allocation Matrix

TSS Risk: Performance of the Services	Allocation		
	Public Sector	Private Sector	Shared
TSS Provider to perform the Services and other obligations under the Agreement fully and faithfully in the best interests of **tie** (Clause 3.1)		✓	
TSS Provider fails to exercise a reasonable level of professional skill, care and diligence in the performance of the Services (Clause 3.2)		✓	
Failure to provide the Services in accordance with the terms of the Agreement (Clause 3.3.1)		✓	
Failure to provide the Services so as to enable the Edinburgh Tram System to be procured, constructed, installed, tested and commissioned and thereafter operated and maintained (Clause 3.3.2)		✓	
Failure to provide the Services in accordance with the TSS Provider's quality management system and plans (Clause 3.3.3)		✓	
Failure to provide the Services so as to ensure compliance with the Functional Requirements Specifications and the Technical Specifications (Clause 3.3.4)		✓	
Provision of Services in accordance with the CEC Design Manual (Clause 3.3.5)		✓	
Failure to provide Services in accordance with applicable Law and Consents, Parliamentary Undertakings, Environmental Statements and all other applicable environmental regulations and requirements (Clauses 3.3.6, 3.3.7, 3.3.8 & 3.3.9)		✓	
Provision of Services to permit compliance with the Code of Construction Practice and with the Construction Proposals from Infraco (Clause 3.3.10)		✓	
Failure to provide the Services in accordance with Good Industry Practice (Clause 3.3.11)		✓	
Ensure Edinburgh Tram Network constructability (Clause 3.3.12)		✓	
Failure to provide the Services in such manner so as not wilfully to detract from the image and reputation of **tie**, TEL, CEC, the Scottish Executive or any project related to performance of the Services (Clause 3.3.3)		✓	
Failure to provide Services in a manner that is not likely to be injurious to persons or property (Clause 3.3.15)		✓	
Failure to use the Key Personnel or persons not approved by **tie** to perform the Services (Clause 3.3.16)		✓	
Ensure that the design maximises construction productivity, minimises disruption to city, safeguards efficiency in obtaining consents, optimises Infraco compliance with Construction Code of Practice and trial running is carried out in accordance with programme and consents (Clause 3.4)		✓	
Failure by TSS Provider to understand the scope and extent of the Services and to satisfy himself that he has sufficient information to enable him to perform the Services (Clause 3.6)		✓	
Reliance by tie on skill and judgement of TSS Provider (Clause 3.7)		✓	
Reliance upon a duty of care in relation to the Services performed by the TSS Provider by other TSS Providers appointed by **tie** in relation to the project (Clause 3.8)		✓	
Accuracy and completeness of Background Information relied on by TSS Provider (Clauses 3.9 & 3.10)		✓	
Failure to liaise with **tie**, its consultants, the Tram Supplier, Infraco, the SDS Provider or the Operator, to facilitate the production by them of information in order that the Services can be progressed according to Programme and properly in accordance with the terms of the Agreement (Clause 3.11)		✓	
Failure to have regard to the budgetary constraints and Programme constraints (Clause 3.13 & 3.14)		✓	
Provision of all labour, goods, materials, services etc required for the Services (Clause 3.16)		✓	
Failure to ensure that materials have not been used specified for use or used in the provision of the Services which are deleterious or contravene relevant BSI standards or European standards, Ove Arup guidance or Good Industry Practice (Clause 3.17)		✓	
Failure to fulfil the responsibilities of a planning supervisor imposed by the CDM Regulations and to obtain and review all information from the designer (Clause 3.18)		✓	

TSS Risk: Performance of the Services	Allocation		
	Public Sector	Private Sector	Shared
Failure to operate a quality assurance system and comply with such system (Clause 4)		✓	
Error or omission in the performance of the Services (Clause 16)		✓	
Unsupervised use of Network Rail services by SDS Provider/Infraco resulting in overspend and delay		✓	
Sufficiency of drawings and specifications for construction.		✓	
Technical due diligence assessment of InfraCo, Tram et al		✓	
Failure to obtain approval and sign-off on all technical aspects of the Edinburgh Tram Network including Approvals, Planning Supervisor, HSE Approvals, Management of Utilities		✓	
Failure to identify that SDS/Infraco does not meet performance standards		✓	
Sufficiency of Independent Verification and Validation Services in order to obtain Licence to Operate		✓	
Failure to deploy additional resources where required by **tie** (Schedule 1)		✓	
Failure to provide **tie** with support to manage disputes and claims (Schedule 1)		✓	
Failure to provide with technical assistance in connection with the Tram Bills (Schedule 1)		✓	
Failure to adequately support **tie** in any procurement activities for the Edinburgh Tram Network (Schedule 1)		✓	
Failure to co-ordinate the comparative technology reviews (Schedule 1)		✓	
Failure to audit the compliance of the Infraco, the Tram Supplier and the Utilities Diversion Contractor with quality assurance plans (Schedule 1)		✓	
Failure to manage development of acceptance criteria and management of testing, trialling and commissioning of Infraco and the Modelling Suite (Schedule 1)		✓	
Failure to manage the Topics Register (Schedule 1)		✓	
Review of payment applications and completion reports (Schedule 1)		✓	
Failure to monitor production of training plans and manuals (Schedule 1)		✓	
Development of safety management procedure and obligation for managing safety (Schedule 1)		✓	
Development of System Acceptance Criteria (Schedule 1)		✓	
Development of ticketing management and information system (Schedule 1)		✓	
Management of environmental compliance (Schedule 1)		✓	
Management of objections, land acquisition compensation and undertakings (Schedule 1)		✓	
Development and management of the Project Cost Plan (Schedule 1)		✓	
Management of change control process (Schedule 1)		✓	
Monitoring of Operator and Infraco with regard to agreed KPIs		✓	
Review of adequacy of project risk management plan, assumptions register, project risk register, scheme design, cost and programme contingency report, design construction risk report and design operation risk report (Schedule 1)		✓	
Monitoring of obtaining of Consents and provision of additional resource to CEC as required (Schedule 1)		✓	
Review and co-ordination of SDS Provider's design, technical specifications, proposals for surveys and Deliverables (Schedule 1)		✓	
Audit of System Integration Plan (Schedule 1)		✓	
Management of heavy rail interface (Schedule 1)		✓	

TSS Risk: Progress	**Allocation**		
	Public Sector	Private Sector	Shared
Failure to progress the Services efficiently and without delay in accordance with the Master Project Programme (Clause 5.1.1)		✓	
Failure to update and amend the Master Project Programme having obtained **tie**'s prior approval to do so (Clause 5.1.2)		✓	
Failure to mitigate delay on **tie**'s instructions where the delay results from TSS Provider's fault (Clause 5.3.3)		✓	
Delay as result of TSS Provider's breach, negligence, wilful act or omission (Clause 5.4)		✓	
Delay as a result of any reason outwith the control of the TSS Provider other than breach, negligence, wilful act, or omission (Clause 5.4)[9]	✓		
Delay in the provision of essential information/decision from **tie** to the TSS Provider (Clause 5.5)[10]	✓		
Failure of TSS Provider to fully describe and evaluate to **tie** any foreseeable consequential effect of the application of any recommendation to **tie** at the time of making the recommendation requiring the decision and agreement of **tie** to proceed (Clause 5.5.4)		✓	
Abortive work for any reason other than a fault of the TSS Provider and/or breach by the TSS Provider (Clause 5.6)[11]	✓		

TSS Risk : Key Personnel, Staff and Sub-Contracting	**Allocation**		
	Public Sector	Private Sector	Shared
Failure to have a sufficient number of staff for the provision of the Services (Clause 6.1.2)		✓	
Failure to make Key Personnel available for meetings in Edinburgh as directed by **tie** (Clause 6.2.2)		✓	
Changes in TSS Provider's Key Personnel and continuity of staff (Clause 6.3 and 6.4))		✓	
Key Personnel to have appropriate level of skill, experience, authority, training and supervision for the Services (Clause 6.5)		✓	
TSS Provider contracts with or retains as an adviser or consultant any person employed or previously employed by **tie** without **tie**'s prior approval (Clause 6.7)		✓	
Objection to and removal from the Services any person employed by the TSS Provider who misconducts himself or is incompetent or negligent (Clauses 6.8 &6.9)		✓	
Compliance with regulations and instructions from **tie's** representative (6.10)		✓	
TSS Provider sub-lets part of the Services to a third party without **tie**'s consent (Clause 7.2)		✓	
Performance of sub-contractors (Clause 7.4)		✓	
TSS Provider fails to procure the execution of a collateral warranty within 14 days of a request from **tie** by any TSS Provider Party in favour of **tie** or such other party as may be reasonably required by **tie** and in a form reasonably acceptable to **tie** (Clause 7.5)		✓	
Acting upon an unauthorised variation of the tie Representative (Clause 8.5.2)		✓	

[9] Allowing an extension of the Programme is at **tie**'s discretion.
[10] TSS Provider required to provide full supporting information to **tie**, including the date by which information/decision is required in order to avoid delay in continuity of the Services.
[11] **tie** and TSS Provider to jointly investigate the nature and extent of any abortive work. Abortive work to be determined as a variation in terms of Clause 13.

TSS Risk : Payment	**Allocation**		
	Public Sector	Private Sector	Shared
Failure by **tie** to issue a notice disputing a VAT invoice within the time limits set in the contract (Clause 10.3 & 10.5)	✓		
Submission of invoice more than 3 months late (Clause 10.8)		✓	
TSS Provider has under estimated the fixed lump sum prices		✓	
Adjustment in rates (unless programme has extended beyond that which was originally anticipated)		✓	
Changes in fixed lump sums or capped sum where the start of the Services has been delayed by more than 12 months of the programme priced in the Formal Offer and such delay is not as a result of the TSS Provider's breach, wilful act or omission or negligence (Clause 10.9)[12]	✓		
Failure to make payments to TSS Provider within 30 days of receipt of a valid VAT invoice/ Interest on late payment (Clause 10.11)	✓		
Failure to issue notice of intention to withhold payment regarding exercise of set -off at least 3 days before the final date for payment to the TSS Provider (Clause 11.2)	✓		
Failure to produce documents or provide information relevant to the Services to **tie's** auditors (Clause 12.1)		✓	
Failure to maintain proper books, accounts and records relating to the Services (Clause 12.2)		✓	

TSS Risk : tie Changes and Changes in Law	**Allocation**		
	Public Sector	Private Sector	Shared
Execution of a **tie** Change resulting in additional costs and impact on programme (Clause 13)	✓		
Failure to deliver estimate within 18 days of receipt of a **tie** Notice of Change (Clause 13.2)		✓	
Failure to agree issues set out in the Estimate (Clause 13.7)			✓
tie does not have legal power or capacity to require the implementation of a **tie** Change (Clause 13.8)	✓		
Implementation of tie Change is contrary to law, not technically feasible or would adversely affect the TSS Provider's ability to perform the Services or implementation is outwith the competence of the TSS Provider (Clause 13.8.2)	✓		
Failure to confirm in writing an Estimate within 30 days of the contents of the Estimate being agreed (Clause 13.10)	✓		
Non-entitlement to extension of time, payment or relief in respect of **tie** change where requirement for change could have been mitigated by TSS Provider (Clause 13.11)		✓	
Failure to notify **tie** in 10 Business Days that an instruction amounts to a **tie** change (Clauses 13.12, 13.13 & 13.14)		✓	
Specific change in Law (Clause 14)[13]			✓
Non-specific legislative change during design and construction	✓	✓	
Changes in VAT	✓	✓	

[12] This is subject to the agreement of **tie.**

[13] The TSS Provider pays £15,000 of each Specific Change in Law.

Risk : Insurance	Allocation		
	Public Sector	Private Sector	Shared
Failure to procure and maintain Required Insurances (Clause 15.1)		✓	
Required Insurances are not available (Clause 15.5)		✓	
Escalation in insurance premiums well above anticipated rates resulting in cost over-runs		✓	

Risk : Termination	Allocation		
	Public Sector	Private Sector	Shared
Termination as a result of the TSS Provider's breach of any material provision or requirement of the Agreement (TSS Provider default) (Clause 17.1.1)		✓	
Termination as a result of the TSS Provider's breach of a duty of confidentiality (TSS Provider default) (Clause 17.1.2)		✓	
Termination following a written warning that any member of the Key Personnel is incompetent in the opinion of **tie** (TSS Provider default) (Clause 17.1.3)		✓	
Termination resulting from the TSS Provider's conduct which **tie** considers to be incompatible with the performance of the Services and/or wilfully detracts from the image of **tie**, CEC or the SE or any project related to the Services (TSS Provider default) (Clause 17.1.4)		✓	
Termination as a result of any partner/director of the TSS Provider being expelled from or sanctioned by his relevant professional institute thus compromising the performance of the Services (Clause 17.1.5)		✓	
Termination as a result of an Insolvency Event (TSS Provider default) (Clause 17.1.6)		✓	
Termination as a result of failure to resolve a conflict of interest (Clause 17.1.7)		✓	
Termination as a result of a change in legal status in the TSS Provider or a Change in Control which is materially prejudicial to the performance of the Services (Clause 17.8)		✓	
Termination or suspension of Services by **tie** where TSS Provider is not in default (Clause 18.1)		✓	
Failure to require TSS Provider to resume performance of Services within 12 months of notice of suspension where **tie** wishes the Services to resume (Clause 18.3)	✓		
Termination due to **tie** failing to make a payment of any amount of money that is due and payable by **tie** to the TSS Provider exceeding 25% of the value of the Services to be performed under the Agreement (**tie** Default) (Clause 19.3)	✓		
Termination due to a breach by **tie** of any of its material obligations under the Agreement which substantially frustrates or renders it impossible for the TSS Provider to perform its obligations under the Agreement for a continuous period of 90 days (**tie** Default) (Clause 19.3)	✓		
Failure by TSS Provider to issue a notice to terminate within 30 days of becoming aware of a **tie** Default (Clause 19.1)		✓	
Failure by **tie** to rectify **tie** Default within 60 days of receipt of the termination notice (Clause 19.3)	✓		
Termination due to the commission of a Prohibited Act by the TSS Provider or any of its employees or anyone acting on behalf of the TSS Provider (Clause 20.3)		✓	
Termination due to Force Majeure Event (Clause 21)			✓
Failure by TSS Provider to remedy a Persistent Breach following service of notices under the Agreement of 3 "minor" breaches of the Agreement (Clause 22.2)		✓	
No compensation on termination (Clause 22.5)		✓	
Failure to pay undisputed sums and costs within 30 days of termination or expiry (Clauses 23.2 and 23.7)	✓		
Failure by TSS Provider to mitigate costs, incurred as a result of termination on **tie** Default, termination or suspension of Services by **tie**, or termination by reason of Force Majeure (Clause 23.4)		✓	
Failure by TSS Provider to pay to **tie** any sum due under the Agreement within 30 days of		✓	

Risk : Termination	Allocation		
	Public Sector	Private Sector	Shared
termination (Clauses 23.5 and 23.8)			
Failure by TSS Provider to hand Deliverables to **tie** on termination of the Agreement (Clause 24.4)		✓	

Risk : Indemnities	Allocation		
	Public Sector	Private Sector	Shared
Breach by TSS Provider of any term of the Agreement (Clause 25.1)		✓	
Breach by TSS Provider of any Law (Clause 25.1)		✓	
Negligent or wilful act or omission of the TSS Provider or any of its agents in the performance of the Services (Clause 25.1)		✓	
Indirect losses (Clause 25.4)	✓	✓	

Risk : Dispute Resolution	Allocation		
	Public Sector	Private Sector	Shared
Failure to refer a Dispute within 3 months of the date on which the event or matter or situation giving rise to the Dispute occurred[14] (Schedule 8)	✓	✓	
Failure to observe time limits or timescales provided for within Schedule 8	✓	✓	
Failure to resolve Dispute in accordance with Internal Resolution Procedure (Schedule 8)	✓	✓	
Failure to resolve Dispute using Mediation Procedure (Schedule 8)	✓	✓	
Failure to resolve Dispute using adjudication procedure (Schedule 8)	✓	✓	

Risk : Assignation/Novation	Allocation		
	Public Sector	Private Sector	Shared
tie assigns or novates Agreement (Clause 27.2)		✓	

Risk : Copyright and Intellectual Property	Allocation		
	Public Sector	Private Sector	Shared
Failure to assign Project IPR to **tie** (Clause 30.1)		✓	
Failure to grant licence to use TSS Provider IPR to **tie** (Clause 30.1)		✓	
Consultants fails to execute documents and to carry out acts as may be required in order to vest rights in the Project IPR in **tie** (Clause 30.6)		✓	
TSS Provider uses Project IPR for purposes other than the performance of the Services (Clause 30.8)		✓	
With regard to Deliverables generated or maintained on a computer system, the TSS Provider fails to procure for the benefit of **tie** at no charge or at the lowest reasonable fee, the grant of a sub-licence for any relevant Third Party Software to enable **tie** to use the Deliverables (Clause 30.9)		✓	
Failure to ensure back-up and storage in safe custody of Deliverables (Clause 30.10)		✓	
Third party claim of infringement of IPR in any Deliverables or other materials provided by the TSS Provider to **tie** (Clause 30.11)		✓	

[14] If the relevant party was not aware or could not have been aware with reasonable diligence that the event, matter or situation had occurred, the date of the event, matter or situation shall be taken to be the date the relevant part first became aware, with reasonable diligence of the event, matter or situation.

Risk : Copyright and Intellectual Property	**Allocation**		
	Public Sector	Private Sector	Shared
On termination, the TSS Provider's failure to provide **tie** with the object code of any Third Party Software and the TSS Provider Software, a copy of the source code for the Specially Written Software, a copy of information and data relating the Third Party Software, the Specially Written Software and the TSS Provider Software which is reasonably required by **tie** to operate, manage and support such software (Clause 30.13)		✓	

Risk : Confidential Information	**Allocation**		
	Public Sector	Private Sector	Shared
Unauthorised disclosure of Confidential Information (Clause 30.1)	✓	✓[15]	
Breach of the terms of FOISA (Clause 30.9)[16]	✓		

[15] This is a reciprocal obligation.

[16] **tie** will be responsible ultimately under FOISA but the TSS Provider is contractually required to assist and co-operate with **tie** to enable **tie** to comply with its duty under FOISA.

Appendix H – Summary of Public Sector Risks

Appendix [gamma] - Summary of Public Sector Risk Exposure and Mitigation

Ref	What are the risks during development?	What is their potential consequence?	What is the planned mitigation?
1.	Delays in Parliament	Delays to introduction of other Private Bills. Increased costs to public sector for supporting resources and inflation. Potential need to suspend part of SDS/TSS services. Delays to procurement of Infraco/Vehco. Increased costs to support Parliament from advisors including Operator. Operational system may not be deliverable by end of 2009.	Develop a project programme that includes timings of committee meetings. Submit robust documentation to support Bill including evidence. Resource adequately to implement stakeholder management protocol with categorisation and prioritisation of objections. Regularly review progress and programme with PBU. Nominate 'lead consultant' to co-ordinate witness and evidence with supporting review from QC. Review implications to programme for any proposed Bill amendments.
2.	Changes required by CEC/**tie**	Increased costs and delays to programme to current base costs from SDS and others. Lack of challenge to proposed changes including assessment of impacts. Increased management costs to monitor from **tie** and TSS. Claim for extension and extra costs by SDS. Lack of confidence of design stability from Infraco. Changes may be unacceptable to Operator.	Include contractual provisions to address mechanics and cost allocation for changes introduced during contract implementation. Ensure adequate budget contingency is set aside for each contract for internal management of change. Develop a clear governance structure and protocols for management of change which assess the impacts. Commence early design as soon as possible.
3.	Delays in advance works	Increased costs due to inflationary increases or need to accelerate to meet desired programme. Increased disruption and potential impacts to wider CEC planned schemes. Increased management and supervision costs including TSS. Insufficient information or progress to provide to Infraco reflecting in higher risk premia and	Develop clear procurement and construction implementation strategy that demonstrates the advantages of advance works. Develop project programme and assess the impact to scheme for timing options including advance, during main works and as part of other schemes. Commence advance works as early as possible

Ref	What are the risks during development?	What is their potential consequence?	What is the planned mitigation?
		increases to base costs. Insufficient information to provide survey information to JRC to allow model to be developed. Delays to procurement of Tram and Infraco, with operational system not deliverable by end of 2009.	in order to de-risk the main works. Secure fixed or capped costs for service delivery. Include contingency in delivery programme.
4.	Failure to Novate of SDS and Tram	Increased design related costs to allow Infraco to bring on designer. Delay due to loss of work in progress. Loss of credibility to the scheme. Relationship with Infraco may be compromised. Market may not wish to accept separate Vehco procurement pre-Royal Assent. Sub-optimal service providers and suppliers may be acquired directly by Infraco.	Incentivise novation with release of retention and payment of work in progress for SDS. Allow comment on the proposed contractual arrangements. Undertake market soundings on proposed assemblage of contracts with Tram manufacturers. Monitor progress and willingness of service providers during procurement and design development.
5.	Failure to acquire land	Increased/decreased costs to acquire land through CPO process. Delays to Infraco construction access. Re-sequencing of Infraco & USFA activities leads to claim for additional costs. Increased land, management and advisor costs to accelerate acquisition. Delays to procurement of Infraco with operational system may not be deliverable by end of 2009.	Obtain specialist legal and land/property advice. Prioritise land acquisitions for the critical areas of the scheme. Develop programme and protocols in conjunction with District Valuer and CEC. Develop robust budget for minimised land take including requirements for contractors' areas. Adopt CPO procedures.
6.	Poor project management	Increased costs and delays to programme to current base costs from Infraco and others. Change in personnel. Claims raised by Infraco or USFA. Increased management costs due to supplementing existing team with TSS.	Verify governance and authority levels. Ensure timeous decision making and information supply. Ensure prompt assessment of invoices and payment. Ensure adequate internal resources are applied

Ref	What are the risks during development?	What is their potential consequence?	What is the planned mitigation?
		Poor quality controls to deliverables. Lack of challenge to process. Operational system may not be deliverable by end of 2009.	to project management activities. Ensure activities within team are shared to minimise loss of knowledge in event of loss of personnel. Establish Key Performance Indicators to measure quality and monitor internal cost and progress against baseline budget and programme.

Ref	What are the risks during construction?	What is their potential consequence?	What is the planned mitigation?
7.	Incorrect capital cost estimates	Increased capital costs to those allowed in current base costs and specified contingencies. Increased funding requirement. Delay during review of scope of scheme and value engineering exercises to fit within budget. Reduction in quality of system accepted with subsequent increased maintenance and lifecycle costs. Scheme is stopped with subsequent potential negative PR reaction. Increased management and advisor costs during reassessment of delivery options.	Develop robust cost estimates including allowance for potential optimism bias. Develop detailed cost estimates including benchmarking. Carry out thorough risk assessments. Seek market commitment to deliverable packages of work which allocates appropriate risks to private sector. Ensure market attractiveness considered to bring greater competition. Ensure experienced personnel in contract are employed to monitor and challenge cost increases. Monitor market pricing and interrogate basis of pricing pre-award.
8.	Incorrect time estimates	Increased to costs due to acceleration of activities to meet deadlines. Sluggish progress leading to increased project costs. Operational system may not be deliverable by end of 2009.	Establish baseline programme that includes adequate contingency for each workstream to identify the critical path. Identify critical activities including approvals, agreements, Parliamentary process, procurements, advance works et al. Track activities, progress to identify resource

Ref	What are the risks during construction?	What is their potential consequence?	What is the planned mitigation?
			constraints. Define common software platform.
9.	Changes required by CEC/**tie**	Increased costs and delays to programme to current base costs from Infraco and others. Lack of challenge to proposed changes including assessment of impacts. Increased management costs to monitor from **tie** and TSS. Claim for extension and extra costs by Infraco. Lack of confidence of design stability from Infraco. Changes may be unacceptable to Operator. Operational system may not be deliverable by end of 2009.	Include contractual provisions to address mechanics and cost allocation for changes introduced during contract implementation. Ensure adequate budget contingency is set aside for each contract for internal management of change. Develop a clear governance structure and protocols for management of change which assess the impacts. Engage key parties in assessment of proposed changes including Operator. Commence early design as soon as possible.
10.	Poor project management	Increased costs and delays to programme to current base costs from Infraco and others. Change in personnel. Claims raised by Infraco or USFA. Increased management costs due to supplementing existing team with TSS. Poor quality controls to deliverables. Lack of challenge to process. Operational system may not be deliverable by end of 2009.	Verify governance and authority levels Ensure timeous decision making and information supply. Ensure prompt assessment of invoices and payment. Ensure adequate internal resources are applied to project management activities. Ensure activities within team are shared to minimise loss of knowledge in event of loss of personnel. Establish Key Performance Indicators to measure quality and monitor internal cost and progress against baseline budget and programme.
11.	Incorrect choice of tram vehicles	Poor vehicle reliability leads to claim from Operator. Poor image for system leads to reduction in revenue. Inefficiency lead to operating cost increases	Review of performance of other UK vehicles. Seek support from advisors including Operator. Develop a detailed specification. Undertake market soundings with manufacturers.

Ref	What are the risks during construction?	What is their potential consequence?	What is the planned mitigation?
		above current allowance. Cost increases due to modifications to vehicle. Sub-optimal quality system is delivered. Delays to commissioning of system.	Seek to constrain overall system design to ensure that manufacturers' standard products are not excluded from the procurement process. Review procurement options to allow full application of competitive stress. Investigate buying existing designs and consolidate maintenance purchases with another UK system owner.
12.	Weaknesses in contractual interfaces	Increased costs due to mediation with parties with increased legal costs. Claims by affected parties for additional costs exceed current base costs and contingencies. Delay in progress of project until issues resolved. Increased management and advisor costs.	Utilise specialist procurement legal advisors to develop a matrix of contracts based on consistent definitions and structures with review of previous contracts. Undertake market testing through PIN to gain views on risk allocation. Maintain registers of risk allocation for each contract.
13.	Delay in gaining access to land	Delays to Infraco & USFA construction access. Re-sequencing of Infraco activities leads to claim for additional costs. Increased land, management and advisor costs to accelerate acquisition. Delays to detailed surveys and investigations result in potentially abortive work by SDS/Infraco. Delays to activities of Infraco & USFA with operational system may not be deliverable by end of 2009.	Seek to minimise land take within limits of deviation. Develop programme for land and property acquisition allowing time for negotiation and agreements. Assign clear responsibilities for Section 75 and individual areas of land. Obtain support from specialist land and property, compensation, planning and legal advisors.
14.	Force majeure	Lack of clarity of force majeure event e.g. terrorist event leads to dispute. Delays lead to operational system may not be deliverable by end of 2009.	Define those external events that are considered to be force majeure and include appropriate drafting within each proposed Contract. Undertake HAZOP risk assessments.
15.	Termination	Lack of clarity of grounds and protocols for termination leads to dispute.	Define and include appropriate unambiguous drafting for grounds for Termination within each

Ref	What are the risks during construction?	What is their potential consequence?	What is the planned mitigation?
		Negative PR to scheme. Delays lead to operational system may not be deliverable by end of 2009. Claims for loss of earnings by parties. Additional procurement, management and advisor costs. Commercially sensitive information may be released to market by a discontented party.	proposed Contract. Review the potential scope for parent company guarantees, warranties and bonds. Ensure confidentiality agreements are put in place to prevent leakage of confidential knowledge.
16.	Legislatory/regulatory change	Amendment to scheme specification. Increased costs and delays to implement change of law requirements.	Provide clear provisions for change of law in contract. Monitor and discuss potential changes of law, legislation or regulation with regulatory bodies. Review and appraise timing and financial impact of these changes as they arise.
17.	Changes in taxation	Increased costs to implement change in taxation requirements.	Establish strategy for tax implications for Project including the views of financial advisors, Partnerships UK and SE. Agree approach in financial models with Scottish Executive and CEC Finance.
18.	Change in VAT	Increased costs to implement change in VAT requirements.	Establish strategy for VAT implications for Project including the views of financial advisors, Partnerships UK and SE. Agree approach in financial models with Scottish Executive and CEC Finance.
19.	Contractor Default	Potential PR implications to manage. Scrutiny of evaluation and reasons for default. Increased management and procurement costs. Delays lead to operational system may not be deliverable by end of 2009.	Review technical capacity and capabilities of Contractors during procurement process in accordance with EU procurement law. Define and include appropriate unambiguous drafting for grounds for Contractor Default within each proposed Contract. Review the potential scope for parent company guarantees, warranties and bonds. Ensure FOI(S)A compliant confidentiality

Ref	What are the risks during construction?	What is their potential consequence?	What is the planned mitigation?
			agreements are put in place to prevent leakage of confidential knowledge.
20.	Elements become uninsurable	Potential cost increases to place project insurances or significant risk exposure to the private and public sector. Elements of governing operating agreements become unworkable. Increased mitigation costs and checks are required to obviate risks.	Review the scope of insurance provision for the project including strategy for placement including project, owner controlled and contractor placement. Establish potential scope of uninsurable items. Confirm scope of insurances and through best value study and monitor during the project. Seek advice through a specialist insurance advisor. Obtain clarity of insurance limitations and exemptions and pricing from Contractors.

Ref	What are the risks during operations?	What is their potential consequence?	What is the planned mitigation?
21.	Incorrect revenue estimates	Increased advertising and scheme promotion costs. Delay to Line 2 due to lack of confidence of implications of Earl scheme. Loss of public confidence due to further bus/tram integration plan revisions. Compromised operating surplus available to fund operating and lifecycle costs. Operator terminates agreement. Increased costs due to monitoring patronage and amendment to services including yield. Operating subsidy necessary.	Develop robust revenue estimates with an integrated transport model including rigorous risk appraisal, sensitivity analysis on parameters, scenarios including calibration and validation of model. Share risk on 'target revenue' with operator. Review and develop fare strategy in context of overall PT network. Work closely with bus operators to develop integrated service plan early involvement of Operator. Develop the design of the tramway alignment and its relationship with the surrounding highway to improve the tram journey times relative to all other modes. Promote the tram through advertising and minimise fare evasion with reliable ticket

Ref	What are the risks during operations?	What is their potential consequence?	What is the planned mitigation?
			machines and fare evasion teams.
22.	Incorrect operating cost estimates	Increased operating costs to those secured through Operator Agreement. Need for subsidy to generate funding for operations. Delay to opening due to review of scope of costs and value engineering exercises to fit within budget. Reduction in quality of system accepted with subsequent implications to revenue. Scheme suffers negative PR reaction due to subsidy.	Develop robust operating cost estimates including sensitivity analysis with costs not yet secured with Operator. Carry out thorough risk assessments on staffing, insurances, security and power costs. Seek market commitment to deliverable packages of work which allocates appropriate risks to private sector. Ensure market attractiveness considered to bring greater competition. Ensure experienced personnel in contract are employed to monitor and challenge cost increases. Monitor market pricing and interrogate basis of pricing pre-award.
23.	Failure to provide tram priorities	Sub-optimal operating service is delivered. Increased run-time resulting in less efficient system with reduction in revenue.	Carry out an independent review of the assumed junction priorities. Establish CEC opinion and Approval in Principal for junction priorities and potential risk areas that may require review. Develop a robust view of junction modifications with CEC Transport and Planning Authority. Ensure involvement of Operator to assess run-time of trams.
24.	Failure to integrate PT network	Competitive bus stance taken. Loss of potential synergies with bus rail. Loss of public confidence due to compromised public transport service network leading to further bus/tram integration plan revisions. Compromised operating surplus available to fund operating and lifecycle costs for tram. Increased costs due to monitoring patronage and	Develop clear interface points for interchange designs. Hold regular meetings with First ScotRail and Lothian Buses. Develop the project programme for developing the Network Service plan. Achieve Board sign-up to the programme and TEL support to meeting key milestones.

Ref	What are the risks during operations?	What is their potential consequence?	What is the planned mitigation?
		amendment to services including yield. Cross PT network operating subsidy necessary. Increased costs in model development for JRC. Barriers placed in progress of Operator integrated service plan. Challenge by First Group on basis of infraction of Competition Act 1998. Challenge by EU Commission/UK Competition Authority.	Agree the method of evaluating the network including software, development, programme, reporting methods, priorities et al. Review the role of the joint revenue setting committee and their input to this process. Consider the assessment in zones to achieve sectional completion. Ensure that there is a commitment to succeed from Tram Operator, Lothian Buses and First ScotRail. Service Integration achieved through TEL in legally compliant and inclusive process.
25.	Force majeure	Lack of clarity of force majeure event e.g. terrorist event leads to dispute. Suspension of operational system leads to loss of revenue.	Define those external events that are considered to be force majeure and include appropriate drafting within each proposed Contract. Undertake HAZOP risk assessments.
26.	Termination	Lack of clarity of grounds and protocols for termination leads to dispute. Negative PR to scheme. Suspension of operational system leads to a loss of revenue. Claims for loss of earnings by parties. Additional procurement, management and advisor costs. Commercially sensitive information may be released to market by a discontented party.	Define and include appropriate unambiguous drafting for grounds for Termination within each proposed Contract. Review the potential scope for parent company guarantees, warranties and bonds. Ensure FOI(S)A compliant confidentiality agreements are put in place to prevent leakage of confidential knowledge. Ensure low cost for termination.
27.	Legislatory/regulatory change	Amendment to scheme necessary resulting in increased capital investment. Increased costs and delays to implement change of law requirements.	Provide clear provisions for change of law in contract. Monitor and discuss potential changes of law, legislation or regulation with regulatory bodies. Review and appraise timing and financial impact of these changes as they arise.

Ref	What are the risks during operations?	What is their potential consequence?	What is the planned mitigation?
28.	Changes in taxation	Increased costs to implement change in taxation requirements.	Establish strategy for tax implications for Operating Service including the views of financial advisors, Partnerships UK and SE. Agree approach in financial models with Scottish Executive and CEC Finance.
29.	Change in VAT	Increased costs to implement change in VAT requirements.	Establish strategy for VAT implications for Operating Service including the views of financial advisors, Partnerships UK and SE. Agree approach in financial models with Scottish Executive and CEC Finance.
30.	Incorrect estimate of maintenance costs	Increased routine, planned and reactive maintenance costs to those currently allowed for in business case. Need for subsidy to generate funding for maintenance. Compromised maintenance leading to increased lifecycle costs. Delay to opening due to review of scope of costs and value engineering exercises to fit within budget. Reduction in quality and reliability of system accepted with subsequent implications to revenue. Scheme suffers negative PR reaction due to subsidy or quality.	Obtain robust maintenance cost estimates from technical advisors including sensitivity testing. Review basis of maintenance costs and assumptions. Ensure procured with competitive stress to market. Confirm life-cycle basis for level of maintenance to be carried out. Assess the potential to transfer higher or lower risks to InfraCo/Operator and separate maintenance agreements over alternative durations. Review the potential for withholding payment as retention pending remedial works. Review option for Operator to carry out the maintenance and assess if they can offer better value for money than InfraCo.
31.	Incorrect estimate of lifecycle costs	Increased lifecycle costs to those currently allowed for in business case. Need for subsidy to generate funding for lifecycle replacement. Delay to opening due to review of scope of costs and value engineering exercises to fit within	Obtain robust lifecycle cost estimates from technical advisors including sensitivity testing. Review basis of lifecycle costs and assumptions. Ensure procured with competitive stress to market.

Ref	What are the risks during operations?	What is their potential consequence?	What is the planned mitigation?
		budget. Reduction in quality and reliability of system accepted with subsequent implications to revenue. Scheme suffers negative PR reaction due to subsidy or quality. Reduced residual value.	Confirm maintenance basis for frequency/scale of replacements to be carried out. Assess the potential to transfer higher or lower risks to InfraCo/Operator and separate lifecycle replacement agreements over alternative durations. Review option for Operator to carry out the replacements and assess if they can offer better value for money than InfraCo.
32.	Operator Default	Potential PR implications to manage. Scrutiny of evaluation and reasons for default. Increased management and procurement costs. Delays lead to operational system not being deliverable by end of 2009.	Review technical capacity and capabilities of Operator during procurement process in accordance with EU procurement law – undertaken. Define and include appropriate unambiguous drafting for grounds for Contractor Default within each proposed Contract - undertaken. Review the potential scope for parent company guarantees, warranties and bonds - undertaken. Ensure confidentiality agreements are put in place to prevent leakage of confidential knowledge - undertaken.
33.	Failure to upgrade to new technology resulting in obsolescence	Public perception of city compromised. Opportunities for cost savings or increased revenues which could be driven from emerging innovative technical solutions are lost. System becomes redundant shortly after design-life. Reduced residual value.	Define the system specification. Monitor emerging market technologies, performance and reliability. Review and appraise timing and financial impact of these changes as they arise. Consider the view's of the Operator regarding alternative technologies. Consider benefits of alternative technologies during lifecycle replacements.
34.	Elements become uninsurable	Potential cost increases to place project insurances or significant risk exposure to the	Review the scope of insurance provision for the project including strategy for placement

Ref	What are the risks during operations?	What is their potential consequence?	What is the planned mitigation?
		private and public sector. Elements of governing operating agreements become unworkable. Increased mitigation costs and checks are required to obviate risks.	including project, owner controlled and Operator placement. Establish potential scope of uninsurable items. Confirm scope of insurances and through best value study and monitor during the project. Seek advice through a specialist insurance advisor and review annually. Obtain clarity of insurance limitations and exemptions and pricing from Operational Service Providers.

Appendix I - Working Note from Scottish Executive FPU on PPP Support Funding

ANNEX A

PPP support funding - potential options for application of Transport Department Budget funding (£375m) assuming PPP option progressed.

Scottish Executive financial support of PPP projects is always for the capital elements of projects. The cost of inflation on borrowing is caught within the borrowing swap rate, while meeting the cost of inflation on capital has always been the responsibility of the public sector procurer. The typical means of calculating potential PPP funding support will therefore result in a smoothed payment, rather than a sum subject to indexation.

Accordingly, calculation of the support for a project of capital value £375m should use the format of existing Revenue Support Grant (RSG) calculations, using payments on an annuity basis with a discount rate of 6.3% (this figure is the current PFI credit rate in England and has been approved for use in Scotland). i.e. apply the methodology used in the IOBC but adjust the support rate. Note, from the IOBC, it is not clear what assumption were used in respect of lifecycle in respect of the support calculation. Given the profile / mix of lifecycle in a light rail project is different from Schools (which is what the RSG regime is covering) and given the intention of the original lump sum funding to meet upfront capital costs, please run the base calculations with no lifecycle deemed as eligible in the calculation. The FPU are happy to discuss this assumption.

The possibility has been discussed of using some of the £375m funding early in the project to pay off a proportion of the debt. Transport Department need to consider this and decide on their view. There are potentially two variants from a standard PPP here.

1	Block Payments	Use entire £375m as block payment contributions (on a staged completion basis) at end of construction period(s). Remaining elements project procured and paid for as by PPP, assuming no central support for the PPP charge (as SE funding has been injected entirely up front).
2	Part Block Payments	As above, but only paying a proportion of £375m at the start; the remainder would be spread over the contract life.

If Transport Department were provisionally agreeable to either of these variants, sensitivity analysis would be required to identify the optimum position between the extremes of the standard PPP and variant 1.

As already stressed, further affordability analysis should be carried out on all options to assess how much of a contribution would be required from tie/CEC.

Note

i) The scenarios above assume that two lines are being procured. We would expect that the timing of receipt of SE funding could be adjusted to cater for phased payments if the two lines come on stream at different times.
ii) tie have to confirm the proposed contract length and associated duration of support (not expected to be greater than 30 years) .
iii) The £375m funding total would be reduced, where applicable, for pre-released sums (e.g. £22m advance works, etc.)
iv) Level Playing Field Support (LPFS) is no longer applicable, and is therefore referred to as Revenue Support Grant (RSG).

v) tie should consider any variation assuming, for example, prudential funding (potentially applied to variants 1 or 2).
vi) All funding scenarios are subject to confirmation of SE funding and that there will not be an impact on the SE balance sheet.

ANNEX B

Assessment of PPP feasibility within IOBC

A thorough comparison of PPP against conventional procurement is required, with strong justification of PPP if this is to proceed. This should be demonstrably better than conventional procurement on grounds of value for money (VfM). We note that you have used the new Scottish VfM guidance (in draft form) in the IOBC. This should be reproduced / updated in the resubmitted IOBC, and the guidance should frame the above VfM calculations.

The traditional comparison of Public Sector Comparator (PSC) and PPP shadow bid will not suffice. A more detailed comparison should be made covering the differences in approach and treatment of areas such as:

- value for money
- efficiency of delivery
- risk allocation
- project management
- programme.

Whatever procurement and financing structure is proposed, the OBC should make clear the role and timing of staged project reviews (such as the Key Stage Review or Gateway process). The decision-making process within tie should be made clear, describing the relationships and hierarchies between SE, tie, CEC and TEL.

Details should also be given covering the proposed balance sheet status, and the impact of "bullet" capital injections into the project funding at an early stage. These funding projections should tie in with the guidelines produced by FPU on creating projections of revenue support funding (see Annex A).

The projected funding streams should allow a discussion on the affordability of the project. Sensitivity analyses and indifference point analysis should be provided outlining the impact of different cost and risk scenarios and variations in interest rate and / inflation rate.

Benefits of different timing of delivery and the impact of different project scale should be detailed. Decision-making process should be made clear, but also proposals for project management (during procurement and operation).

APPENDIX J – Tram Team Organisation Chart

Appendix K – Tram Project Programme

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