patronage and revenue generation. Therefore, TEL must balance opportunities for cost savings against the impact this may have on the quality of services provided.

9.81 Operating cost projections have been developed for TEL's bus and tram operations based on current experience and benchmarked against other schemes. The primary driver for these estimates has been the capacity required to meet demand, based on the patronage growth projected by the JRC modelling. An iterative review process has allowed TEL to take an overarching view of the projections, avoiding cost duplications in the operational set-up and a number of opportunities for synergies have been identified. The resulting cost projections are a reflection of the integrated system which TEL will operate, and an attempt has been made to merge activities where possible. Areas where significant synergies may be further explored include administration, marketing, cash collection and security, as well as other back office functions.

9.82 The majority of tram operating costs have been estimated by Transdev, based on the cost model prepared for the DPOFA contract. Key operating costs outside the scope of that model, which must paid by TEL, include electricity, insurance and marketing costs. All of the estimates have undergone an iterative process of evaluation, involving input from TEL, and are benchmarked against other schemes to gain a high degree of confidence in their reasonableness. Tram operating costs include an element of regular, annual maintenance of the trams and the infrastructure. The updated information received from the bidders confirms the costs included in the cost estimates for this are conservative.

9.83 Bus operating costs projections are based on LB experience and take into account the requirements of the service integration plan for the introduction of tram, from which reductions in bus services are assumed to flow. Bus patronage is a variable in the cost projections that will flex the with the peak number of bus vehicles, operating hours and miles required to meet demand.

9.84 LB management and administration costs are combined with TEL's overheads and reflect the assumption that most of TEL's corporate management activities will be performed by the current LB head office functions.

Human resources, industrial relations and succession planning

9.85 TEL has created an outline human resource strategy to maintain and develop the bus operating division, to meet the resource requirements of TEL itself and to develop the tram operating division in partnership with Transdev.

9.86 The recruitment plan and terms and conditions are one of the primary drivers of the labour cost contained within the individual tram and bus operating costs. Maintaining and developing good industrial relations is essential to ensure the ongoing success of the TEL business. The TEL Business Plan assumes that recruitment within the bus division can be readily scaled down prior to the introduction of the tram, so that natural staff turn-over will result in appropriate staffing levels.

9.87 The human resources (HR) strategy has further identified a number of areas where inclusion in common training of tram staff with bus staff would be beneficial, from an integration perspective, as well as offering opportunities to secure cost savings.

Safety management and quality assurance

9.88 TEL will implement a SMS to assume its duties in relation to health and safety requirements as the majority owner of LB, and to monitor the health and safety and quality management of the tram operator, Transdev. TEL's responsibilities, with respect to monitoring health and safety management the tram and infrastructure maintenance providers, will depend upon on the final contractual arrangements with those entities, but it is anticipated that the tramway

operator will play a pivotal role in determining the safety of the tramway system at all times during the operational phase.

Risk and insurance provision

9.89 Appropriate risk allocation is fundamental to achieving value for money for the tram system. As part of the risk management approach developed by **tie** during the design, construction and commissioning phases of the Tram Project, risks are being allocated to the parties best placed to manage and / or bear them and can be used as a basis to incentivise the private sector to help ensure that CEC's objectives for tram and TEL are met.

9.90 The risk analysis has considered the historical risks affecting light rail schemes, as identified in industry best practice and government guidance. A comprehensive risk management strategy has been developed by **tie**, which will be carried forward during the project phases and into commencement of operations of tram. The aim is to combine approaches to risk analysis and management for the tram and LB, providing TEL with a sound foundation from which to assess and, where possible, mitigate risks to the business.

Capital assets and investment strategy

9.91 The proposed legal ownership structures for the tram assets are quite distinct from the operational use of these assets in the integrated system. Important drivers for the decision on the optimum ownership arrangements are the direct and indirect tax implications during and post construction of tram for TEL, CEC and **tie**. These are balanced with the legal obligations arising from the creation of the tram assets and the subsequent operational implications. Investigations are currently underway to identify opportunities to minimise future tax burdens, while maintaining operational flexibility. The financial projections in the TEL Business Plan assume that corporation tax will be payable at the prevailing rate on TEL's forecast operating surpluses.

9.92 It is intended that ownership of CEC's majority shareholding in LB will transfer to TEL prior to the commencement of tram operations. Upon the transfer of ownership of LB from CEC, TEL will acquire LB assets which consist primarily of passenger vehicles and properties. All of these are fully utilised in the operations of LB business and the day-to-day management of these assets will remain with LB executive management team.

9.93 The assets created during the construction of the tram will not be legally owned by TEL, but remain in the ownership of CEC, at least initially. This includes all compensation paid in respect of land and properties acquired, as well as the tram vehicles and infrastructure assets. In effect, this means that CEC will hold the assets on their books and account for depreciation according to local authority rules, whereas TEL will account for maintenance expenditure as and when it is incurred as part of its ongoing business. Operational management of the assets will lie with TEL and its contractors. This area is particularly important to achieve an optimal taxation position and is currently under review.

Lifecycle costs and replacement costs

9.94 The capital investment and lifecycle costs provided for in the TEL Business Plan relate primarily to the purchase of new buses to renew and / or expand the existing bus fleet and to the heavy maintenance expenditure on the tram (infrastructure and vehicles) necessary to ensure the tram assets reach the end of their useful lives.

9.95 Based on LB current experience, bus fleet renewals and additions range between £7m - £8m per annum (2006 prices), which represents approximately 10% of total bus costs in any given year. This cost reflects TEL's targets to maintain an average fleet age of six years.

9.96 The projected life of the elements of tram system will vary. Replacement of many of the major elements, including the tram vehicles will be required soon after it has been in operation for

30 years. The TEL Business Plan provides specifically for the expenditure required to achieve the life expectancy of the system over the first 30 years of operation and to ensure the system performs effectively throughout. During this period, regular heavy maintenance and renewals must be implemented and will take place at pre-determined time intervals dictated by the specified performance criteria for the individual elements of the system. These costs are significant and, particularly the half-life refurbishment of tram vehicles after approximately 15 years, will require careful planning to balance cash flow availability with servicing needs.

9.97 The TEL Business Plan does not specifically provide for the major replacement expenditure which will be needed after 30 years, including replacement of the tram vehicles. The options for funding this expenditure will need to be kept under review, in light of the operating surpluses which TEL achieves and in consultation with CEC and TS.

Distribution policy

9.98 CEC currently receives a dividend of c£2m per annum in respect of its 91% shareholding in LB. The TEL Business Plan adopts the payment of this level of dividend by TEL as a continuing requirement in the period beyond the commencement of tram operations when TEL will become the majority shareholder in LB.

9.99 The TEL Business Plan assumes this dividend policy will be applied prudently and that the annual dividend might be reduced or foregone for short periods in response to lower profits or short-term demands on TEL's cash-flows. In such circumstances, the dividends for future periods would be adjusted upwards to ensure the shareholders receive the target dividend on a cumulative basis.

Risks to patronage and revenues

9.100 In consultation with TEL, **tie** and other stakeholders, JRC has carried out a series of tests on the sensitivity of the forecast TEL patronage and revenues to changes in key assumptions. The results are detailed in the Revenue and Risk report (Appendix III) and are summarised below.

Development and economic growth

9.101 The tram is an investment to encourage and facilitate the new development planned in North and West Edinburgh and to stimulate economic growth in the city. However it is important to recognise that the forecast of future TEL patronage and revenues, both for bus and tram, is highly sensitive to the level and timing of new development and the underlying level of economic growth. Two tests for Phase 1a only were carried out as part of the work for the DFBC as follows (Table 9.5):

- **Lower and delayed new development** – New development at Granton is 25% of that in the central case and in other areas, including Leith and Edinburgh Park, is delayed by 5 years; and
- **Lower underlying economic growth –** Long-term background patronage growth is 50% of that reflected in the central case.

Table 9.5 Sensitivity of TEL revenues to development and economic growth (2005 prices).

2005 Prices	2011 Shortfall		2031 Shortfall	
	£m	%	£m	%
Lower and delayed new development				
- Reduction in total TEL revenue	3.1	3%	20.7	13%
- Reduction in revenue uplift due to tram	0.4	16%	4.0	54%
Lower underlying economic growth				
- Reduction in total TEL revenue	7.2	8%	40.0	25%
- Reduction in revenue uplift due to tram	0.6	22%	4.6	61%

9.102 In the event of slower than expected development or a general economic downturn, TEL would plan and implement services to match the reduced demand.

9.103 On the Phase 1a corridor, where there is already a high level of demand, the opportunities to implement revised integrated service patterns for buses and tram, with commensurate savings in operating costs, would significantly mitigate the risk of failure to meet annual operating profit targets.

- Approximately 30% of forecast demand between Leith and Haymarket will be directly dependent on new development; and
- Approximately 50% of forecast demand between Haymarket and the airport will be directly dependent on new development, although there is potential to adjust bus and tram service provision to mitigate shortfalls in demand.

Other risks and sensitivities

9.104 Other sensitivities tested included:

- **Attractiveness of tram to the public** – To realise the incremental revenue and wider economic benefits from the introduction of tram, TEL will strive to meet and exceed targets with regard to travel times and environment, comfort of seating, accessibility and reliability of the tram. These factors represent an opportunity as well as a risk and the analysis shows that tram revenues could be influenced by as much as +/- 10% by relative success or failure to achieve these targets; and
- **Revenue yield** – TEL will have the same opportunity as any other public transport operator to influence its revenues by managing its revenue yield per passenger in a relatively inelastic market. Increasing the target revenue yield per passenger by RPI + 1.5% each year (instead of RPI + 1% used as the base assumption in the revenue forecasts) results in an uplift of £4.3m (3.4%) of total TEL revenue forecast for 2012. However the TEL Business Plan reflects TEL adoption of the fares strategy at 9.50 above.

10. Financial analysis

Background

10.1 Section 3 of this FBC details the analysis which has been carried out to demonstrate that each of Phases 1a and 1b of the tram can deliver significant economic benefits in return for the proposed investment.

10.2 However, it is still necessary to demonstrate the affordability of the Tram Project in the context of existing visible funding and the risks being borne by CEC and TS as the principle funders. Specifically, following the ministerial announcement in mid-2007 to cap government grant funding at a maximum of £500m, the risks of potential cost overruns would have to be borne by CEC. Therefore, consideration is given to what constitutes a prudent level of headroom over the cost estimates, bearing in mind CEC's limited resources, as well as the specific allowances for contingencies already included in these estimates.

10.3 It is also sensible that decision making remains flexible and can consider prospective additional sources of funding and the evolution and confirmation of capital cost estimates.

10.4 The tender processes for the Tramco and Infraco contracts are close to completion and disclosure in this FBC (Version 1) must respect the commercial sensitivity of the tender process. Reference to cost estimates is restricted to totals only and certain other sensitive commercial terms are described in summary terms only. The full detail of the submitted and negotiated bids has been discussed with Council officials and has been subject to the project governance and approvals processes. The cost estimates set out in 10.36 reflect the terms of the recommended preferred bids for the Infraco and Tramco projects.

Cost estimates for Phase 1

Evolution of cost estimates for the project

10.5 The original estimates of capital costs for Line 1, Line 2 and for the full network of Lines 1 and 2 were prepared by **tie**'s technical advisors in 2003 and formed the basis of the submissions to Parliament in 2003. In common with the presentation of costs on other capital projects, these cost estimates were base dated to a particular point in time (second quarter of 2003) and did not include inflation.

10.6 In 2005 the estimates were reassessed and found to be robust for the stage of development of the project. Extensive work was done to support the robustness of the underlying cost estimates, which were predicated on the execution of the Procurement Strategy being followed by **tie**. At that time, the costs were re-presented to include estimated inflation, such that the total reflected the estimated cash which would be spent on the project. The inflated estimates as reported to CEC in January 2006 were:

Line 1 plus line 2	**£715m**
Leith to airport plus Roseburn to Granton (Phase 1)	**£570m**
Leith to airport (Phase 1a)	**£484m**

10.7 These estimates were presented concurrent with the adoption of Phase 1 as the first phase of construction of the tram, as described in section 3. They included contingencies (allowances for risk) at 24%, calculated in accordance with HM Treasury guidelines for considering the impact of 'Optimism Bias (OB) on required funding. The requirement to address OB has arisen from a historical trend of underestimating the cost of public works in the UK. CEC and the Scottish Government (now operating through TS) determined that there should be visible funding in respect of OB when assessing the affordability of Phase 1 of the project.

November 2006 cost estimate

10.8 In November 2006, **tie** and its advisors completed a further detailed review of the cost estimate for the project to reflect the agreed scope of Phase 1, as described in section 5, and to reflect a programme for delivery of Phase 1 into service by mid 2011.

10.9 The 'updated estimate' was reflected in the DFBC, as follows :

Phase 1 in total	**£592m**
Phase 1a only	**£500m**
Phase 1b incremental cost	**£92m**

10.10 The estimated total inflated cost of Phase 1 had increased by approximately 4%, compared to the estimates reported in January 2006, reflecting clarification with regard to scope, progress on design and the inflationary effect of an extension to the target opening date.

10.11 Based on the estimating methodology used, the level of certainty and confidence associated with the updated estimate was considered to be relatively high. Nearly 98% of the costs were estimated based on rates and prices from firm bids received, known rates applied to quantities or based on market rates applied to quantities derived from Preliminary Design. The level of confidence was reinforced by the benchmarking exercises completed and the relatively high allowance for risk included in the estimate, as explained below.

10.12 The updated estimates comprised base costs and an allowance for risk and uncertainty. As part of the project estimate update, the Project Risk Register was updated with cost impacts and risks re-assessed. As explained in section 11, a rigorous quantitative risk analysis (QRA) was then applied to the risk and cost impacts to derive a risk allowance for a very high level of confidence (statistically at a 90% confidence level, meaning that there is a 90% chance that costs will come in below the risk-adjusted level).

10.13 The level of risk allowance, so calculated and included in the estimate at that time, represented 12% of the underlying base cost estimates. This was considered to be a prudent allowance to allow for cost uncertainty at that stage of the project. It reflected the evolution of design and the increasing level of certainty and confidence in the costs of Phase 1 as procurement had progressed through 2006.

10.14 **tie** continued to comply with the HM Treasury recommendations for the estimation of potential OB and had determined, in consultation with TS, that no allowances for OB were required in addition to the 12% risk allowance above.

10.15 The base cost estimate comprised:

- External costs borne under contract with third party contractors and suppliers, the principle elements of which are utility diversions (mostly under MUDFA), the tram vehicles (Tramco), infrastructure works (Infraco) and compensation payments for land; and
- Internal costs including management, supervision, design and legal costs, accommodation and support costs.

The base cost element of the updated estimate was derived using robust management and estimating tools to optimise the certainty of the estimate and to ensure that due allowance was made for all elements of the scope of Phase 1.

10.16 The MUDFA contract was awarded in October 2006. Tender pricing was based upon drawings from the utility companies and Preliminary Design drawings and specifications prepared by SDS. The MUDFA contract was based on re-measurement and the rates, prices and allowances in the contract were used as the basis for the updated estimate.

10.17 Certain utilities works are outwith the scope of the MUDFA contract, including high pressure gas, high voltage electricity and some aspects of telecoms. Price estimates were obtained from the utilities and form the basis of the updated estimate.

10.18 Tenders were received for the tram vehicles (Tramco) in October 2006 and the updated estimate reflected an appraisal of the prices received.

10.19 The system designer (the SDS contractor Parsons Brinckerhoff) had prepared quantified estimates for the infrastructure works (the Infraco contract) and the utilities works based upon their Preliminary Design submission which formed the basis of the Tramco and Infraco ITN's. Cyril Sweett produced independent estimates for both the infrastructure and utilities works. Estimates from both parties were reviewed and reconciled by the TSS consultant (Turner and Townsend).

10.20 Previous cost estimates for the Edinburgh Tram were established on the basis of a "first principles" approach, as well as benchmarking against other comparable tram schemes. This enabled a greater degree of certainty and confidence to be obtained in respect of the infrastructure (Infraco) element of the updated estimate. The tender documents for the Infraco contract were issued in October 2006.

10.21 Land compensation estimates were provided by the DV.

10.22 Internal costs were estimated on the following basis:

- **tie** project management – A project management team structure and management plan was developed for the duration of project, from which a resource schedule was prepared. The cost allowed in the updated estimate was built up by applying known resource rates to this resource schedule. These costs included those relating to the support of Transdev as part of the DPOFA contract;
- Design costs – SDS design costs were included on the basis of the SDS contract sum adjusted for known changes; and
- Legal costs – Procurement costs were largely complete with the exception of those related to the negotiation phase of the Tramco, Infraco and maintenance contracts. Costs to support land acquisition and the TTRO and TRO consent processes were assessed using resourcing plans and rates.

10.23 The Tramco contract cost and MUDFA contract rates were stated at fixed prices at outturn cost levels. The base estimate costs for remaining items were estimated at 2nd Quarter 2006 price levels and were then inflated over the duration of the works at an annualised rate of 5%, with a further 1% allowed for in the calculation of risk allowances given the uncertainty of forecasting future market price levels. This allowance was consistent with the forecasts assessed by the RICS Building Costs Information Services (BCIS) and indices prescribed by TS.

10.24 The approach to the preparation of the November 2006 updated estimate was thorough and rigorous. The following section sets out the most up to date position on all key areas of the project capital cost.

Final cost estimate and recommended preferred bidder terms

10.25 Since November 2006, all of the critical aspects of the project have progressed and revisions made to the cost estimates as necessary. The progress made and the impact on final costs is summarised below.

Design

10.26 Design work has continued to refine the requirements of the utilities, Infraco and Tramco contracts. The utility design work has been used as the utility work has been implemented since summer 2007. During the tender process in 2007, the Infraco and Tramco bidders were provided with details of the emerging designs for the main price-critical items which allowed them to incorporate these in their final bids, as well as to develop proposals for value engineering. Although the final acceptance of the design is subject to bidders' due diligence and final negotiations, the consultative approach taken will have reduced the scope and pricing risks normally included in bid prices under a traditional procurement approach. In overall terms, the design work is being completed within the aggregate allowed for in the November 2006 estimate, plus approved changes.

Utility diversions

10.27 Commencement of physical utility works was delayed following the Scottish Parliamentary elections in May 2007 but the project is working to minimise the consequential additional costs for the MUDFA contractor. However, the project is aiming to minimise the impact on programme and budget by progressing advance works at the Gogar depot, undertaken by AMIS. Utility work commenced in summer 2007 and excellent progress has been made, including diversion work in some of the most critical and high risk parts of the tram route. It is too early to conclude definitively, but no increase in the November 2006 estimate for the utility works is currently believed to be necessary.

Impact of EARL

10.28 As explained in section 4, the tram project financial projections assume no introduction of a rail link to Edinburgh Airport from central Edinburgh (EARL). The most significant impacts of this assumption has been to improve the BCR for the project, as set out in section 4. The effect on capital cost was broadly neutral. Some costs previously allocated to EARL are now required to be absorbed by the tram project. However, cost savings were developed relating to the design, which previously accommodated EARL, offsetting the increased cost allocation. No allowance has been made in this business case for the possible introduction of an interchange with heavy rail at a new station at Gogar, a proposal for which was presented by the Scottish Government in September 2007.

System construction and vehicle contracts

10.29 The contractual structure for the Infraco and Tramco contracts effectively creates one legal relationship, improving risk transfer from the perspective of the Council. The negotiations on the bids submitted during 2007 have resulted in an aggregate capital cost from the recommended preferred bidders, which is in line with the November 2006 estimate.

10.30 The final aggregate cost remains subject to finalising the terms of the contracts in the period to Financial Close. A risk relating to late cost escalation is normal in these circumstances but the extent of the risk is assessed as minimal. The risk is being managed through the creation of detailed deal packages which confirm the principal agreements reached during the competitive tender stages. The resulting draft deal ensures that the Preferred Bidder status has legal standing and commits the bidders to the obligations agreed to during negotiations. Additionally, the main price critical design elements have been incorporated, with provisional allowances for final roads and paving designs.

Value engineering

10.31 In arriving at preferred bids within the cost band described above, substantial effort has gone into the process of value engineering. As part of this process, a thorough analysis was performed to identify and select the best value alternatives for designs, materials, processes, systems and programme without compromising quality or functionality of the resulting system. In close collaboration with SDS and CEC, a significant number potential opportunities has been identified relating to the following categories:

- Buildings;
- Depot;
- Highways;
- Land and property;
- NR;
- OLE;
- Structures;
- Supervisory and communications;
- 3rd party;
- Trackform;
- Traction power;
- Tramstops; and

- Trams.

10.32 The bidders have been fully informed of all opportunities and have put forward a number of initiatives of their own. Their bids reflect those value engineering items which are fully agreed. This has resulted in substantial cost savings and, in value terms, approximately two thirds of the opportunities are either crystallised or expected to be crystallised by the time of Contract Award. It should be understood that the process of value engineering will continue well into the life of the project and that fresh opportunities continue to be identified.

Land

10.33 Nearly all of the land required to construct the tram has now been acquired and the latest valuations provided by the DV for compensation costs are comfortably in line with the November 2006 estimate.

Project management costs

10.34 Project management costs, including management, supervision, design and legal costs, insurance, accommodation and support costs, were thoroughly re-examined and reconfirmed the November 2006 estimate. These costs are estimated based on the detailed PMP and team structure. The composition of these costs has changed from the DFBC, reflecting the success of **tie**'s strategy to enhance its in-house expertise and reduce reliance on external advisors.

Risk

10.35 A risk contingency sum has been retained in the final cost estimate. The level of contingency reflects the reduced risk attaching to project costs, in the light of the further work described above and, in particular, the conclusion of negotiations on the Infraco and Tramco contracts. This allowance provides an uplift of 16% on the future base costs estimates of the project. Added to the balance of the committed funding available for the tram, this allowance provides a headroom of 26% over the future project costs. This is considered a very reasonable allowance for headroom and reflects the fact that CEC carry a greater level of risk as funder of last resort.

Total final cost estimate

10.36 The final cost estimate for Phase 1a is £498.1m compared to £500m in the November 2006 estimate. The following factors should be noted:

10.37 The programme leading to award of Preferred Bidder and Financial Close has been impeded during 2007 by substantial uncertainty about the ultimate delivery of the project arising from the change in Holyrood administration. The final funding arrangements are set out in the next section, but the hiatus in early summer 2007 adversely affected bidder confidence, risk perception and programme, all of which have exerted upward pressure on cost.

10.38 The bidders have confirmed in their bids that there is a cost penalty in a programme which constructs Phases 1a and 1b in sequence rather than simultaneously. As explained in section 10.47 onwards, affordability constraints dictate sequential construction. Accordingly, the bidders have ensured that all fixed costs of construction will be borne by Phase 1a, increasing the cost of that Phase with a consequent potential cost saving in Phase 1b.

10.39 The final cost estimate for Phase 1b is £87.3m, compared to £92m in the November 2006 estimate.

Measuring affordability

Existing funding package

10.40 In January 2006, and in conjunction with the adoption of Phase 1 as the first phase of the project (as detailed in section 3), CEC made an in-principle commitment to make a contribution of £45m towards the capital cost of Phase 1, to be structured in a manner which minimises financial risk. This contribution was re-confirmed in December 2006.

10.41 In early February 2006, Scottish Ministers announced an increase, in line with indexation, of the £375m grant originally offered in March 2003, up to £500m. This sum has been confirmed by TS as the maximum available to the tram project so that that CEC is the funder of last resort.

10.42 The commitment by both parties remains an in-principle commitment subject to approval of this FBC. The terms of the funding are documented in a grant award letter between TS and CEC.

10.43 [The terms of the award letter have not yet been finalised between Transport Scotland and CEC and this will require to be achieved before Financial close.]

OR

10.44 [The principal terms of the award letter are as follows :

10.45 Funding from TS and CEC is for capital expenditure only. All operating and lifecycle costs in relation to the tram will be borne by TEL. This means that CEC in its capacity as sole shareholder of TEL, is explicitly bearing all risks in relation to revenues, operating costs and the long term maintenance of the tram, insofar as these risks are not wholly or partly passed contractually to the private sector.

10.46 CEC must balance its desire to support the project with its fiduciary responsibility and limited resources. Therefore, CEC's contribution, comprises only such amounts as could reasonably be expected to be funded from future tram related development income and receipts, rather than from general funds or from Council Tax. The anticipated sources of such receipts include:

- Land contributions by CEC;
- Anticipated development gains accruing to the Council on Council owned sites in the vicinity of the tram;
- Section 75 planning agreements already negotiated and anticipated future agreements;
- Third party developments around the tram route; and
- Anticipated capital receipts from tram related Council owned sites.

Phased 1a then 1b approach

10.47 The practical effect of the funding arrangements is that TS will contribute £453.2m and CEC will contribute £44.8m to the capital costs of delivery of Phase 1a. Based on these costs, there is £47m of headroom in the committed funding for Phase 1a. Bearing in mind that the capital cost estimate for Phase 1a contains adequate risk contingency at 16% on future costs, Phase 1a, at a cost of £498.1, is affordable. In fact, in context of the committed funding of £545m, the risk allowance of £49m denotes a headroom between base costs estimates and available funding of £95.9m which equals 26% of future costs.

10.48 However, a complete Phase 1, at a cost of £585m, is £40m in excess of the committed funding, with no additional headroom, although including a risk allowance of £9.6m (11% of the incremental expenditure). This also assumes that the balance of grant funding is available for Phase 1b and this will require to be evaluated by all parties in the event that a decision in favour of proceeding with Phase 1b is reached.

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10.49 In considering the affordability equation, there are a number of variables which may increase available funding:

- Examination and execution of opportunities to secure contributions from property developers over and above the levels of contribution which were assessed by CEC as necessary for the delivery of their existing £45m contribution; and
- Further consideration of financing options such as an element of tram vehicle or other asset leasing, prudential borrowing by CEC, borrowing against future cash flows of the integrated tram and bus system and additional capital asset sale receipts generated by CEC.

10.50 Additional funding secured from third party sources increases the funding available to support Phase 1b. Additional funding which requires borrowing (or equivalent mechanisms) will require careful cost:benefit evaluation. The means to assess and secure additional funding are under review.

10.51 As a response to the affordability constraints described above, the programme at section 12 assumes that a phased approach is adopted such that construction of Phase 1a proceeds with a target opening date of first quarter 2011. The construction of Phase 1b, if approved, would commence in mid 2009 with a target opening of Phase 1b in Quarter 2012.

10.52 The principal advantages of adopting the phased approach are:

- Phase 1 is maintained as the preferred first phase of the tram as supported by the tests of economic viability in section 4 and financial viability in section 9. The economic benefits to be derived from Phase 1 are diluted by the adoption of the phased approach. However,

Phase 1a is economically viable in its own right and carries greater certainty of financial viability;

- If approved, the construction of Phase 1a as the 'spine' of Phase 1 can commence immediately, as it is comfortably within the affordability envelope of £545m;
- Phase 1a will be delivered into operation earlier – by first quarter 2011 – and with greater certainty;
- It reflects a prudent, risk-controlled approach to managing the financial impact on TEL if the scale of development assumed for Granton, in particular, does not materialise in the timescales currently envisaged. In addition, this approach would provide TEL with an increased focus on the integration of Phase 1a with the bus services in advance of integrating Phase 1b; and
- Decisions regarding the timing of commitment to Phase 1b can be made with the benefit of greater clarity with respect to the funding variables which still exist, as explained above. In addition, there would be significant construction progress on Phase 1a providing greater capital cost certainty for that phase and, therefore, the whole of Phase 1

10.53 The contractual terms agreed with the recommended preferred bidder accommodate the phased approach. Fixed prices have been agreed for Phase 1a and an option arrangement has been negotiated which will allow the Council to commit to Phase 1b by March 2009 for commencement of construction in July 2009.

10.54 The phased approach does have drawbacks. The redevelopment at Granton, which is facilitated by Phase 1b, is very likely to be delayed as a result of a later introduction of the improved transport infrastructure, which is required to encourage and serve the new development. The wider economic benefits which can be delivered by Phase 1b, as detailed in section 4, would be realised later, even if they not significantly reduce in total but would be realised later.

10.55 In addition to the economic impact of the phased approach, a delay to commit to Phase 1b means economies of scale are lost. Some of that risk is addressed in the option negotiated as part of the Infraco and Tramco contracts. However, the later the decision is left outstanding, the greater the potential cost impact on Phase 1b. Nevertheless, in the given circumstances, the phased approach represents a prudent approach to a large and complex project, delivering the benefits from Phase 1a (airport to Leith) and leaving the option to extend to Granton fully under the control of the Council.

Application of available funding

Expenditure profiles

10.56 Payment for capital costs will be made by **tie**, in accordance with principles of the contractual payment mechanisms for each contract as detailed in section 7. Table 10.1 presents **tie**'s current best estimate of the profile by which expenditure will be incurred based upon a phased approach to the implementation of Phase 1a (opening at the start of 2011), followed by Phase 1b (construction starting in 2009 and opening at the end of 2011). The programme is detailed at section 11.

Table 10.1 – Estimated capital expenditure profile (fully inflated)

Estimated capital expenditure [1]	**Phase 1a**	**Phase 1**
Cumulative expenditure to March 2007	£44.2m	£45.2m
April 2007 to – Financial Close	£84.8m	£86.5m
Cumulative up to award of Tramco and Infraco	**£129.0m**	**£131.7m**
To financial year end 2008	**£208.3m**	**£211.0m**
Year to March 2009	£115.1m	£115.1m
Year to March 2010	£125.4m	£135.6m
Year to March 2011	£45.3m	£74.6m
Year to March 2012	£4.0m	£49.0m
Total capital expenditure	**£498.1m**	**£585.3m**

[1] The profile reflect the current understanding of the bidders milestone profile and will be updated following final negotiations on Phase 1b.

10.57 The following should be noted with regard to the expenditure profile outlined above:

- The profile represents incurred and committed expenditure and not cash flow, which will lag behind commitment;
- The cumulative incurred expenditure at any point in time does not include the payments which would be required to extinguish outstanding contractual obligations in the event that the project was cancelled. These costs would include compensation payments to contractors, costs of disposing of any land acquired, redundancies at **tie** and other associated costs of closing down the project; and
- The profile for Phase 1a does not include the expenditure incurred on design development for Phase 1b of approximately £3m. This expenditure was incurred in the years 06/07 and 07/08 in line with approvals from the two funders, TS and CEC.

Lifecycle costs and funding of major renewals

10.58 As detailed in section 9, TEL (and therefore CEC) will assume responsibility for paying for the regular heavy maintenance and renewals in respect of the tram vehicles and infrastructure during the first 30 years of operation. These costs will be incurred at pre-determined time intervals dictated by the specified performance criteria for the individual elements of the system and will include the half-life refurbishment of tram vehicles after approximately 15 years. The nature of this expenditure is to protect the investment by TS and CEC by ensuring the tram assets reach the end of their useful lives and that the tram system will operate effectively throughout.

10.59 The TEL Business Plan does not specifically provide for the major replacement expenditure which will be required after 30 years, including replacement of the tram vehicles, and the options for funding this expenditure will need to be kept under review, in light of the operating surpluses which TEL achieves and in consultation with CEC and TS.

11. Risk Management

Introduction and background

11.1 Appropriate risk allocation is fundamental to achieving value for money for the tram system. Risks are being allocated to the parties best placed to manage and / or bear them, allowing significant risk transfer to the private sector while maintaining scheme affordability. The purpose of this section of the FBC is to address the following aspects of risk analysis:

- Types of risk that needed to be considered from development to residual value for the tram system;
- Extent of identification, analysis and management of risk undertaken;
- Effect of **tie**'s procurement strategy and risk allocation achieved; and
- Overall contingencies and their consideration in the cost estimates for the tram project.

11.2 **tie**'s approach to developing the tram project has been heavily focused on the identification and management of risk. The methodology applied to the risk analysis is set out in more detail below. **tie** have maintained a full register of risks identified in respect of the project throughout its development. This section outlines the development, assessment and current status of risks related to the project and the risk allocation between the public and private sector. The risks affecting the economic case had been examined and reported on within the updated STAG2 appraisal submitted as part the DFBC.

11.3 **tie** has developed a sophisticated approach to risk management. Central to this has been the appointment of a Risk Manager, and the establishment of a comprehensive risk management process including both a highly detailed risk matrix for the overall project, and detailed risk matrices for the individual contracts within the procurement strategy. These risk matrices were used effectively to influence the development of the procurement strategy and they underpinned the contract negotiations with the Infraco and Tramco providers as detailed in section 7.

11.4 The background to risk analysis in terms of historical risks affecting light rail schemes has been identified in various industry reports. Risk analysis for the Edinburgh tram scheme can be traced to the original Feasibility Study published in July 2001 and continues on the project to date. Industry best practice and government guidance from HM Treasury, National Audit Office, Department for Transport, Audit Scotland and the Holyrood Inquiry have been considered by **tie** during the development, to ensure the application of risk management best practice.

11.5 A review by Audit Scotland in summer 2007 confirmed that the procedures in place to actively manage risks associated with the project are sound.

Project risks

11.6 The risks to the scheme have been allocated to the following four principal risk categories.

- **Development risk**: design and development, scheme approvals and procurement of all scheme components and activities to be concluded prior to commencement of construction of the network;
- **Construction risk**: advance works including utility diversion, main infrastructure construction and integration, project management and commissioning related risks and trial running;
- **Performance risk**: standards, defects and delays related risks occurring during and post-construction; and
- **Operation risk**: repair and replacement risks impacting the scheme during operation of the system (outwith DPOFA Operator risks).

11.7 Many of the Development and Construction risks are now either crystallized, superseded or effectively mitigated, through management action or transfer to the private sector. They are retained in this section to provide a clear audit trail from the DFBC and as evidence of the

comprehensive approach to risk management taken by the project. The key project risk areas are detailed in Table 11.1 below.

Table 11.1 – Key risks relating to tram project

Development risk	Construction risk	Performance risk	Operation risk
• Failure to acquire land. • Delays in obtaining Temporary Traffic Regulation Orders, Traffic Regulation Orders, Prior Approvals, etc. • Cost and delays due to utility diversions. • Poor contractual interface between infrastructure contractor, vehicle supplier and system integrator. • Incomplete definition of scope to implement the operational tram system. • Failure to design to brief. • Continuing design development. • Delays in advance works . • Changes in design required by the Operator. • Changes in design required by stakeholders. • Insufficient powers. • Low market appetite for procurement approach. • Final acceptance by Infraco bidder of procurement approach (novation). • Staff retention.	• Incorrect cost estimates. • Incorrect time estimates. • Unforeseen ground / site conditions. • Unforeseen ground / site conditions under existing buildings / structures. • Failure to build to design. • Delay in gaining access to the sites. • Responsibility for maintaining on-site security. • Responsibility for maintaining site safety. • Third party claims. • Compensation events. • Delay. • Force Majeure. • Termination. • Legislative / regulatory change. • Changes in taxation. • Changes in VAT. • Contractor default. • Poor project management. • Contractor / Sub-contractor industrial action. • Adverse weather. • Protestor action. • Changes in inflation during construction. • Incorrect time and cost for commissioning new tram.	• Competition. • Latent defects to infrastructure. • Performance of sub-contractors. • Default by sub-contractors. • Industrial action. • Failure of system integration. • Failure to meet performance standards. • Incorrect choice of tram vehicles. • Availability of tram infrastructure. • Relief events. • Force Majeure. • Termination. • Failure to upgrade to new technology resulting in obsolescence. • Poor Publicity.	• Legislative / regulatory change. • Changes in taxation. • Changes in VAT. • Incorrect estimate of maintenance costs. • Incorrect estimate of lifecycle costs. • Residual value. • Service integration. • Wage inflation. • Quality of equipment. • Accidents. • Vandalism. • Terrorism. • Major incidents. • Poor publicity.

Impacts of Project Risks

11.8 The risks identified in each of the four principal risk areas have been categorised as to their primary impact as set out in table 11.2.

Table 11.2 – Categorised impact of project risks

	Capital costs	Operating costs	Revenue	Programme	Quality	Functionality	Approvability
Development Risk	✓	✓	✓	✓	✓	✓	✓
Construction Risk	✓		✓	✓	✓		✓
Performance Risk	✓	✓	✓	✓	✓	✓	
Operations Risk	✓	✓	✓	✓			✓

11.9 **tie** have assessed the multiple primary and secondary impacts of the identified project risk register entries. Although the impact of each risk is being assessed against these impact areas, it is considered that the primary potential impacts for consideration are in relation to capital expenditure, operating expenses and profit and achieving delivery programme. Each of the identified risks is allocated to the most appropriate Functional or Project Manager in the tram delivery team who have the responsibility for developing and implementing a risk mitigation strategy.

11.10 The risk allocation between **tie** and Infraco and Tramco is defined by the contract agreements. These provide for significant risk transfer to the private sector and are summarised below.

Overall Project Risks

11.11 In the DFBC, **tie** recognised a number of overall project risks that required to be considered. These included the project affordability, approvability and market appetite, any of which could have led to suspension, curtailment or significant delays being imposed. **tie** mitigated these risks through development of robust cost estimates and adopting a plan to phase the introduction of the tram. Additionally, through application of the Procurement Strategy, the risk relating to market appetite was mitigated. The positive market feedback at the tender stage and the competitive bid process that resulted in the selection of the preferred Infraco and Tramco contractor, affirms the success of the mitigation strategy. The risk of project affordability is addressed as part of the Financial Analysis in section 10.

11.12 **tie** have significantly mitigated risks affecting the quality of the scheme through regular consultation with the CEC as the Planning Authority. The potential of delay and cost increases due to planning requirements have been actively managed during the Preliminary Design and Detailed Design phases of the SDS contract. An integrated team approach involving experts from **tie**, SDS and CEC continues to mitigates design related risks in obtaining Prior Approvals. **tie** and CEC have further mitigated the quality risk through the development of a Tram Design Manual that identifies principles of the tram system design, provides supporting design guidance and states the design requirements for the main components of the tram vehicles and infrastructure. These have been incorporated in the project scope (section 5), which sets out the specification for the tram system, which in turn inform the ERs for the Infraco and Tramco contracts. The Infraco bidder will undertake a due diligence exercise on the SDS designs and tram designs as part of the procurement process. Finally, **tie** is supported by the TSS contractor and other specialist personnel who undertake reviews on behalf of **tie** to ensure that SDS and the Infraco will comply with project specifications and performance requirements. This provides a significant risk mitigation role.

11.13 Service integration risk is significantly mitigated by the delivery of a TEL Business Plan. TEL and **tie** continue to consider the influence of other transport initiatives. The risks arising from the following factors are being managed throughout construction period:

- Waverley and Haymarket Station developments;
- Inclusion of other transport schemes;
- Ticket integration; and
- Future phases and potential future expansion of the tram system.

11.14 A number of key areas with potential to delay the project programme (with consequential cost impact) have been identified. The following bullet points outline the risks identified at the DFBC stage and beyond and sets out their current status and mitigating actions:

- Lack of political will to implement the scheme: is being mitigated through intensive communication of the benefits of the scheme to politicians and intensive stakeholder engagement. In addition, a well managed publicity campaign under the slogan "Trams for Edinburgh" is ongoing to generate public anticipation for the scheme;
- Failure of **tie** to deliver required resource plan leads to missed project milestones: This has been mitigated by securing key resources with knowledge and experience of delivering similar projects;
- Competing local and national projects for resources: The project team has been successfully resourced during the development through to the current phase. **tie** now has the support of a highly experienced Human Resources Director who is implementing a strategy to secure the necessary resources to manage construction. The resource deployment proposed by contractors has been closely scrutinised during the tendering process and **tie** will continue to monitor the implications of market activity;
- Possibility of delays in funding availability or of an unexpected affordability concern: The DFBC mitigated this risk through robust financial modelling and continuing communication with the funders, CEC and TS. Additional mitigation was applied by benchmarking the capital cost estimates for Phase 1 of the project against other tram schemes. At this stage, the risk of funding availability is mitigated by the terms of the funding agreement between CEC and TS. This is supported by internal funding draw-down process which is based on the Infraco milestone payment schedules and the project's working capital requirements;
- Poor project governance resulting in unclear decision making or poor planning of procurements and project controls leading to cost creep: This has been mitigated by forming a TPB, initially with representation from principal stakeholders – CEC, TS (until 2007) and TEL, together with the development and agreement of project governance arrangements that includes the protocols for approving additional expenditure. These arrangements have been successfully been implemented to date, resulting in a positive statement from Audit Scotland on the robustness of the cost estimates. Following the ministerial announcement in mid-2007, the governance arrangements are under review as set out in section 6. However, no changes are anticipated impacting on the agreed protocols to maintain control over costs, programme and scope;
- Possible consequences of poor communications with TS: These were mitigated through ongoing liaison by project staff at all levels with TS and their representation at the TPB and its sub-committees. Following the announcement, TS withdrew from the formal governance processes (TPB and sub-committees) in favour of a monitoring regime based on regular reporting and meetings with CEC, supported by audit processes and issue of regular compliance certificates in relation to grant award letter terms;
- Lack of market appetite for the scheme: This risk was mitigated through frequent consultation with potential bidders for the Infraco contract and response to their concerns (the MUDFA utilities diversion contract had already been awarded and tenders for Tramco (vehicle supply and maintenance) had been returned and were being assessed). In light of the nomination of Infraco and Tramco Preferred Bidders and anticipated Contract Award in January 2008, this risk is no longer relevant;
- Protracted bidder negotiation: the risk was mitigated by building a significant in-house team of experienced personnel with the ongoing support of advisors. The practical skills necessary to negotiate effectively and avoid delays had been demonstrated through closure of the MUDFA utility diversion contract, the negotiation of improvements to the Tramco tender process and continual enhancement of the Procurement Strategy. The

results of the Infraco and Tramco negotiations will confirm that this risk was successfully mitigated, subject to the acceptance of the SDS novation following due diligence review of the design;

- Infraco tenders are unaffordable, bidders withdraw or bids are late requiring delays to the approval process: Affordability risks were being mitigated at the DFBC stage by developing and updating the estimate of capital costs for Phase 1 of the project with independent validation of the estimate by TSS and benchmarking of costs against those of other comparable tram systems. The revised cost estimates in section 10 now fully incorporate the negotiated prices from the Infraco bidders. As the negotiations are nearing completion, this risk is less significant;
- Uneconomic and / or unrealistic levels of risk transfer to the private sector. At DFBC, the bidders had been consulted in respect of the procurement approach and **tie** has considered the utility of risk premiums compared to the value of risk transfer during the tender evaluation and negotiation phase. Details of the risk transfer to the private sector are achieved are set out below (Section 11.46 onwards);
- SDS deliverables are below the desired quality levels leading to delays to approval of Planning Consents and issue of design information to Infraco bidders: This is mitigated by independent validation of the design, as it emerged, supported the issue of price-sensitive information to the bidders throughout the bid process. Further, the Infraco bidder will perform a due diligence exercise before accepting the SDS design. Therefore, this aspect of the risk is mitigated. However, the risk of delays to approvals of planning consents remains. This is being mitigated through the measures described above;
- Obtaining planning consents: the development of the Tram Design Manual and Construction Code of Practice, in conjunction with CEC Planning, had significantly mitigated this risk. A joint working approach between CEC and **tie** regarding the preparation of the design packages for approval, together with an enhanced review process, was implemented in spring 2007 to further mitigate this risk. However, as the ultimate approval of planning consents remains with the statutory planning function, this concern remains as a risk on the project's risk register;
- Successful commissioning and obtaining a licence to operate the tram: **tie** has examined this risk through the evaluation of Infraco tender returns and ongoing assessment of programme with input from TEL and Transdev. The Infraco milestone payment mechanism and liquidated damages regime incentivises performance in this regard, backed up by escalating scale of liquidated damages;
- Ineffective integrated service patterns for tram and bus: has been significantly mitigated by the testing of planned service patterns through the JRC modelling and by the preparation of the TEL business plan;
- Land and property acquisitions and utility diversion (MUDFA) delays impacting the planned dates for commencement of Infraco activities: Following some delay caused by the political uncertainty about the delivery of the project after council and parliamentary elections in Spring 2007, the land and property acquisitions commenced with the issue of GVD notices in April 2007. The programme of acquisitions is now almost complete and no issues have arisen to prevent Infraco to commence on programme. MUDFA works commenced in July 2007 with significant work being progressed on target to date. The programme for these is under continuous scrutiny and although it is recognised that there will most likely be an overlap of MUDFA and Infraco works, this is unlikely to delay Infraco activities;
- Archaeological finds: investigations are now complete and trial works identified that a more detailed dig at Gogar is required. This can be accommodated within the current programme and budget;
- Failing to reach agreement with NR on necessary license, lease, APA and subsidiary legal agreements: This is being closely managed by a dedicated Project Manager with close support from specialist legal advisors, including those of CEC. Detailed engagement has been underway for many months and this process is reaching closure prior to Contract Award;
- Failing to reach agreement with NR on necessary technical approvals: This has been managed through a design submission and approvals process which has been established and is being managed and will ultimately lead to final approval of the design; and

- Failing to reach agreement with NR on the scope and implementation of any necessary equipment relocation and immunisation works: This is being tackled directly with the engineering experts and the appointment of a specialist Project Manager to deal solely with this interface. Specific agreements are being put in place between **tie** and NR to govern this work including clear identification of the critical milestones. NR possession requirements have been advanced as far as possible. Additionally, progress on the above items is subject of a monthly director level review between NR and **tie**

11.15 As the Development Phase of the project comes to an end and construction of the tram takes place over the next four years of the project, the majority of the above risks that are inherent in the development and construction process arise during the early stages of the Infraco contract and will have been resolved or become actual costs by end of commissioning.

Risk impacts - Capital costs

11.16 Although the cost estimate is based on the negotiated contracts for Infraco and Tramco, a number of capital costs risks remain. The most significant capital expenditure risks are in the areas listed below as the eventual cost is largely determined by third parties and they may significantly impact the total outturn cost of the scheme:

- Finance charge costs if insufficient public sector capital;
- Utility diversion costs;
- Land costs associated with acquisition, temporary disruption during construction and compensation;
- NR costs for interchange design, immunisation of equipment, possessions, compensation costs to train operating companies, information supply, liaison and development of agreement;
- Ground conditions which cannot be foreseen from ground investigations undertaken for currently accessible and inaccessible areas;
- Poor interface and integration management of the scheme;
- Compliance with Planning Authority requirements;
- Contractor resource shortages resulting in increased premia for staff; and
- Stakeholder initiated changes to the scheme specification.

These risks have been significantly mitigated through the considerable amount of work undertaken to date by **tie**'s Project Team to generate a robust cost estimate including prudent contingencies. Further mitigation is proposed through the 'phased' construction methodology adopted to ensure deliverability of a feasible core network.

11.17 Risks have been identified in relation to the progress of Detailed Design and the progression of TROs which could affect the overall programme. **tie** have mitigated these risks as follows:

- Progress of Detailed Design – through a staged release of design information to Infraco bidders, the project maintained the flexibility for Infraco to take a greater role in design development and by applying effective project and contract management to the design process. Further, the acceptance of the SDS design by the Infraco is dependent on the outcome of their due diligence of the design;
- Progression of TRO's – by consultation with CEC on detailed traffic modelling and close alignment of TRO programme with the construction programme. A detailed TRO strategy has been developed by **tie** as set out in section 9.

11.18 The main risks that have been analysed relate to third parties. Of these the majority relate to development and construction risks. The majority of risks which are inherent in the development and construction process occur over the first four years of the project.

Risk impacts - Operating costs

11.19 The most significant operating expenditure risks which will require to be managed with the support of CEC are those set out below:

- Inclusion of potentially loss making sections of route;

- Slower run-times than anticipated;
- Lack of priority to schemes in rail / road network with proposed transport developments;
- Robustness and detail of modelling along tram corridor;
- Specification issues including staffing levels;
- Variability of global market conditions impacting on insurance costs;
- Long term increases in operating costs e.g. energy, labour escalation and insurance;
- Maintenance and lifecycle replacement costs; and
- Stakeholder initiated changes to the scheme specification.

It is noted that these have been significantly mitigated, through proceeding with early operator involvement and the leading role of TEL in service integration planning and the preparation of a robust and prudent TEL Business Plan.

11.20 The Infraco and Tramco maintenance contracts are currently planned to be fixed price contracts with a performance related payment element for planned, preventive and lifecycle maintenance activities of the trams and infrastructure. The DPOFA operator contract is a fixed price contract with a performance element that covers the operating risks relating to operation and cleaning of the network. **tie** consider that these risks will be appropriately transferred to, or shared with, the private sector.

11.21 Maintenance and lifecycle replacement costs had been estimated for the DFBC by **tie**'s technical advisers. These have been confirmed as per the negotiated maintenance agreements for Infraco and Tramco, with maintenance costs risks being shared primarily by Infraco, and partly by TEL, where it affords the best value for money option.

Risk impacts – Revenue

11.22 A robust revenue analysis for Phase 1 (and Phase 1a on its own) of the tram had been conducted at DFBC stage, using the JRC modelling and in the context of an integrated service network with LB and the planned phasing of the project. The JRC is responsible for supporting analysis of ticket integration and fare strategy for the purposes of the TEL Business Plan. Revenue yield has been shown to be both underestimated and overestimated in previous light rail schemes. Benchmarking of revenues demonstrated the credibility of the estimates in the DFBC. The following key risks are being actively managed by TEL, **tie** and their advisers including the JRC, whose report on revenue risks is included at Appendix III:

- Quality control and reliability of model development including interchange design;
- Slower run-times than anticipated making the system less attractive;
- Lower level of bus / tram integration than expected including different revenue apportionment;
- Customer attractiveness including fare strategy;
- Emerging competitive responses from bus operators;
- Public response during early years (i.e. slower than planned ramp up in demand);
- Failure of ticket machines or vehicle breakdowns; and
- Unplanned long-term demographic, lifestyle or land use changes.

11.23 **tie**'s advisors have additionally taken account of the above risks which have previously resulted in an overestimation of tram revenues on some other light rail schemes. TEL have examined the balance and sensitivity of costs and revenues in the development of service integration plans in conjunction with JRC. The timing of the above risks is annual throughout the operational period of the project. There will be ongoing analysis to examine the reliability of forecasts and thereby refine service specifications and traffic management plans to further optimise the system.

11.24 A risk exists that the revenue predictions may not be achieved as a result of poor system performance. The mitigation for this risk is the RAMs (Reliability, Availability and Maintainability) of the system and the performance regime leading to the potential for deductions due to poor performance against a number of KPIs and impacts 4-weekly against payment of operating costs for system availability and tram punctuality.

Procurement Strategy risks

11.25 The Procurement Strategy had number of key objectives, including the following:

- To deliver a performing tram system for Edinburgh;
- Meet run-time and capacity performance requirements;
- Achieve effective (economic) risk transfer to market within affordability;
- Minimise market risk pricing through de-risking, including advance utility diversion, prioritised design to minimise design and performance risk uncertainty and to achieve key consents;
- Assemble a large design and build contract responsible for system integration; and
- Set operation and maintenance criteria to incentivise system performance in the operating phase.

11.26 The objectives are achieved through the assembly of contracts as summarised below:

- Procure SDS to develop Requirements Definition, Preliminary Design, Detailed Design, traffic modelling and deliver planning consents all of which contribute to achieving the specified project functional requirements (run time, capacity etc);
- Procure Tramco and Infraco concurrent with design and modelling;
- Progressively pass design information to Infraco bidders through the tender and negotiation process to enable the Infraco bidders to refine their pricing and thus minimise design and performance risk pricing through negotiation;
- Novate SDS and Tramco to Infraco at Financial Close to create a single design, construct and maintain contract;
- TSS and other specialist personnel validate that SDS design will deliver the tram system performance requirements (run-time and capacity etc) to ensue discharge of SDS and **tie** duty of care to stakeholders; and
- Separately procure utilities diversion contracts (principally MUDFA) to enable **tie** to directly manage the utilities diversion risks and complete diversions in advance of Infraco works commencement thus avoiding the impact of diversions risks on Infraco delivery performance.

11.27 The Procurement Strategy has a number of features which import risk and this has required close management as further explained in section 7:

- Detailed programme to reach financial close;
- Novation of SDS and Vehicle contracts at Infraco award;
- Clarity of scheme definition for Phase 1;
- Default, expiry or early termination;
- Partial handovers and staged commissioning due to incremental construction;
- Calibration of payment mechanisms and potential retentions / compensations; and
- Change control.

Stakeholder risks

11.28 Management of the following stakeholder risks is recognised as critical to progression of the tram scheme. Risk owners have been identified and monitoring of the mitigation progress on these matters is taking place at TPB level

- Political and stakeholder support for the scheme reduces due to other sector priority;
- FBC is not approved / accepted due to affordability or financial / economic viability-affordability, financial and economic viability had been established in the DFBC and is confirmed in this FBC;
- CEC / TS Funding Agreement (including bearer of any potential cost over-runs) is not delivered and / or funding package reduces in real terms – this risk is fully mitigated through the new funding arrangements;
- Negative public relations (PR) results in reputational damage;
- Infraco programme and price is above DFBC estimates – risk is mitigated in the negotiated contract price;

- Challenge by unsuccessful Infraco / Tramco bidders to the procurement process; and
- Sections of the scheme implementation are delayed due to adverse TRO hearing.

Insurable risks

11.29 **tie** has developed a schedule of potentially required insurances for the main stages of the project lifecycle in conjunction with Heath Lambert Group, their insurance advisers, as shown in Table 11.3. The final decisions on the tram insurance portfolio including scope, cover and deductible has be subject to value for money, affordability and overall risk appetite of the parties concerned.

Table 11.3 – Insurable risks

Development	Construction	Operational
tie and contractor's own Required Insurances		
• Employer liability • Head office insurances • Professional Indemnity for design and construction	• Employer liability • Head office insurances • Professional indemnity for design and construction • Marine cargo including loading and unloading • Contractor plant and equipment • Motor road traffic Liability • Engineering Inspections	• Employer liability • Head office insurances • Continuing professional indemnity until expiry of defects liability • Directors and officers liability • Employee benefits • Fidelity guarantee • Money in transit • Motor road traffic Liability
Owner Controlled Insurance Programme covering all interested parties		
	• Third party liability ** • Products liability ** • Construction all risks ** • Defects liability under construction all risks ** • Offsite storage ** • Goods in transit ** • Delay in start-up including suppliers extension **	• Third party liability ** • Material damage ** • Defects liability under construction all risks ** • Engineering • Business interruption (including customer and utility extensions) **

11.30 The construction phase includes manufacture, supply, construction and testing. Traditionally, even on major construction projects, individual contractors have procured project insurance or the main contractor will insure on behalf of all. Such an arrangement would lead to a multitude of different policies provided by the individual contractors expiring on the contractual completion date of the each contract or annually renewable. This would leave **tie** with a complicated task of gradually insuring or being responsible for all handed over contracts until a permanent insurance programme could be put in place

11.31 It is now common practice that a project of this type is covered by a project-specific bespoke policy wording that is negotiated between the broker and his client, in this case **tie**. The advantages to **tie** of procuring insurance directly for the whole project are that **tie** receive the best value for money afforded by scale and direct procurement, consistency of cover throughout the project period and receive the benefit of an expiry date which coincides with the end of construction, testing and commissioning and with the start of tram operations.

11.32 **tie**'s has procured and effected an owner controlled insurance programme (OCIP) and has reflected this provision in all key construction contract documents. The OCIP strategy has been successfully used on the majority of UK Light Rail Projects. Dockland Light Railway including all its extensions, Manchester, West Midland, Sheffield, Croydon, Nottingham and Dublin were all insured using the OCIP approach. Croydon also included the first two years of operational insurances within a five year project programme, as is being applied by **tie**.

11.33 OCIP Insurance has also become the popular choice of many owners including BAA generally and specifically for Terminal 5, London Transport's Jubilee Line, London and Continental Railways for the Channel Tunnel Rail Link and NR for the West Coast Main Line