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provider and novate it to the Infraco. The decision which approach to adopt will be taken after market consultation in summer 2005.

**tie** has considered the benefits of leasing tram vehicles and other equipment. Due to anticipated changes in the leasing legislation in April 2006, the window of opportunity to lease vehicles is heavily constrained given that the date of Royal Assent is currently anticipated to be December 2005. It is still possible to develop a lease financing for the trams. The mechanics for doing so are discussed in detail in Appendix D.

In summary, a change to procurement strategy would be required so that the vehicle is chosen earlier, and the contract for the vehicles is substantially developed prior to the change in leasing legislation in April 2006.

**tie's** decision on whether to pursue this approach will be influenced by the response to the market consultation. Key issues which will be explored are the impact of leasing on the overall funding structure (which could consist of government grant, leasing and private finance), and whether the early identification of the preferred vehicle is attractive in itself.

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**5.12 System Procurement: Infraco Contract**

The Infraco will be the central contract in the procurement process. The Infraco will be responsible for delivering the tram service as a whole.

**5.12.1 Nature of Infraco Contract**

The Infraco will be responsible for integrating the outputs of the SDS Provider, the Tram Supplier and its own subcontracts.

Initially, the Infraco will be responsible for commissioning the project and ensuring that it meets the requirements of the output specification. The Infraco will also be responsible for ensuring that the output specifications for the project continue to be met over the economic life of the assets. Maintenance cost, latent defect and whole life cost risk are therefore transferred to the Infraco.

**5.12.2 Financing Structure of Infraco Contract**

The financing structure adopted for the Infraco Contract needs to reflect the risks that **tie** and other stakeholders are attempting to transfer and the way in which the Infraco is paid (whether in advance or in arrears, whether linked to achievement of milestone events or achievement of ongoing performance).

The way in which the Infraco is paid will also determine the extent to which it has a financial incentive to manage the risks transferred to it.

The options for risk transfer to the private sector fall into two categories:

- Transfer of all design, construction and commissioning risk with maintenance of vehicles and infrastructure for a short period, long enough to test the initial functionality and quality of the system, likely to be around six years; and
- Full initial risk transfer as above with, in addition, full risk transfer for maintenance of vehicles and infrastructure for the expected life of the system, i.e. around thirty years (Further options for contract periods are considered in Section 8 (Funding, Financing and Affordability)).

The approach which **tie** has developed is best described as a ‘Hybrid PFI’ – combining risk transfer characteristics of a PFI scheme with partial funding of upfront costs by the public sector in order to minimise the cost of private finance. In developing this approach, **tie** has considered the approach taken on other projects and developed an approach to linking the payment of upfront contributions to construction cost to progress under the construction contract that it believes will be acceptable to the market.

Full details of the process of identifying and evaluating potential options, and how the preferred option was arrived at are set out in Appendix B to this Outline IOBC.

**Attributes of tie’s Approach to Infraco Contract**

*Benefits*

This approach:

- transfers the risks on the delivery of a fully functional operating system;
- transfers the risks on long term performance and availability of the system; and
- removes a number of interfaces between contracts that **tie** would otherwise be taking risk on if design, infrastructure and vehicles were provided under separate contracts

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let directly by **tie**.

**tie** is transferring to the Infraco risks that the industry has demonstrated its willingness to accept in the past, but is not forcing them to take operating and revenue risks, which the industry will only accept and price at a very high premium.

Particularly if a phased implementation of the Edinburgh Tram Network is considered, this approach also allows **tie** a greater degree of flexibility in expanding the network than has been the case on other projects (eg Manchester, where the entire concession needs to be re-let each time there is a change to the network).

*Risks*

**Potential Risk Margins** The Infraco will be taking responsibility for subcontractors which it has not selected. This may lead to a degree of additional risk pricing. **tie** believes that there is sufficient experience in the market of different consortia working together that this should not be a significant issue (in fact, no consortium has ever bid in the exact same form more than once on any tram deal.) In addition, experience on the DLR project demonstrates that contractors are willing to take risk on commissioning systems when vehicles have been procured separately. **tie** will consider this further as part of the market consultation exercise.

*Comparison with Benchmark Option*

This approach differs from the benchmark, in that the designer starts its work before the Infraco is appointed and the contract is novated, and that vehicles will be the responsibility of the Infraco.

**5.12.3 Process of Appointment of Infraco**

The competition for the Infraco will be launched in late 2005. This launch date will allow **tie** to prequalify candidates for the main tender, so that the tender documents can be issued shortly after the granting of Royal Assent (some schemes have initiated Infraco contract tendering prior to Royal Assent but **tie** assumes the Executive and Parliament would not welcome such a step).

When the tender is launched, the design will have been developed to a stage where planning consents can be applied for (by the SDS Provider acting on behalf of **tie**).

The bidders for the Infraco Contract will have access to the design as developed up to the launch of the tender, and will be given a schedule of delivery of further updates on design. They will also be supplied with the specification for vehicles which will be the basis of the vehicle tender, currently expected to be launched at the same time.

After receipt and evaluation of initial bids, a shortlist of two infrastructure providers will be selected. These will be asked to further refine their proposals, and to assist with this **tie** will provide updated design details and vehicle tender information.

On selection of a preferred bidder, the selected bidder will be required to close the contract within an agreed period and to have novated to it contracts with the SDS Provider and the Tram Supplier.

**5.12.4 Release of Design Information to Infraco Bidders**

During the period when Infraco bidders are developing their proposals, design work will be continuing. This will necessitate a managed release of further design information to the tenderers.

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Initially tenderers would be provided with the Preliminary design plus Detailed design as available for critical areas. Tenders would be required to confirm the design parameters and raise any issues related to generic design solutions, including possible cost savings of efficiency improvements.

Transfer of further design information to the Infraco bidders during the tender period would be done in a completely transparent and balanced way, and will need strict control by **tie**. Limited access to the SDS Provider for each of the bidders may be facilitated by **tie**.

Design would continue whilst tenders are being evaluated and after selection of two preferred Infraco and one or two preferred tram supply bidders. The bidders would receive a significant design update to price at BAFO.

Given that bidders will need time to digest information and incorporate this into their plans, there will be a cut-off date in advance of return of tenders.

**tie** believes that continuing the design process will mean that design resources are used efficiently and will not disrupt the tender process.

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**5.13 Potential Variants on Proposed Procurement Strategy**

The above described Procurement Strategy has been arrived at after much careful deliberation and after considering the results of a number of other tram procurement exercises. **tie** is therefore clear about the approach it wishes to adopt.

However the approach is flexible enough to be adapted to changing facts and circumstances which may arise as the procurement progresses.

The following variants have either already been considered (and rejected for the reasons given) or may be possible refinements to the Procurement Strategy that could be incorporated after market consultation.

**5.13.1 Variants in Selection of Operator Stage**

## 5.13.1.1 Later Operator Involvement

**tie** is already realising benefits from its early involvement of Transdev as system operator. In the event that Transdev fails to deliver as required, it is possible to terminate their contract at low cost and relatively short notice and procure an operating contract alongside the Tram Supply and Infraco Contracts. This would be considered if the need arose. There appears to be little or no downside from Early Operator Involvement. **tie** believes that the incentive structure it has in place will deliver the same benefits as a fully fixed price operating contract (this operating contract has prices fixed for three years, via the original competition, and subject to rigorous benchmarking thereafter) and the benefits of access to Transdev's skills and experience have been significant.

**5.13.2 Variants in Project Development Stage**

## 5.13.2.1 Tendering Design with the Infraco Contract

The pros and cons of integrating design with the Infraco contract are set out in detail in section 5.7. **tie** believes that the case for early design is strong.

**5.13.3 Variants in System Procurement Stage**5.13.3.1 Retaining the SDS contract with **tie** rather than transferring to the Infraco

This approach would enable **tie** to retain more knowledge in house and assist with supervision of the Infraco.

However, the Infraco would then need to have its own designer, work would be duplicated and there would be delay and additional cost while a second design team was mobilised and familiarised itself with the SDS's design. **tie** believes the approach of starting design early and then novating the SDS contract to the Infraco will save cost by being quicker and eliminating duplication. The engagement of the TSS contractor will help to ensure that **tie** retains sufficient knowledge to monitor the Infraco after the SDS contract has been transferred.

It should be noted that **tie** will retain the right not to novate the SDS if it wishes not to, so this approach can be reconsidered later in the tender process if circumstances change.

## 5.13.3.2 Tendering Vehicle Supply with Infraco contract

This has been the approach taken on a number of other tram procurement exercises. **tie** believe that its proposed approach achieves the same transfer of integration risk with the further advantage that **tie** can choose the best vehicle and the best Infraco bidder rather than being dictated to by the way in which private sector consortia happen to be formed.

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## 5.13.3.3 Separate Vehicle contract

It is common practice on the National Rail Network for rail vehicles to be procured under supply and maintain contracts provided by the manufacturer. In such cases the supplier takes risk on vehicle performance and availability. This is appropriate where the infrastructure already exists and the two cannot therefore be combined in one contract, and where vehicles are more interchangeable between different services in different parts of the country.

However **tie** believes that systems integration risk will be better managed if the two key items are combined through the novation process it proposes. In fact, separate procurement of the Tram Supply Contract prior to novation achieves the best of both approaches.

## 5.13.3.4 Early Vehicle Procurement

It would be possible to procure the trams first and then procure the infrastructure on which they would run. This would lengthen the overall procurement process if **tie**'s proposed approach of awaiting Royal Assent prior to commencing tenders for these system assets is followed.

Depending on the results of the market consultation, **tie** might still choose to finalise the tram contract earlier, potentially prior to Royal Assent. It should be stressed that in no circumstances will **tie** enter into any agreement to purchase vehicles which it will have to pay to exit, before the Infraco contract reaches financial close.

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**5.14 Further Proposed Developments of Procurement Strategy****5.14.1 Market Consultation**

**tie** has already been contacted by many of the key players in the light rail sector regarding its plans for the procurement of the new tram system. The feedback received from industry is that the proposed plans are attractive, and should gain significant market interest when tenders are launched.

However, in order to get a balanced and informed view from industry, it is **tie**'s intention to launch a formal market consultation.

This will be undertaken in early summer 2005 following the issue of a PIN regarding the Infraco and Tram Supply procurements, and a request for expressions of interest. It will be made clear that expressions of interest are welcome from all of those who could potentially form part of Infracos or supply the trams.

Interested parties will be sent a pack of information regarding the plans, and asked to submit written comments and make clear whether they would be willing to have a consultation with the **tie** procurement team. **tie** is developing the documentation for this process at present, and intends to provide a questionnaire which addresses the key options which remain open to **tie** within the procurement strategy.

A successful consultation should result in high quality feedback on the approach that **tie** is taking, and provide confirmation or otherwise of key aspects of the proposed Procurement Strategy. This will inform the further development of a final Procurement Strategy prior to launching competitions for Vehicle Supply and Infraco Contracts.

**5.14.2 Final OBC (Proposed February 2006)**

**tie**'s intention is to reflect on the feedback received from the proposed market consultation and to critically review the procurement strategy in the light of the messages received.

This will require a review of the approach to the key contract which will still need to be let at that stage namely the Infraco and Tram Supply contracts.

In addition, **tie** will consider the views of interested parties on the procurement strategy as set out herein, and on the basis of feedback a specific strategy on the split of funding between grant and private finance will be procured.

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**5.15 Questions and Answers Regarding Procurement Strategy****5.15.1 What impact will a phased implementation have on the Procurement Strategy?**

The possibility of phased implementation has always been an issue informing the development of the procurement strategy, and the approach described above is entirely compatible with phasing. Further details on phasing are given in section 8.5.

**5.15.2 Could planning issues be dealt with differently?**

A more conventional way to approach planning would be for it to be pursued by **tie**, acting through a consultant. How would this differ from the proposed approach with the SDS? The whole approach of **tie** in using the SDS is to remove risk from the procurement in a way that is commercially attractive. The SDS role is much more than that of a consultant. **tie** expects the SDS to act as a private sector partner – which it will become, when the contract is novated to the Infraco.

Therefore, there will be more focus on practicality, constructability, and costings throughout the period before the SDS contract is novated.

In addition, the private sector will benefit significantly from the novation of the SDS, which it is expected will reduce the time and expense of planning applications after the SDS contract is novated.

**5.15.3 Who decides which utilities to divert?**

**tie** has decided not to move any utilities which are deeper than 1.9m. Where utilities are shallower than this a view will be taken by **tie** and its advisers on whether to move the utility or leave it in situ. Many of the most complex issues regarding utilities are already being progressed through negotiations with the utility companies, with whom **tie** has agreed heads of terms for utilities diversion works. These negotiations have resulted in a number of innovative solutions for utility issues, highlighting the benefits of early engagement with the utilities companies. Such early engagement would be impossible if utility diversions were to be left to the Infraco.

**5.15.4 How will whole life cost risk on rolling stock be handled?**

Sections 5.11 and 5.12 above give further descriptions of how the procurement process for the infrastructure and trams will be handled.

In short, the whole life cost risk for the trams will be carried by the Infraco. This means that the Infraco will have to develop costings for the maintenance of the trams. The information that is required to do this will be derived from the proposals of the vehicle suppliers.

Since it is proposed that the vehicle supply procurement process will be quicker than that for the Infraco, it should be possible to provide detailed output from the vehicle procurement process for the purposes of the bidders for the Infraco contract.

**5.15.5 How can the results of the Infraco and vehicle supply contract be made compatible?**

**tie** will expect each of the bidders for each of the contracts to provide statements on whether they are unwilling to work with any of the bidders for the parallel competition.

Therefore, **tie** will identify early on whether there are any incompatible combinations.

Further details on what would happen if subsequent events caused a potential combination to fail are given in 5.4.5.2.



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**5.15.6 Why is the operator not taking all revenue risk?**

Recent light rail procurements have encountered significant difficulties, not least because of a hardening of the market post with regard to revenue risk, in the light of failures to achieve target revenues in Croydon, Manchester and Birmingham schemes.

Therefore, in order to maximise value for money, **tie** is proposing to retain revenue risk, but to give its operator an incentive to improve farebox through a pain/gain mechanism, where the operator takes risk on 30% of the difference between the actual farebox and the forecast.

Transferring all of the revenue risk to the operator would mean that **tie** would encounter all of the problems that have occurred on recent procurements. Operators are no more likely to be willing or able to sensibly price revenue risks over a thirty year period than consortia bidding for the English schemes. More background on how revenue will be handled is given in section 5.6.1.2.

**5.15.7 The recent Nottingham NET scheme has been successfully introduced. Why does tie not simply follow this proven template?**

The Nottingham scheme has some good attributes which **tie** wishes to follow. In particular, **tie** is adopting the full transfer of construction and integration risk to the Infraco. This is what has made the Nottingham scheme attractive for the public sector.

However, it is worth bearing in mind that the contractors who built the Nottingham scheme failed to make a profit, and this would have implications for any future scheme built on the same model.

**tie** intends to de risk the project prior to the market pricing it, through the SDS contract and the utilities strategy. This should make the project more attractive to the market than a carbon copy of the Nottingham project.

**5.15.8 What will be the accounting treatment of the proposed funding structure? Will carrying out early design work affect the future procurement of the scheme?**

**tie's** approach to the project has been to develop a strategy that delivers maximum value for money. It has not constrained itself with concerns about accounting treatment.

The proposed approach does nothing that would mean that the project would be clearly on balance sheet. The actual balance sheet treatment would depend on a quantitative evaluation based on the precise funding structure adopted, and this would be the subject of the proposed Final OBC in February 2006. With regard to the SDS involvement, it should be borne in mind that all of the risks associated with the design will be carried by the Infraco.

**5.15.9 What are the consequences of tie being unable to enter a contract for the SDS?**

At the time of writing, bids have been received for the SDS contract. At this stage **tie** is not aware of any issues that have been raised by bidders which may cause the procurement to fail.

**tie** would be surprised if it did fail, based on the strong market feedback on this approach. If it was to fail, **tie** would consider the specific reasons behind such a failure. Given the market feedback, it would be probable that any failure could be rectified, because there were no major issues of principle with SDS concept raised during consultations.

**5.15.10 What are the consequences of a delay to Royal Assent for the procurement?**

**tie's** approach to procurement is one of maximising value for money. It has identified a number of activities to be undertaken prior to Royal Assent, and it is not proposed that this will be increased if there is a delay to this key milestone.

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If Royal Assent is delayed, **tie** would continue with its programme (unless the delay was due to a reason that could potentially lead to a failure of the bills). The main activities of **tie** at the time would be design and development of the utilities diversion contracts. Neither of these would be progressed beyond the proposed level if there were to be a delay.

**5.15.11 Why does this differ from the EARL Procurement Strategy?**

The principles followed in developing this Procurement Strategy are similar to those being applied by **tie** to the procurement of the Edinburgh Airport Rail Link ("EARL").

However, EARL involves amendments to existing infrastructure, not new, and is not a self-contained system. The nature of the infrastructure is also very different. The scope for competition (e.g. with regard to the choice of operator of the trains and the network) is much reduced and the scope for risk transfer to the private sector is also lower because it is harder to specify the work on an output basis. There will therefore be significant differences in the EARL Procurement Strategy when it is developed. However, common features such as Utilities will be treated consistently between the two projects.

**5.16 Conclusions**

**tie** has developed a procurement strategy which learns the lessons from past tram procurement exercises and recent investigations by NAO, Audit Scotland and HM Treasury and deals with issues specific to Edinburgh. Early operator involvement has been achieved and is delivering benefits. The SDS Provider will be appointed soon and the early design work will help to optimise the level of risk in the project to assist in managing affordability. The novation of SDS and Tram Supply Contracts into the Infraco will minimise interface risk. The Hybrid PFI approach is designed to optimise risk transfer and financing cost. Overall **tie** believes that the procurement strategy is well designed to serve the objectives of the project and is suitable for market testing.

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## 6 Risk Management

### 6.1 Introduction

The scope for risk in any project is considerable. Project risk reflects several aspects of uncertainty that can present itself throughout the project lifecycle. Risk can manifest itself in terms of uncertainty regarding objectives and priorities; design and logistics; variability and basis of estimates; and uncertainties about fundamental relationships between project parties.

Appropriate risk allocation is therefore fundamental to achieving value for money for the tram system. Risks should be allocated to the parties best placed to manage and/or bear them and can be used as the basis for an incentive to the private sector to help ensure that CEC's objectives for the project are met. This outsourcing of risk and its management would leave CEC/**tie** to concentrate on their core functions of procurement and overall project management.

The purpose of this section of the IOBC is to address the following aspects of risk analysis:

- Types of risk that need 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 intended risk allocation; and
- Overall contingencies including Optimism Bias and their consideration in the Financial Model.

The risk analysis was facilitated by means of a series of meetings involving **tie** and their advisers. Although the exercise is well developed it must be borne in mind that the risk identification and analysis will continue to be updated and developed as the project evolves through design, and further innovation which the private sector will bring to the project.

**tie**'s approach to developing the Edinburgh Tram Network 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.

**tie** has developed a sophisticated approach to risk management. Central to this is the appointment of an identified 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 individual contracts within the procurement strategy.

These risk matrices have been used effectively to influence the development of the Procurement Strategy set out in section 5 of this IOBC.

In this section, we examine the major risks that **tie** will manage directly or share with the private sector and those that will be fully transferred to the various private sector entities with which **tie** will enter contracts.

### 6.2 Background

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 Holyrood Inquiry have been considered by **tie** during the development, to ensure the application of risk management best practice.

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Summaries of key findings and conclusions from review of the above documentation, including the methodologies used to quantify the consequences and likelihood of risks, are presented alongside the key project milestones in Appendix F.

### 6.3 Project Risks

The work undertaken on risk for this IOBC follows industry best practice on identifying and quantifying and managing risks. The risks to the scheme can be allocated to the following four principal risk categories (excluding Termination Risk), using contemporary classifications:

- **Development Risk** : design and development, scheme approvals and procurement of all scheme components and activities to be concluded prior to commencement of construction;
- **Construction Risk** : advance works including utility diversion, main infrastructure construction, project management and commissioning related risks;
- **Performance Risk** : standards and defects 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).

Building on the work initiated four years ago in the Feasibility Study and more recently reported last year in the updated Preliminary Financial Cases, **tie** has identified the following key project risk areas to the infrastructure components.

Development Risk	Construction Risk	Performance Risk	Operation Risk
Failure to acquire land	Incorrect cost estimates	Competition	Legislative / regulatory change
Delays in obtaining planning permissions	Incorrect time estimates	Latent defects to infrastructure	Changes in taxation
Delays in obtaining Royal Assent	Unforeseen ground / site conditions	Performance of sub-contractors	Changes in VAT
Cost and delays due to utility diversions	Unforeseen ground / site conditions under existing buildings / structures	Default by sub-contractors	Incorrect estimate of maintenance costs
Poor contractual interface with vehicle suppliers and system integrators	Failure to build to design	Industrial action	Incorrect estimate of lifecycle costs
Failure to design to brief	Delay in gaining access to the sites	Failure of system integration	Residual value
Continuing design development	Responsibility for maintaining on-site security	Failure to meet performance standards	Service integration
Delays in advance works	Responsibility for maintaining site safety	Incorrect choice of tram vehicles	Wage inflation
Changes in design required by the Operator	Third party claims	Availability of tram infrastructure	Quality of equipment
Changes in design required by CEC / <b>tie</b>	Compensation events	Relief events	Accidents
Insufficient powers	Delay	Force Majeure	Vandalism
	Force Majeure	Termination	Terrorism
	Termination	Failure to upgrade to new technology resulting in obsolescence	
	Legislative / regulatory		

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Development Risk	Construction Risk	Performance Risk	Operation Risk
	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		

**6.3.1 Impacts of Project Risks**

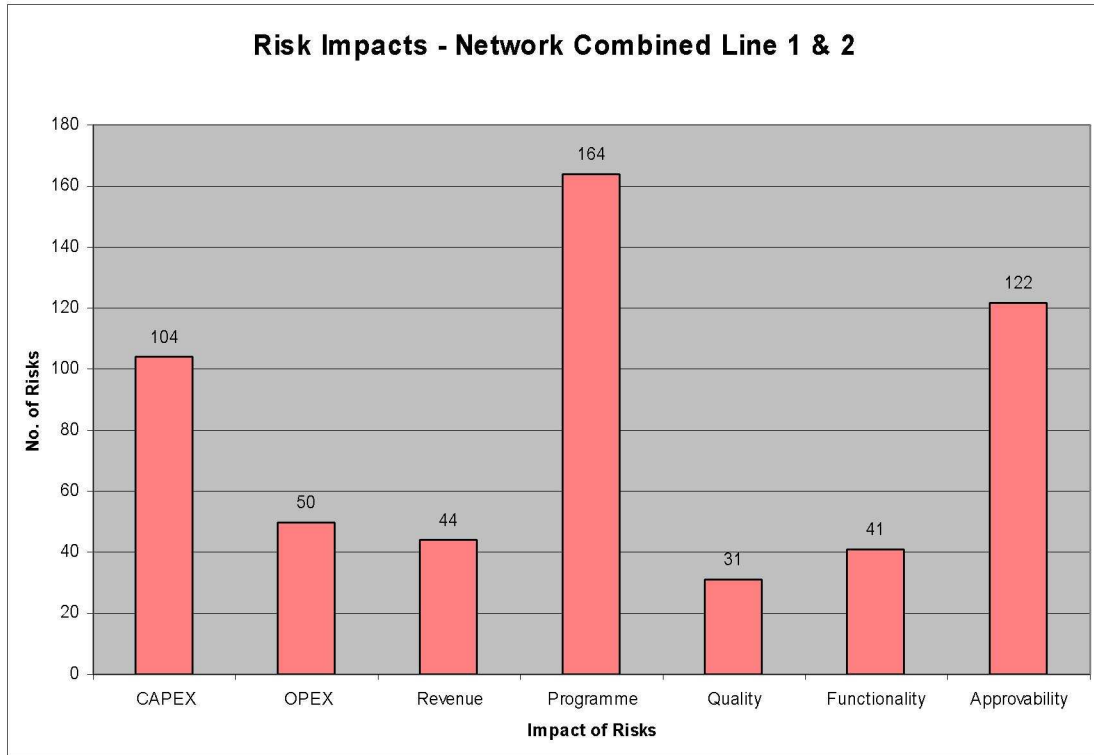
tie have maintained a project risk register to ensure ongoing management of risk. The following impact areas are noted for the principal risk areas of development, construction, performance and operations lifecycle stages of the proposed tram system.

	Capital Costs	Operating Costs	Revenue	Programme	Quality	Functionality	Approvability
<b>Development Risk</b>	✓	✓	✓	✓	✓	✓	✓
<b>Construction Risk</b>	✓			✓	✓		✓
<b>Performance Risk</b>	✓	✓	✓	✓	✓		
<b>Operations Risk</b>	✓	✓	✓	✓			✓

tie have assessed the multiple primary and secondary impacts of the 237 identified project risk register entries as shown below.

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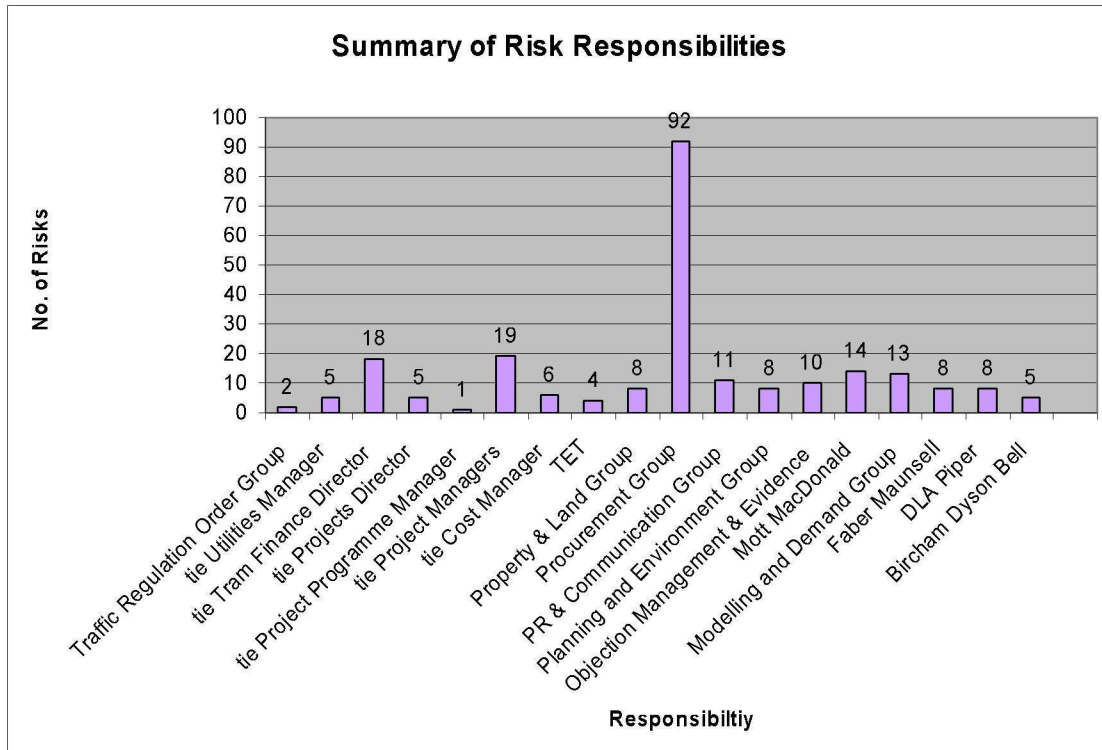
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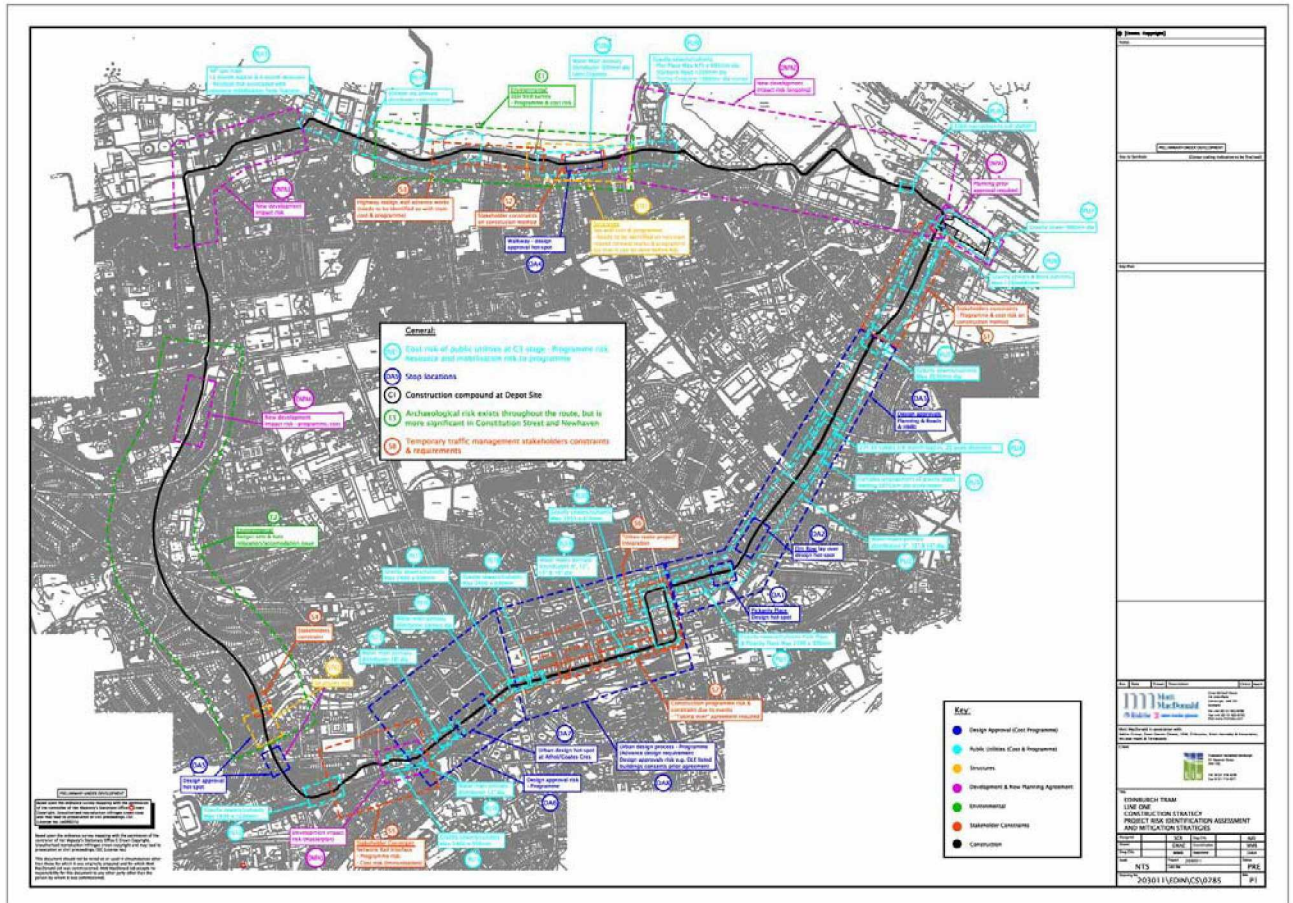
Although the impact of each risk is being assessed against these impact areas, it is considered that the primary potential impacts for consideration are in relation to capital expenditure, operating expenses and profit and achieving delivery programme.

Each of the identified risks have been allocated to the most appropriate team member, each of whom has the responsibility for developing and implementing a risk mitigation strategy, as summarised by responsibility below. It is noted that the current wave of planned significant procurements is reflected in a large number of risks being managed by the Procurement Working Group.

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In addition, an assessment of the location of types of risk has been summarised graphically for Phase 1 in order to assist the understanding and communication of risk, as shown below.



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**6.3.2 Overall Project Risks**

**tie** have recognised a number of overall project risks that require to be considered. These include the project affordability, approvability and market appetite, any of which could lead to suspension, curtailment or significant delays being imposed.

**tie** considers that the single biggest issue affecting the approvability of the tram system relates to funding, as indicated below. **tie** has mitigated this risk through development of robust cost estimates adopting a plan to phase the introduction of the Edinburgh Tram Network and on-going review of alternative funding options in conjunction with **tie**'s advisers. The following Development Risks will need managed.

- Limited Scottish Executive grant funding is available; and
- Delays are incurred in securing other funding sources beyond Scottish Executive grant funding.

**tie** considers that the submission of a robust Outline Business Case in February 2006 will significantly mitigate these 'development' risks. It is anticipated that this will include a risk appraisal on each of the potential funding sources.

**tie** have significantly mitigated risks affecting the quality of the scheme through regular consultation with the Planning Authority on the tram system. However, delay and cost increases due to planning requirements from scheme development will need to be managed during the detailed design phase, prior to commencement of construction. **tie** have further mitigated this risk through the development of a Design Manual that identifies principles of the tram system design, provides supporting design guidance and states the design requirements for the main tram components. This Manual has subsequently been adopted by the Planning Committee. It is envisaged that the SDS Contractor will join the existing project Planning & Environment Working Group to help to de-risk planning approval against delays due to design decisions. **tie** will be additionally supported by the TSS Contractor whom will undertake assessment reviews to ensure SDS/Infraco compliance with project specifications. It is considered that TSS will perform a significant risk mitigation role for **tie**.

**tie** has held significant pro-active consultation with the existing transport operators. An extensive portion of mitigation has been commenced with Transdev who have agreed and signed a heads of agreement with bus operators and, whose objectives include bringing about service integration with local bus operators. **tie** and their advisers will consider the influence of other transport initiatives including CETM and discuss these with CEC. The following risks will require to be managed by **tie** throughout the contract period:

- Bus/tram integration;
- Development of Edinburgh Airport Rail Link;
- Waverley and Haymarket Station developments;
- Inclusion of CETM and other transport schemes;
- Ticket integration; and
- Future phases and potential future expansion of the system.

**tie** have identified a number of key areas with potential to delay the project programme (with consequential cost impact), as follows:

- Parliamentary time with other Bills under consideration;
- Failing to reach agreement with Network Rail;
- Advance works, land and property acquisitions and PU Diversions delays impacting the planned dates for commencement of Infraco activities;
- Weak communications between **tie** and the Scottish Executive;
- Delay in funding availability or affordability;



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- Protracted Bidder negotiation;
- Obtaining planning permissions;
- Development of integrated service pattern for tram and bus;
- Archaeological finds;
- Lack of market appetite in the scheme;
- Competing local and national projects cause shortage of resources;
- Successful commissioning and obtaining licence to operate; and
- Lack of political will to implement the scheme.

As the Parliamentary consideration phase 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 occur over the first four years of the SDS/Infraco contract and will have been resolved or become actual costs by end of commissioning.

**6.3.3 Risks arising from Preferred Option****6.3.3.1 Capital Costs**

**tie** believes that the most significant capital expenditure risks are in the areas listed below because the eventual cost is largely determined by third parties and may significantly impact the total outturn cost of the scheme. These risks have been significantly mitigated through the considerable amount of work undertaken to date by **tie**'s Technical and Land & Property Advisers to generate the robust costs and contingencies allowed.

- Successful objections imposing additional requirements on Infraco;
- Finance charge costs if insufficient public sector capital;
- Utility diversion costs;
- Land costs associated with acquisition, temporary disruption during construction and compensation;
- Vehicle costs;
- Network Rail costs for interchange design, immunisation of equipment, possessions, compensation costs to train operating companies, information supply, liaison and development of agreement;
- Unforeseen ground conditions for currently accessible and inaccessible areas;
- Poor interface and integration management of the scheme;
- Compliance with Planning Authority requirements;
- Poor project, interface and integration management;
- SDS and Infraco resource shortages resulting in increased premia for staff; and
- CEC/**tie** instructed changes to the scheme specification.

The main risks that have been analysed are those related to third parties. Of these the majority relate to Development and Construction risks. As the design, procurement of components, and construction of the tram takes place over the first four years of the project the majority of risks that are inherent in the development and construction process occur over the first four years of the SDS and Infraco contracts.

**6.3.3.2 Operating Expenditure**

**tie** believes that the most significant operating expenditure risks which will require to be managed with the support of CEC are those set out below. It is noted that these have been significantly mitigated, but not eliminated, through proceeding with early operator involvement procurement process:

- 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;

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- Robustness and detail of modelling along tram corridor;
- Compromised routing to satisfy objectors;
- Specification issues including staffing levels;
- Variability of global market conditions impacting on insurance costs;
- Long term increases in operating costs e.g. energy;
- Maintenance and lifecycle replacement costs; and
- CEC/tie instructed changes to the scheme specification.

As the Infraco contract is for 'hard' facility management services (e.g. heavy maintenance) only and the agreed early operator contract covers all the operating risks relating to 'soft' facility management (e.g. cleaning of vehicles), tie consider that these risks will be appropriately transferred to or shared with the private sector. Their timing is annual and considered every three years through DPOFA throughout the project.

The lifecycle replacement and repair costs have been estimated for the next thirty years by tie's technical advisers. A private sector contractor would also have to estimate likely spend on lifecycle costs in pricing their bid. A major risk in this process is the underestimation of the risks for maintaining the tram infrastructure e.g. depot buildings. The consequences of estimating incorrectly at the start of process may mean that there is a recurring cost to the provider which renders the contract non-viable from their point of view leading to breach. This operation risk is present throughout the contract following the commissioning of a full or phased system.

Performance risk (i.e. the potential for deductions from the contract value or Unitary Charge due to poor performance) on the hard facilities management services is passed to the provider and impacts annually.

#### 6.3.3.3 Revenue

Robust revenue analysis has been conducted by tie's technical advisers. tie anticipates that further development of the revenue estimates will be necessary in the context of an integrated service network with bus operators. This development will take place through the proposed Joint Revenue Committee ("JRC") who will be responsible for facilitating early decisions on ticket integration and fare strategy and developing a 'target revenue' on behalf of TEL. Further certainty shall be obtained and mitigation shall be conducted by JRC Contractor through development of a new integrated transport model based on planned surveys to facilitate the bus/tram integration process. Revenue yield has been shown to be both underestimated and overestimated in previous light rail schemes. It is noted that integration and fare strategy issues have been significantly mitigated, but not eliminated, through proceeding with a DPOF procurement process with incentivised performance and pain/gain share on performance. The following key risks are being actively managed by tie and their advisers:

- Inclusion of potential loss making sections of route;
- Quality control and reliability of model development;
- Slower run-times than anticipated making the system less attractive;
- Compromised routing or stop locations to satisfy objectors;
- Poor quality bus/tram integration including different revenue apportionment than expected;
- Customer attractiveness including fare strategy;
- Emerging competitive responses from bus operators;
- Loss of patronage to EARL due to competitive fare levels;
- Public response during early years (i.e. slower than planned ramp up in demand);
- Tram fleet size numbers cannot deliver patronage demands;
- Failure of ticket machines or vehicle breakdowns; and
- Unplanned long-term demographic, lifestyle or land use changes.

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The current STAG assessments for the EARL project has identified likely fare levels that will not compromise the viability of Line 2. However, further assessments will be prudent utilising the planned model.

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. The DPOFA is for the provision of operator services for 9 years post-commissioning, with a planned annual review of 'target revenue'. The timing of the above risks is annual throughout the operational period of the project.

Performance risk (i.e. the potential for deductions due to poor performance against a number of Key Performance Indicators) is passed to the provider and impacts monthly against payment of operating costs and revenue share.

**6.3.4 Procurement Strategy Risks**

The procurement and financing strategy will have a number of features which will require close management. It is anticipated that the OBC in February 2006 will need to address the problems arising from grant, partial private or fully private financing of the scheme, as follows:

- Detailed programme to reach financial close (lender agreement);
- Novation of SDS and Tram Supply Contracts at Infraco appointment;
- Clarity of scheme definition for Phase 1;
- Default, expiry or early termination;
- Partial handovers and staged commissioning due to incremental construction;
- Indexation of Availability Payments;
- Calibration of payment mechanisms and potential retentions/compensations;
- Lease structures; and
- Change control.

**6.3.5 Deliverables to Support Risk Management**

tie continue to hold risk management as a core value and have reflected this in the commission briefs recently for the SDS, TSS and JRC Contracts, which include obligations to provide the following risk management deliverables:

- **Project Risk Management Plan** to confirm the objectives, roles and responsibilities, definitions, risk management process and application throughout scheme development, procurement and construction phases;
- **Assumption Register** to record all capex, opex, lifecycle, revenue, programme, quality, functionality and approvability assumptions and consequent risks to the project throughout scheme development, procurement and construction phases;
- **Project Risk Register** to summarise all capex, opex, lifecycle, revenue, programme, quality, functionality and approvability risks to the Project and proposed mitigation;
- **Design Diligence Risk Report** highlighting those areas that do not meet our specification requirements, those that require substantial development, those that require some development but are largely satisfactory and those that meet or exceed our specification for each key system component. Report to consider commercial, safety and reliability matters;
- **Risk Progress Report** on status of risk management and mitigation indicating summary of new risks identified, new assumptions, key matters to be resolved and achievements;
- **Cost & Programme Contingency Report** indicating the recommended capital cost and programme contingency allowances to be considered;
- **Design Construction Risk Report** indicating the risks to be considered by Infraco during remaining scheme development and construction including construction

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- sequence, construction methodologies, access, quality, approvals, security, safety, PR and compliance with Parliamentary Bill and Objector requirements;
- **Design Operation Risk Report** indicating the risks to be considered by Opco during remaining scheme development, construction, commissioning and operational stages including maintenance, lifecycle replacement, quality, approvals including HMRI, security, safety, PR and compliance with Parliamentary Bill and Objector requirements; and
- **Revenue Risk Report** indicating the risks to overall PT and tram patronages and revenues (overall PT and 'target' tram revenue) including results of Sensitivity Analysis (including demographic changes, land use changes, aging population, tourism and business travel incomes, potential survey data errors, overall PT fare changes, tram fare pricing ranges, inflation, localised competitive response from bus operator, vehicle breakdowns, fare evasion, compromised bus/tram integration proposals, influence of Park & Ride schemes, early years ramp-up of tram revenue and model parameter assumptions) and risk-return and trend plots of PT and Tram market size from first (or consequent) 15 years of tram.

**tie** has held a series of risk workshops and one-to-one meetings with those responsible for mitigating project risks over the past years. Regular risk management meetings and workshops are proposed during the planned development and construction phases. The allowance for this in supporting the above deliverables has been and will be included in all service provider remits.

**6.3.6 Insurable Risks**

**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 follows. The final decisions on the tram insurance portfolio including scope, cover and deductible will be subject to value for money, affordability and overall risk appetite of the parties concerned.

Development	Construction	Operational
<ul style="list-style-type: none"> <li>• Employer Liability</li> <li>• Head Office Insurances</li> <li>• Professional Indemnity for Design &amp; Construction</li> </ul>	<ul style="list-style-type: none"> <li>• Employer Liability</li> <li>• Head Office Insurances</li> <li>• Professional Indemnity for Design &amp; Construct</li> <li>• 3<sup>rd</sup> Party Liability **</li> <li>• Cargo inc Loading and Unloading **</li> <li>• Construction All Risks **</li> <li>• Contractor Plant &amp; Equipment</li> <li>• Delay in Start-Up inc Suppliers Extension **</li> <li>• Environmental Impairment Liability</li> <li>• Goods in Transit **</li> <li>• Material Damage **</li> <li>• Motor</li> <li>• Offsite Storage **</li> <li>• Products Liability **</li> </ul>	<ul style="list-style-type: none"> <li>• Employer Liability</li> <li>• Head Office Insurances</li> <li>• 3<sup>rd</sup> Party Liability **</li> <li>• Business Interruption (including Customer &amp; Utility extensions) **</li> <li>• Continuing PI until expiry</li> <li>• D&amp;O</li> <li>• Defects Liability under CAR **</li> <li>• Employee Benefits</li> <li>• Engineering</li> <li>• Fidelity Guarantee</li> <li>• Material Damage **</li> <li>• Money in Transit</li> <li>• Motor RTA</li> </ul>

*Insurances marked “\*\*” will be bespoke project covers.*

The construction phase would include manufacture, supply, construction and testing.

Traditionally it was the approach even on major construction projects such as the Tram Project for the contractors to insure, or the main contractor to insure on behalf of all. If left to the contractors to insure, **tie** would receive a patchwork quilt of different policies provided by your individual contractors that would each expire on the contractual completion date of the

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individual contracts (or worse, be annually renewable). This would leave **tie** or Transdev with a complicated problem of gradually insuring or being responsible for all handed over contracts until a permanent insurance programme can be put in place. This would especially be the case where different works packages are let.

However it is common nowadays that a project of this type is covered by a project-specific bespoke Policy Wording that would be negotiated between the broker and his client, in this case **tie**. This has been the case for the last ten or more years, driven to an extent, but only partially, by the growth in concession projects.

If **tie** were to insure the whole project, **tie** would therefore receive consistency of cover throughout the project period and would receive the benefit of one expiry date that would dovetail in with the start of operation of the Project.

The key evaluation will therefore be **tie**'s decision whether to adopt the Owner Controlled Insurance Programme (OCIP) route. **tie** proposes to make this decision to allow this to be reflected in key contracts. A decision to use on private finance may see the Banks insist on the OCIP approach for the construction and maintenance of the system.

The OCIP strategy has been successfully used on the majority of UK Light Rail Projects. Dockland Light Railway including all its extensions i.e. Bank, Beckton etc, 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, which would be worth consideration by **tie**.

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 Network Rail for the West Coast Main Line refurbishment. Evergreen 2 (Laing Rail), the first Design Build Finance and Transfer rail project, which is currently being constructed, is insured by an OCIP programme.

### 6.3.7 Terrorism and Security Risks

**tie**'s advisers have recommended that the following investment in security systems is set aside as part of the overall approach to system security.

- **Stops** – Allowances are included for full CCTV coverage to evidential standards for all stop platforms, passenger emergency/help points linked to the Operations and Control Centre (OCC) together with public telephone facilities and appropriate levels of illumination via dedicated lighting;
- **Operations and Control Centre** – Allowances are included for the entire facility to be contained within a securely fenced site with barrier controlled access and manned gatehouse. All areas to have full CCTV coverage to evidential standards and appropriately illuminated by dedicated lighting. All buildings to incorporate security access and intruder alarm systems; and
- **Vehicles** – Estimated unit costs included for tram vehicles assume provision of CCTV coverage to evidential standards, passenger/driver communication facility and driver radio link to the OCC. Allowances are included within Signalling and Communication estimated costs for an automatic vehicle recognition system linked to the OCC.

**tie** recognise that the confidence in the security of the tram system will have a direct relationship to the overall quality of the system and therefore potential patronage. **tie** appreciate that the risk of terrorism exists both during construction and operation. However, it should be accepted that the tram could continue to operate, albeit in a reduced capacity, if part of the line or depot were damaged due to a terrorist event.

Currently under DPOFA, terrorism is treated as a Force Majeure event. During the original development of the contract, the procurement group discussed how **tie** would want to treat a

**STRICTLY CONFIDENTIAL & COMMERCIALY SENSITIVE**

situation in which Force Majeure had seriously impacted the operation of the system - recognising that the infrastructure provider, carrying responsibility for system availability, would be more sensitive to this issue than the Operator.

The Operator is contractually responsible for the security of system operation under DPOFA, including incident management and security management under plans which are presented to and agreed by **tie** prior to system commissioning. **tie** will define the extent of duties for the system including any requirements for anti-terrorism detection equipment or special terrorism risk reduction measures and build them in, if necessary, to the DPOFA Operating Output Specification and Transdev's operating function.

Physical measures to protect the infrastructure, vehicles, interchanges and depot(s) will be a question of the supply requirements set by the output specification for the tram vehicle and infrastructure contracts, including, the responsibility of the infrastructure provider to carry out system surveillance.

**tie** in conjunction with Transdev are considering the merits of insuring key tram assets to provide Material Damage and Business Interruption coverage arising from the specific peril of Terrorism. However, it is recognised that these covers have a large deductible and relatively low cover relative to the premium and may not be available to the sector at the time of placing.

## 6.4 Risk Contingencies

This section describes the contingencies that have been set aside for the project over and above the 'base' cost and programme allowances. It is noted that this section should be read in conjunction with **Section 8** where switching value assessment, risk influence on NPV, payment mechanism and unitary charge are considered.

### 6.4.1 Specified Capital Contingencies

Capital costs of schemes vary due to the uniqueness of each scheme and this creates challenges when building up cost estimates generally and for specified contingencies in particular. Cost estimates have been built up from cost consultant inputs from **tie**'s technical advisers with contingency estimated on each element of the costs based upon perceived risk of the respective elements.

The consultant for each line has produced elemental analysis of construction costs and allowed between 10-18.5% contingency for each principal element of costs. Detailed analysis of individual cost items have been undertaken by the cost consultant for each Line with experienced in delivery of tram projects. Each consultant has benchmarked risk from their own cost analysis.

The level of specified contingency varies based upon the scope of each proposal and is included in this business case, as follows.

Scheme	Specified Contingency (2Q2003)	Percentage Increase to Base Costs
Phase 1 - Line 1 Standalone	£23.73m	10.82%
Line 2 Standalone	£22.84m	8.17%
Investment Enhanced Network	£42.74m	9.64%
Investment Enhanced Network excluding Newbridge	£38.36m	9.65%