

- 18      **Separation - achieving resolution on payments to be made**
- 18.1      As referred to above, clause 3.3.4 envisages that the parties will seek to agree "*mutually acceptable terms*" in relation to deal with the consequences of automatic termination pursuant to clause 3.3.3. That will include seeking to agree any payments which should be made.
- 18.2      If agreement cannot be achieved through discussion, the parties will then require to look to more formal means of resolving any disputes which remain.
- 18.3      The dispute resolution provisions contained in Schedule Part 9 of the Infraco Contract will survive the automatic termination. This means that any disputes ought to be resolved in accordance with the mechanism set out in that Schedule: broadly, that mechanism consists of internal Infraco/tie discussions, mediation, adjudication and litigation.
- 18.4      As can be seen from the discussion above in relation to the many heads of claim which remain outstanding, there a number of issues which divide the parties, and where there has been little evidence of consensus. Taking those issues through the DRP process is likely to be lengthy and expensive; unless the parties agree to be bound by the decisions of adjudicators, it is likely that the disputes would end up before the Court of Session.
- 18.5      An alternative approach might be for the parties to adopt a speedier means of resolution: this might be by way of mediation, or by way of a binding expert determination to sweep up all outstanding issues.
- 18.6      In the event that matters cannot be resolved in this way, legal and expert costs will be incurred in the event that the disputes are litigated through the courts. A figure of £3m has been utilised in relation to these costs; that figure does not represent a definitive estimate of the potential costs, but has been adopted in order to provide a comparison between this and the other options available to tie/CEC.
- 18.7      Beyond these legal and expert costs, there would also be internal costs for tie/CEC associated with the dispute resolution proceedings.

19 **No Settlement Agreement – continuing with the Infraco Contract**

**Provisions of MOV4**

- 19.1 If the Settlement Agreement is not entered into before 1 July 2011 for any reason other than the funding issues referred to in section 3 above, then the Infraco Contract will remain in place<sup>27</sup>. The Infraco Works should recommence on 2 July 2011, with the Prioritised Works effectively being subsumed into them.
- 19.2 The Infraco Contract going forward will be subject to two principal amendments introduced by clause 3.4 of MOV4, namely:
- (a) Infraco is required to self certify that the civils, systems and trackwork Design is in accordance with the Employer's Requirements. It will have no right or obligation to review that Design, and Infraco will be released from its obligations under clause 10 of the Infraco Contract (subject to issues in relation to ROGS);
  - (b) The Planned Sectional Completion Date for Section A is revised to 16 December 2011, and the delineation of Section A is ~~changed to include an area to the east of the Depot Access Bridge~~ reduced.
- 19.3 The exposure of tie/CEC will then include all the elements referred to above in connection with separation<sup>28</sup>, plus a number of other factors:
- 1) The costs associated with tie Change in relation to work which has not yet been carried out (see section 8 above);
  - 2) The costs associated with Infraco completing the work to York Place under the Infraco Contract, with the existing risk profile, including any claims which arise in relation to that work;
  - 3) Assuming that the project is only to continue to York Place, Infraco may be entitled to recover the profit that it would have earned in relation to the omitted section from York Place to Newhaven.

Each of these is dealt with in turn below.

**Change in relation to work not yet carried out**

**Agreed INTCs**

<sup>27</sup> Subject to certain changes introduced by MOV4 dealt with in more detail below

<sup>28</sup> Save that the payment to CAF in return for delivery of trams will not be triggered

- 19.4 As referred to in section 8 above, there are currently a number of INTCs where there is agreement between tie and Infraco in relation to both the principle and quantum of an INTC, but there is a dispute in relation to the extent to which the work in question has been completed. If work continues under the Infraco Contract, it is assumed that Infraco will complete the work, and the full agreed amount will become due to Infraco.

**INTCs determined through adjudication**

- 19.5 As referred to at section 8 above, there is a dispute between the parties in relation to the extent to which work which is the subject matter of adjudications has been completed. It is assumed that if work proceeds under the Infraco Contract, that work will eventually be completed by Infraco, and the sums determined at adjudication will therefore fall to be paid in their entirety.

**INTCs where there is a dispute on quantum**

Infraco value	£12,212,041
tie value	<u>£10,724,485</u>
Difference	£1,937,556

- 19.6 There is no independent analysis of tie's figures available; in the event of a dispute in relation to this issue, it is likely that factual and expert quantity surveying evidence would be required to determine the correct value. In those circumstances, as explained at section 2 above, a mid point has been taken between the tie and Infraco figures.

**INTCs where there is a dispute in principle**

**Design development/Pricing Assumption No.1**

Infraco value:	£18,354,838
tie value:	<u>£3,006,734</u>
Difference	£15,348,104

**Misalignment**

Infraco value:	£5,913,690
tie value:	<u>£308,403</u>
Difference	£5,605,287

- 19.7 tie has also produced an alternative figure in each case which evaluates the INTC in question on the assumption that Infraco is correct in principle to assert that there has been a tie Change, but tie takes issue with the quantum of Infraco's figure. This would reduce the value of Infraco's claim to £9,275,293 in relation to Pricing Assumption No.1, and £4,189,947 in relation to misalignment.
- 19.8 On the basis of the comments above in relation to the relative prospects of success of the competing arguments, it can be seen that it would be prudent to proceed, for present purposes, on the basis that Infraco will be entitled to make recovery in relation to these INTCs. There is no independent verification of Infraco's alternative assessment on quantum, and accordingly, the prudent approach would be to take a comparison between tie's figures and Infraco's figures, and adopt the mid point between these two figures in the analysis, as referred to at section 2 above.

**Clause 22/65**

- 19.9 The issues of principle in relation to this dispute are set out at section 8 above. tie assesses that the value of the work yet to be done which falls within this category is £292k. This is higher than the figure of £93k advanced by Infraco (because Infraco seek to categorise potential changes in terms of clause 80, rather than clause 65).
- 19.10 For the sake of prudence, tie's higher figure ought to be used in the analysis being carried out for present purposes.

**Miscellaneous INTCs**

- 19.11 tie has produced figures in relation to the respective values in relation to this category of INTCs as follows:

Infraco value:	£8,633,000
tie value – if tie correct in principle:	£24,000
tie value – if Infraco correct in principle:	£3,734,000

- 19.12 For the reasons explained in section 8 above, it would be prudent to proceed, for present purposes, on the basis that Infraco will be entitled to make recovery in relation to these INTCs. There is no independent verification of Infraco's alternative assessment on quantum, and accordingly, the prudent approach would be to take a comparison between tie's figures and Infraco's figures, and adopt the mid point between these two figures in the analysis, as referred to at section 2 above.

**Cost of completing outstanding work to York Place**

19.13 It is understood from tie that the costs associated with completing the work to York Place on the basis of the Infraco Contract (as amended by MOV4) are projected to be £182,706,712.

19.14 This figure is made up as follows:

**Offstreet airport to Haymarket**

	£m
BB work to be carried out	47.264
BB preliminaries	10.450
BB changes as yet unidentified	8.000
BB risk issues	4.060
BB – value engineering not realised	9.104
Siemens – work to be carried out	53.270
Siemens – preliminaries	<u>10.654</u>
	142.802

**Onstreet – Haymarket to York Place**

Work to be carried out (incl. preliminaries) 22.500

**Other**

SDS 2.003

CAF 10.330

Maintenance/spares 5.071

**Overall total** £182.706m

19.15 The figures referred to above include the following:

19.15.1 £8m in relation to change: it is understood from tie that this relates to changes which have not yet been identified; in other words, there is no double counting between this figure and those referred to above in connection with INTCs in relation to work yet to be carried out. By its very nature, the figure for as yet unidentified changes can be no more than an allowance: it is not possible to predict with any degree of certainty what this figure might be.

19.15.2 £4m in relation to risk issues: this is understood to consist of £2.5m in relation to ground risk, with the remainder being a general allowance of 5% in relation to miscellaneous risk.

19.15.3 £9m in relation to value engineering: it is understood that the figure of £47.264m for work to be carried out includes a significant element of value engineering savings. tie's approach has been to assume that Infraco will not realise this value engineering, and it ought therefore to be factored back in to the figures.

19.15.4 £20m in relation to preliminaries: if the project continues under the Infraco Contract, that work will broadly speaking be carried out in the period after 1 September 2011. During that period, Infraco will no longer be recovering preliminaries in terms of Schedule part 5 (those preliminaries cease in mid July 2011) or MOV4. Accordingly, Infraco will be entitled to make a recovery for their continued presence on site (to the extent that it is not caused by their own culpable delay). The allowances for preliminaries seek to recognise this continued presence on site.

19.16 The figures referred to above should be treated as allowances, rather than definitive predictions of what Infraco's entitlement might be in the event that the project continues.

#### **Omission of work from York Place to Newhaven**

19.17 In order to provide a proper comparison with the Settlement Agreement, consideration has been given to the omission of certain work from the scope of the Infraco Contract, specifically from York Place to Newhaven<sup>29</sup>.

19.18 The detailed analysis in relation to this issue is contained within Appendix 5 of this report. In summary, however, tie is entitled to instruct a tie Change which omitted elements of the Infraco Works. This extent to which this entitlement may be exercised is a question of degree: there are arguments which would support the proposition that it would extend to omitting the section from York Place to Newhaven.

19.19 In this event, it is likely that Infraco would be entitled to recover the profit that it would have made on the work omitted, whether through the operation of the valuation mechanism in the Infraco Contract, or as damages for breach of contract.

19.20 If the instruction to omit the work from York Place is a lawful one within the meaning of the Infraco Contract, in common with any other tie Change, it will require to be valued in accordance with the provisions of the Infraco Contract.

19.21 If it is held that the instruction to omit constitutes a breach of contract, then Infraco would be entitled to recover damages calculated to put it in the position that it would have been in had

<sup>29</sup> Subject to the comments made in this report in relation to powers of omission, it ought to be possible for instructions to be issued to omit any specific section of work – York Place to Newhaven has been used in order to provide parity with the Settlement Agreement

the breach not occurred: in other words, damages to restore to it the profit that it would have made had the work not been omitted.

19.22 On the basis of the foregoing, it is likely that Infraco would be entitled to recover any element of profit on the work that had been omitted, as well as the direct costs of demobilising.

19.23 tie has assessed the potential loss of profit and overheads that might be sustained by Infraco as £1.938m. By its nature, this figure can only be a very broad brush estimate of the way in which Infraco might formulate its claim.

#### **Legal and other costs**

19.24 As referred to above, at the end of section 18, legal and expert costs will be incurred in the event that the disputes are litigated through the courts.

19.25 The figure for these costs is likely to be higher if the work proceeds under the Infraco Contract, than if separation occurs. A figure of £4m has been utilised in relation to these costs; as before, that figure does not represent a definitive estimate of the potential costs, but has been adopted in order to provide a comparison between this and the other options available to tie/CEC.

19.26 Beyond these legal and expert costs, there would also be internal costs for tie/CEC associated with the dispute resolution proceedings.

20 **No Settlement Agreement – termination**

20.1 For the reasons explained in section 3 above, if the Settlement Agreement is not entered into for reasons other than those associated with funding, the Infraco Contract remains in place (as amended by MOV4), with the Infraco Works recommencing on 2 July 2011.

20.2 In that situation, it might be open to tie to seek to terminate the Infraco Contract on grounds of Infraco Default. The challenges associated with this approach were addressed in the Report for tie Limited on Certain Issues Concerning the Edinburgh Tram Project produced by McGrigors LLP on 14 December 2010.

20.3 In summary<sup>30</sup>, for tie to be entitled to terminate on the grounds of Infraco Default:

- (a) tie must establish that an Infraco Default has occurred;
- (b) That Infraco Default must be the subject matter of a Remediable Termination Notice which has been validly and competently formulated;
- (c) tie's determination of whether a submitted rectification plan is acceptable must have been exercised in accordance with the Infraco Contract.

Failure to meet any one of these tests will mean that a purported termination will constitute a wrongful repudiation of the Infraco Contract.

20.4 Establishing that an Infraco Default has occurred requires detailed forensic analysis; the issue will be subject to intense scrutiny in the context of any ensuing dispute, which is ultimately likely to be ventilated before the courts. The key default is Infraco Default (a), which involves proving not only a breach of the Infraco Contract, but also that the breach has materially and adversely affected the carrying out and/or completion of the Infraco Works.

20.5 The exercise referred to in the foregoing paragraph includes the compilation, review and analysis of all relevant written material as well as witness evidence. Expert input is also required in relation to technical and planning issues. That exercise was commenced by tie in late 2010, but was suspended following the discussions at Mar Hall.

20.6 Remediable Termination Notices were issued by tie in 2010 (prior to the exercise referred to above having been undertaken). It would be unsafe to rely on those notices:

- (a) Without the benefit of the outcomes of the forensic exercise referred to above; and

<sup>30</sup> See Executive Summary at section 1 of that report, and the decision tree at page 47 of that report (also reproduced at Appendix 7 to this report).



- (b) Because there is a material risk associated with the formulation of the Remediable Termination Notices (based on the sample which has been considered by McGrigors and Richard Keen QC<sup>31</sup>).
- 20.7 Infraco is entitled to issue a rectification plan following the service of a Remediable Termination Notice. tie is required to exercise good faith in considering any such rectification plan. Good faith requires an absence of dishonesty, fraud, irresponsibility or malice. The issue should not be pre-judged. The decision should be tie's alone, and not imposed by a third party. A decision to reject a rectification plan does not require to be justified as being fair or reasonable.
- 20.8 The Infraco Contract does not expressly provide for any time limit for the service of a termination notice following the rejection of a rectification plan. However, the elapse of time might affect tie's entitlement to rely on a Remediable Termination Notice, for example through the doctrine of personal bar, or in terms of whether the decision to terminate could be said to have been exercised fairly and reasonably in all the circumstances.
- 20.9 If tie terminates the Infraco Contract, it is entitled to enter upon the Infraco Works and expel Infraco. That is likely to provoke a legal challenge, the ultimate outcome of which may be measured in years. During that intervening period, it is unlikely that work could continue on the project – either by Infraco or by another contractor – other than with the co-operation of Infraco.
- 20.10 If tie is ultimately *successful* in the legal proceedings referred to in the foregoing paragraph, then:
- (a) The Infraco Contract will have been brought to an end;
  - (b) Infraco will have no further liability, unless tie proceeds to complete the tram project with another contractor on the basis of the same scope of works that was let to Infraco. In these circumstances, tie would be entitled to recover the additional, or "extra over", cost of completing the project, subject to the cap on liability.
  - (c) In these circumstances, Infraco's entitlement to make recovery would be similar to those of separation, as dealt with at section 5 above.
  - (d) It is likely that there would be an element of irrecoverable legal and internal costs associated with the period of litigation.

<sup>31</sup> See Appendix 2 to the McGrigors report of 14 December 2010

- 20.11 If tie is ultimately *unsuccessful* in the legal proceedings referred to above, then the potential exposure for tie is significantly greater. The option of electing whether or not the Infraco Contract should be treated as continuing will lie with Infraco. Infraco can choose to treat the "wrongful" termination as a tie Default and terminate itself, but it is not obliged to do so.
- 20.12 If Infraco elects to treat the "wrongful" termination as a tie Default and terminates, then Infraco will not only be entitled to payment for work actually carried out, but will also be entitled to payment for loss of profit at 10% on civils and 17% on track and systems. The Infraco Contract expresses this payment for loss of profit to be "*calculated with reference to demobilisation costs*". The meaning of this provision is uncertain, but there is a risk that tie's exposure to Infraco would not be restricted to lost profit on the costs of demobilisation.
- 20.13 If Infraco elects to treat the Infraco Contract as continuing at the conclusion of the legal proceedings, then the parties would be locked into that contract. Infraco would be entitled to insist on being allowed to complete the Infraco Contract. Infraco would be entitled to be paid for work already carried out. The underlying disputes between the parties would remain to be resolved (for example, in relation to Pricing Assumption No.1). Work would not have proceeded during the intervening period; the issue of any consents or approvals which had expired during that period would require to be addressed by tie.
- 20.14 In addition, the intervening period of delay, and its associated cost, would be tie's responsibility. It is impossible to assess with any degree of certainty what tie/CEC's exposure in this respect might be: it will turn to a significant extent on the length of time that any proceedings take to resolve. It will also depend on the way in which Infraco's site establishment is treated during the intervening period: it may be that agreement can be reached in relation to the extent to which Infraco demobilise. If such an agreement cannot be reached, the exposure to Infraco would potentially be higher.
- 20.15 An alternative approach would be to seek a ruling (through the DRP and/or the courts) that certain key breaches constitute Infraco Default, and if successful, use this as a basis for a Remediable Termination Notice. It is likely that tie would be entitled to require Infraco to continue with the Infraco Works in the interim, although careful consideration would require to be given to the framing of the referral in this respect. The same degree of forensic analysis would be required as referred to above.
- 20.16 A summary of the possible outcomes of the termination approach is set out in the decision tree at Appendix 7 of this report (and was also at Appendix 4 of the McGrigors report of 14 December 2010).
- 20.17 As referred to above, at the end of sections 18 and 19, legal and expert costs will be incurred in the event that the disputes are litigated through the courts.

- 20.18 The figure for these costs is likely to be higher if the disputes to be litigated include the question of termination. A figure of £7m has been utilised in relation to these costs; as before, that figure does not represent a definitive estimate of the potential costs, but has been adopted in order to provide a comparison between this and the other options available to tie/CEC. In the event that tie are successful in any argument in relation to termination, they are likely to be entitled to recover some of their legal costs in relation to the termination dispute, although the costs in relation to the underlying disputes in relation to entitlement will be dealt with according to success in relation to those disputes. Accordingly, a figure of £4m has been utilised in relation to this option.
- 20.19 Beyond these legal and expert costs, there would also be internal costs for tie/CEC associated with the dispute resolution proceedings.

21 **Conclusions**

- 21.1 Reference is made to the spreadsheets at Appendix 1 of this report which pull together the various building blocks identified in this report in relation to each of the options under consideration.
- 21.2 As explained in section 2 of this report, the figures set out there do not represent a definitive view in relation to the prospects of success in relation to each of head of claim; rather they represent what would amount to a prudent allowance to be made in relation to the various claims for the purposes of comparing the various options.
- 21.3 The spreadsheets show the range between Infraco's position (so far as that position is known – see comments at section 2 in relation to this issue) and tie's position, together with an indication of the values referred to in this report as the prudent values to be taken for the purposes of carrying out a comparison of the consequences of adopting the various options that have been identified.

**McGrigors LLP**  
**21-24 June 2011**

**APPENDICES**

**Appendix 1 - spreadsheets**

**Appendix 2 - mobilisation**

**Appendix 3 - Pricing Assumption No.1**

**Appendix 4 - claims by tie**

**Appendix 5 - loss of profit**

**Appendix 6 - putting project on hold**

**Appendix 7 - decision tree on termination taken from report of 14.12.10**

**Appendix 8 - glossary of terms**

Comparison Details	
Title	pdfDocs compareDocs Comparison Results
Date & Time	24/06/2011 14:12:40
Comparison Time	8.53 seconds
compareDocs version	v3.4.5.6

Sources	
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Modified Document	[#7617358] [v16] report re project separation 24.06.11.docDMS information

Comparison Statistics	
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Deletions	5
Changes	13
Moves	0
TOTAL CHANGES	30

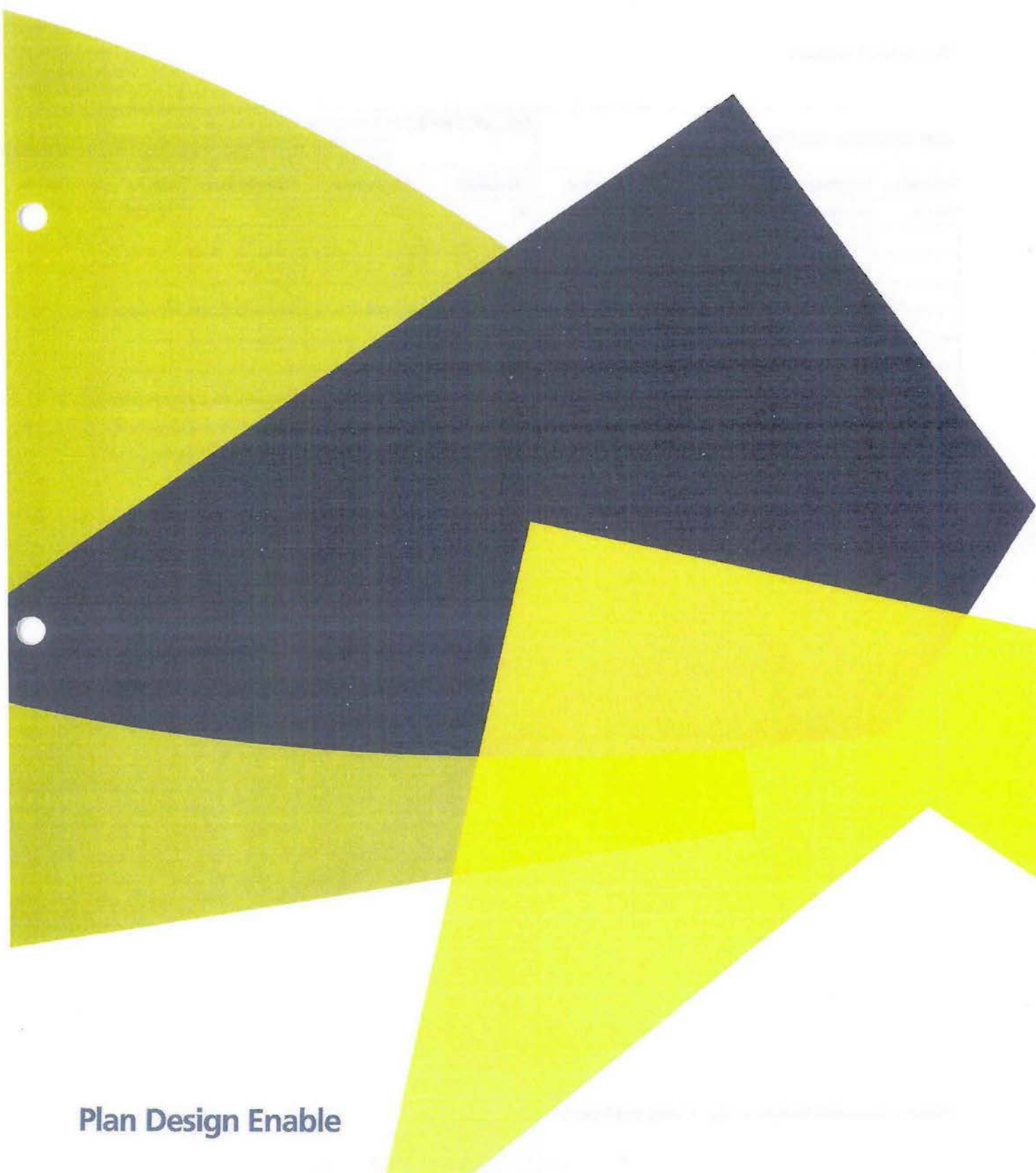
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Include Moves	Word	False
Show Track Changes Toolbar	Word	True
Show Reviewing Pane	Word	True
Update Automatic Links at Open	Word	False
Summary Report	Word	End
Include Change Detail Report	Word	Separate
Document View	Word	Print
Remove Personal Information	Word	False

# City of Edinburgh Council Independent Review

**ATKINS**

June 2011



**Plan Design Enable**

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## Document History

JOB NUMBER: 5013064			DOCUMENT REF: P:\GBE\HAIF and G - Scotland and Ireland\Jobs\FE\Projects 5000 - 6000\510 Projects\5013064 - Edinburgh Trams			
Revision	Purpose Description	Originated	Checked	Reviewed	Authorised	Date
Rev 3	Independent Review	22 <sup>nd</sup> June 2011	JF	KW	PS	22/06/11



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## 1. Introduction / Executive Summary

This report seeks to validate the processes and procedures carried out in the McGrigors reports (Report on Certain Issues Concerning Edinburgh Tram Project – Options to York Place Revisions – 16<sup>th</sup> June 2011; 15<sup>th</sup> June 2011; & 17<sup>th</sup> June 2011) and to give a sense check on the figures taken forward to the Budget Analysis spreadsheet produced by the City of Edinburgh Council (CEC).

This has been a very high level review of those processes and procedures with information taken at face value. Faithful+Gould has not had access to the contract documents nor had the time to scrutinise at a molecular level the build up of costs/prices supplied.

The report is split into four areas;

- General – an overview of the report
- Specific Items for review – Chapters 3 to 7 as detailed
- Other Issues – covers items that were discussed at the various meeting attended
- Going Forward – we have included this to take into account items that we see as critical to the successful conclusion to this project.

We would conclude that the approach taken by McGrigors and CEC demonstrates an appropriate method of identifying the likely heads of liability and there is no indication of any internal conflicts within the drafting. We also consider the methods used to establish the quantum of those liabilities suitable and appropriate.

## 2. General

This section reviews the review of the separation issues completed on behalf of CEC by McGrigors LLP ('McGrigor'). The McGrigor review has considered the sequence of events and impacts in the event of 'separation' of the Infraco contract under the terms of the MOV in the event that the Settlement Agreement ('SA') is not signed. The McGrigor review then goes on to consider the scenarios of 'No settlement agreement but continuing with the Infraco contract', and 'No settlement agreement – termination' where termination is instigated by tie.

We have not received or reviewed the contract documentation.

### Contract

We would expect any review of potential liabilities under a contract to be based on, and commence with, a review of the relevant contractual provisions. The McGrigor report incorporates a comprehensive review of the contract, establishing the basis of 'separation' in the event that the SA is not signed by the relevant timescales. The review further considers the provisions relating to Infraco's entitlement to recover monies under the contract and to establish the scope for the CEC liabilities.

The report considers the various heads of claim/recovery open to Infraco in the event of separation. Whilst we cannot comment on the accuracy or validity of the conclusions reached, we consider that the arguments are logically presented and do not indicate any internal conflicts within the drafting.

### Heads of Claim/Recovery

The report considers the potential Infraco recovery under the following broad headings:

- Payments due under the contractual milestone mechanism
- Payments for preliminaries
- Payments for variations (Changes)
- Payments for extensions of time

We consider the approach adopted in this regard to be acceptable, although we cannot comment on the validity of the conclusions reached.

Further sections of the report review potential costs arising in connection with the separation comprising:

- Costs of completing a proportion of the outstanding construction works
- Costs of completing the outstanding design
- Costs of purchasing trams and tram equipment
- Costs of temporarily mothballing or permanently abandoning the project

Again, these headings appear to address all likely further tie liabilities.

#### **Calculation of Potential Liabilities (From report 13-06-11)**

The report discusses the likely level of recovery by Infraco in respect of the identified heads noted above. The source of and means of calculation of the sums identified under these heads are not entirely clear [reviewed elsewhere in this document]. We note however, that McGrigor has applied a varying level of 'discount' to sums claimed by Infraco to arrive at a 'prudent' assessment of the potential tie liabilities. The rationale for the level of discount identified is not clear; we also note that the sums detailed do not always reflect the level of discount proposed.

***[Subsequently to this initial review this discount has been removed and the sums clarified.]***

The report does not conclude or gather together the overall impact of the various sums assessed and discussed and the full extent of potential liability is not clearly identified. We would therefore suggest that a liability matrix be incorporated indicating:

- Current agreed values
- Disputed, outstanding or potential values

The following values against each disputed, outstanding or potential head should then be identified:

- Tie assessment – best case value
- InfraCo assessment – worst case value
- The value of payments already made

This will allow the potential net maximum and minimum liabilities to be clearly shown. At present, given the current development of discussions and presentation by Infraco of claims for reimbursement, it does not seem possible to identify a likely level of tie liability. An indication of the possible range of outcomes will however be useful.

***[McGrigors report did not initially have these comparison spreadsheets attached. Subsequently these have been provided and validated.]***

#### **Conclusion**

We consider that the approach to the demonstration of the contractual liability is appropriate and that the likely heads of liability have been identified.

The spreadsheets now give a certain amount of clarity in the liabilities considered in the report. But for a full understanding of the liabilities one has to factor in those items that are being considered by Hg Consulting. Although we have discussed the individual figures with Colin Smith (Hg Consulting) we have not been able to review his report. These headings have been included in the CEC Budget Analysis spreadsheets.

### 3. Section 9 - Extension of Time

The McGrigor report 'redacted draft' 17/6/11' page 28 Item 9.2 1<sup>st</sup> para states "To date, Infraco has sought the following extensions of time through the formal mechanism under the Infraco contract:"

From the information available to Faithful+Gould to formulate a comment on the rational approach, EOT1 (INTC 1) was quantified, following adjudication, on the basis of tie letter of 5 November 2009 ref INF CORR 2773. This letter does not make reference to any contractual formal mechanism and therefore cannot be considered as a contractual document. However as the same approach was adopted for subsequent adjudication on MUDFA rev 8 / INTC 429, the question would be, is the method adopted for INTC 1 and INTC 429 applicable to INTC 536 and a claim in respect of the Depot and associated works?

The first two EOT claims are based on adjudication decisions so there can be no doubting there merit. There quantum can be clearly identified and although Infraco attempted to seek a further extension to INTC 429, this was rejected by the Adjudicator. We can therefore assume that the value of these adjudications is as reported with little risk of further exposure.

The EOT claim INTC 536 and Depot works is less clear, as little information has been provided and it is stated that it has been incorrectly pleaded. The report accepts that Infraco are likely to be due a significant claim and therefore we would agree with the prudent approach of including Infraco figures of £43.670M and £20.080M.

It should be noted that if the contract progresses to completion with Infraco any further extension of time claims not already notified to date will be included within the completion contract cost to complete, and no further claims can be perused.

If the contract Separation is instigated there could be further claims for Extension of time, this has been allowed for under the Primary Risk Items.

Financial analysis of Section 9 is now contained in Section 11 of the McGrigor report.

On balance the assessments used under this heading seem to be a sensible approach for evaluation of EOT claims.

### 4. Section 10 – Preliminaries

The question posed by the by McGrigors report is what method of calculation should be used to calculate a claim for additional preliminaries associated with the granting of an extension of time claim. Two options were explored:

- Time based
- Additional Cost based

Having reviewed the information contained within the report and the commentary of the adjudication in November 2010 by Lord Dervaird, we are of the opinion that the most likely method of calculation is that of the Time Based method. It would seem to follow, most closely, the principle set out by the adjudication.

We would also agree with the general principle that the Contractor should not be 'entitled to make a second, double, recovery.' for loss & expense over the same period. But he would be entitled to loss & expense claim for work that he had already procured and had to terminate due to the delay.

Delay caused by inclement weather was an area where recovery of time can be gained against a delay that does not attract preliminaries. This was felt to have minimal impact when considered in parallel with that of the delay caused by the MUDFA delays

## 5. Section 12 - Mobilisation Payment

On the matter of recovery of an amount against this payment we first have to consider what would be standard practice within the industry. JCT Standard Building Contract 2005 (SBC05) and ECC NEC 3<sup>rd</sup> Edition make special reference to an Advanced Payment (Clause 4.8 and Option X14 respectively), whilst Government Accounting only allows for advance payments in exceptional circumstances. Such as in the 1991 New Roads and Street Works Act (NRSWA). This puts strict provisions for any advanced payment for Highway Works to Statutory Undertakers.

Advanced Payments are given with the expectation of deriving some benefit to the Employer. Whether that is a direct reduction in the contract sum, in the case of the NRSWA, or to procure specialist plant or materials with a high initial spend profiles. It is also industry practice to establish a mechanism for recovery of this payment through milestone repayments or percentage reductions to valuations. JCT SBC05 requires under clause 4.10.2 this repayment to be itemised in the valuation certificate. These repayment mechanisms are agreed and inserted in to the contract conditions. To reduce the Employer's risk of losing the advanced payment a Bond would normally be obtained as surety.

Although there is mention in the McGrigors report of an understanding between the parties that the payment amounting to £45.2M being an advanced payments, there does not seem to be any other evidence that would support this understanding i.e. repayment mechanism, bond. Schedule Part 5 (Milestone Payment Schedule) is also quite clear in dealing with this payment as milestone payments.

In conclusion, we would agree with McGrigors final paragraph at present the prudent approach would be to assume that there will be no recovery of the sums paid.

## 6. Section 15 - Cost of Employing Another Contractor

The process of assessing the potential cost of employing another contractor to complete the works to St Andrews Square appears to be based on the sums of completing the existing work as per the schedule of work or Bill of Quantities. The figure allowed of £189.4M only accounts for the direct cost of employing a new contractor. Other risk items have been included in Section 4 of the CEC Budget Appraisal spreadsheet. These include bad project risk, system integration risk and exclusion risks and are commented on below.

Other items that should be considered are:

- Materials off site - £16M of materials off site has been paid to the Contractor already. No reduction to completion cost is apparent. Although it is unlikely that the full sum would be realised.
- Design warranties – allowance for installed works to be adopted
- Princes Street – are the remedial works included in the works to complete element and if so, has there been a subsequent counter claim allowed for this work.
- Design Completion – allowance of £2m is include for the completion of design. This does not seem to included for the intellectual design of the system by Siemens. [£10M is included in the 'Systems Risk' element that would cover this item].
- Sub-contractor title claims – there is £20M included in the 'BSC Settlement Premium Risk' to deal with Sub-contractor claims
- Responsibility and costs for making good defects – there is an allowance of £22.3M that includes this item
- Responsibility for latent defects – a new contractor will be unwilling to pick up this risk and unless a clear delineation between different pieces of work can be established it will become very difficult to prove who is responsible. This risk will only become apparent if the defect is picked up during the life time of the construction project. Otherwise it is more than likely that the CEC will be come responsible and costs will have to be borne by the CEC's maintenance budget.

We are satisfied that between the McGrigor report and the Budget Analysis spreadsheet the relevant heads of liabilities have been covered.

## 7. Section 17 - Costs of putting the Project on Hold

As stated in the Appendix 'Legal analysis in relation to putting the project on hold' the costs in relation to putting the project on hold are dependent upon what is carried out and the extent of the 'hold' period.

The following are possible ways to maximisation the existing assets:

- With regards the depot buildings, these could be completed and marketed for sale / lease, dependant on the hold period. Employment of another contractor to carry out these works may result in additional cost of providing warranty on works carried out by previous contractor. Once complete, however the buildings would realise a return on the expenditure to date.
- The section of track constructed on previous green field land, again dependant on the hold time and dependant on the terms of any compulsory land purchase agreement could be utilised as, for example a walkway / cycle track. This would require the removal of any track currently in place. The value of the track materials removed will be negligible.

With regards the section between Haymarket and St Andrews Square, the costs will vary dependent upon what is carried out. Should the hold period be extensive, and as the tracks currently laid require remedial treatment to bring them up to the tendered specification, the costs to put on hold should be offset by a claim against Infraco based on the cost to carry out remedial work to bring up to specification. The basis of this claim against Infraco should start at the full reinstatement cost, for the Princes Street section, as the works were defective in this area.

Allowance within the McGrigor report and the Budget Analysis spreadsheet include for demobilisation, reinstatement costs, removal of certain infrastructure, maintenance costs and design completion. Other considerations that have been included for are compliance with "the Tram Act". No allowance for maximising the existing asset has been allowed for.

We consider that the appropriate headings of liabilities have been included for in the report.

## 8. Other Issues

Various meetings were held at the City of Edinburgh Council's (CEC) offices at Waverly Court to review and discuss the detail in McGrigor's report, supporting information to that report and CEC's Budget Appraisal spreadsheet.

Some of the issues that were raised and dealt with at those meetings were as follows:

- **Third party Agreements –**
  - An allowance of £3M had been included for unknown 3<sup>rd</sup> Party Agreements in the "Exclusions Risk" item of the CEC spreadsheet.
  - A further £9M needed to be added to this figure for identified 3<sup>rd</sup> Party Agreement Claims, as identified at the meeting of 20<sup>th</sup> June 2011.
- **Pricing Exclusions –** these are items that have been identified as exclusions by the Contractor should they complete the project. They will therefore be risk item for any contractor completing the works. These items included costs for disruption caused by for other events, ordinance, post adoption maintenance of roads and bridges, and storage of materials. These were also identified in the "Exclusions Risk" allowance.
- **Claims that have not been as yet identified –** there is a definite period when the claims 'begin to dry up'. Thus meaning that if the project was to terminate either amicably or not further claims would be forthcoming. Additional risk allowances had been made under the 'Primary Risk' and 'Further Risk/Contingency' items.
- **Integration of Design –** this relates to section 6 above and is a significant factor. This is the ability of Siemens or CAF holding CEC 'to ransom' should another contractor complete the works. The CEC would be forced into buying the rights to use the system as in stalled by Siemens / CAF. An allowance of £10M has been included.
- **Putting Project on Hold –** this included items such as demobilisation, removal of certain infrastructure, remedial works, reinstatement costs and design completion costs. An allowance of £22.3M has been included.
- **Bad Press / 'Tram Factor' –** this item is included for any re-procurement scenario. It is likely a future contractor would add a percentage increase to their tenders for the uncertainty in working on a project that has now a bad reputation.
- **BSC Settlement Premium + Risk –** The £80M allowed is broken down into three parts; payment to Sub Contractors £20M; payment to BBS £50M; and a sum of £10M split between the two for them to walk away from the project. These sums are very global but are dependent on the parties' attitudes to settlement.
- **Utility Works –** this was considered a major concern that further (unknown) utility works will be required in the Shandwick Place. Allowances to carry out the works have been included in the 'Further Risk / Contingencies' item. To mitigate this risk from any completion contract we believe that any works to this area should be dealt with by sectional completion and no date given for site possession but only on successful completion of the utilities works.

## 9. Settlement Figure Analysis

Having reviewed the Settlement Figure Analysis brief, we would agree with the 'tactics' portrayed by Hg Consulting in bullet points 1 to 8. As stated above (8 Other Issues, bullet point 'BSC Settlement Premium + Risk') the figures quoted are very global and the deciding factor will be on how aggressive and intransigent the Infraco attitude is to settlement.

On termination of a contract it is normal practice to only to deal with the Main Contractor and responsibility for the settlement of sub-contracts is the responsibility of the Main Contractor. Any sub-contract claims are fed through the Main Contractor. We therefore assume that the allowance of £20M for Sub-contractors is either an allowance to deal with those secondary claims or a legal obligation as part of the Infraco / tie contract.

## 10. Going Forward

Should the project be completed either by the incumbent contractor or a new contractor we would consider some of the following to be critical for a successful delivery of the project going forward:

- Novation agreement with Design Team and Main Contractor to be adjusted - all design risk with the Main Contractor.
- No payment for materials off site.
- On site materials only paid where the Main Contractor can prove he has title to the materials.
- Activity Payment Schedule to be amended - to make it more flexible.
- Any existing underground services work to be carried out either prior to the Main Contractor gaining possession or transfer the risk for this work to the Main Contractor.
- Possible Sectional handover of site to the Main Contractor - Haymarket to Airport - then Haymarket to York Place - helps to give more time to organise the on-street works and any design issues and agreement on remedial works to Princess Street.
- Withholding notices / mechanism to be issued on defective work - so payment is not made to Main Contractor.
- No advance payments.
- Strict Change Order procedure - agreement before work is carried out.
- A mechanism for informal dispute resolution, with clear stages/levels of hierarchy

The above items are only some of the points that should be part of the negotiation with the Main Contractor prior to contract agreement. We have not had sight of the original contract but believe these are areas of contention.



**John Findlay**  
Canning Exchange  
10 Canning Street  
Edinburgh  
EH3 8EG

**Email:** [john.findlay@fgould.com](mailto:john.findlay@fgould.com)  
**Telephone:** 0131 221 5600



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	Settlement Agreement (High)	Separation				Unsuccessful Termination	Continue with Infraco to York Place (High)	Continue with Infraco to York Place (Low)
		Mothball/Cancel Project (High)	Mothball/Cancel Project (Low)	Re-Procure (High)	Re-Procure (Low)			
	MOV5 entered into on or before 1.7.11, and subsequently becomes unconditional	MOV5 not entered into on or before 1.7.11 for reasons associated with funding: automatic termination	MOV5 not entered into on or before 1.7.11 for reasons associated with funding: automatic termination	MOV5 not entered into on or before 1.7.11 for reasons associated with funding: automatic termination	MOV5 not entered into on or before 1.7.11 for reasons associated with funding: automatic termination		MOV5 not entered into on or before 1.7.11 for reasons other than funding: continue with Infraco Contract	MOV5 not entered into on or before 1.7.11 for reasons other than funding: continue with Infraco Contract
<b>Section 1</b>								
<b>Milestones</b>								
Construction Milestones		22.2	20.6	22.2	20.6	22.2	22.2	20.6
CAF - Tram Supply Milestones + to go cost		57.3	57.3	57.3	57.3	57.3	57.3	57.3
Maintenance Milestones		0.3	0.3	0.3	0.3	0.3	0.3	0.3
SDS		6.2	6.0	6.2	6.0	6.2	6.2	6.0
MOV4 - Certificate 1		29.1	27.0	29.1	27.0	29.1	29.1	27.0
MOV4 - Certificate 2		12.1	9.0	12.1	9.0	12.1	12.1	9.0
Certificate No. 43		7.7	6.2	7.7	6.2	7.7	7.7	6.2
MOV4 - Certificates 3A, B and C (yet to be certified)		13.0	13.0	13.0	13.0	13.0	13.0	13.0
Prioritised Works Milestones (excluding prelims)		22.8	22.8	22.8	22.8	22.8	22.8	22.8
Partially completed Construction Milestones		5.7	5.7	5.7	5.7	5.7	5.7	5.7
Milestones to Date	0.0	176.4	167.8	176.4	167.8	176.4	176.4	167.8
BB/S Airport to Haymarket (under MOV5/Infraco) - Fixed Lump Sum	362.5							
CAF Airport to Haymarket (under MOV5/Infraco) - Remaining Costs under Fixed Lump Sum	62.9							
Haymarket to St Andrew Sq (Target Cost)	22.5							
<b>Section 1 sub total</b>	<b>447.9</b>	<b>176.4</b>	<b>167.8</b>	<b>176.4</b>	<b>167.8</b>	<b>176.4</b>	<b>176.4</b>	<b>167.8</b>
<b>Section 2</b>								
Remaining Infrastructure (Infraco continuation scenario)						182.7	182.7	182.7
New Contractor to replace Infraco				199.5	199.5			
<b>Section 1 + Section 2 = Infrastructure and Vehicles</b>	<b>447.9</b>	<b>176.4</b>	<b>167.8</b>	<b>375.9</b>	<b>367.3</b>	<b>359.1</b>	<b>359.1</b>	<b>350.5</b>
<b>Section 3</b>								
INTC's agreed in full - work done		5.3	5.3	5.3	5.3	10.4	10.4	10.4
INTC's agreed in full - WIP		5.1	4.1	5.1	4.1			
INTC's determined through adjudication - work done		3.1	2.8	3.1	2.8	4.0	4.0	4.0
INTC's agreed in principle but disputed quantum		3.6	2.0	3.6	2.0	15.8	15.8	12.3
INTC's dispute in principle - work done (to be done in case of attrition)		7.4	4.4	7.4	4.4	40.4	40.4	21.5
EOT/Prelims		82.2	54.4	82.2	54.4	82.2	82.2	54.4
Mobilisation		45.2	45.2	45.2	45.2	45.2	45.2	45.2
Additional Consequences		5.6	5.6	5.6	5.6	5.6	5.6	5.6
lit claims e.g. defects		-4.0	-4.0	-4.0	-4.0	-4.0	-4.0	-4.0
Loss of Profits		0.0	0.0	0.0	0.0	1.9	1.9	1.9
BSC Settlement: Premium + Risk (Demob etc.) + potential further claim items		80.0	80.0	80.0	80.0	80.0	80.0	
Costs of Putting Project on Hold		22.3	22.3	22.3	22.3	4.5	4.5	4.5
<b>Section 1+2+3 Total Budget "Final Account"</b>	<b>447.9</b>	<b>432.1</b>	<b>390.0</b>	<b>631.6</b>	<b>589.5</b>	<b>645.1</b>	<b>565.1</b>	<b>506.3</b>

	Settlement Agreement (High)	Separation				Unsuccessful Termination	Continue with Infraco to York Place (High)	Continue with Infraco to York Place (Low)
		Mothball/Cancel Project (High)	Mothball/Cancel Project (Low)	Re-Procure (High)	Re-Procure (Low)			
	MOV5 entered into on or before 1.7.11, and subsequently becomes unconditional	MOV5 not entered into on or before 1.7.11 for reasons associated with funding: automatic termination	MOV5 not entered into on or before 1.7.11 for reasons associated with funding: automatic termination	MOV5 not entered into on or before 1.7.11 for reasons associated with funding: automatic termination	MOV5 not entered into on or before 1.7.11 for reasons associated with funding: automatic termination		MOV5 not entered into on or before 1.7.11 for reasons other than funding: continue with Infraco Contract	MOV5 not entered into on or before 1.7.11 for reasons other than funding: continue with Infraco Contract
Section 4								
Primary Risk					106.6 9	36.9 9	106.6 9	36.9 9
Bad Project Risk 15% of works	77.5 2				40.0 2	40.0 2		
Systems Risk in relation to new contractor using existing materials					10.0 2	10.0 2		
Inflation Risk					25.0 2	25.0 2		
Further Delay							60.0 10	60.0 10
Specified & Exclusion Risk					77.5 2	77.5 2	77.5 2	77.5 2
Litigation, Professional Fees		3.0 6	3.0 6		3.0 6	3.0 6	8.0 6	4.0 6
Section 4 sub total = Risk Related Items	77.5	3.0	3.0		262.1	192.4	8.0	248.1
Section 5								
Non BSC Costs to date (incl design)	239.0 3	239.0 3	239.0 3		239.0 3	239.0 3	239.0 3	239.0 3
Project Management Costs to go	9.0 4	3.0 4	3.0 4		12.0 4	12.0 4	18.0 4	3.0 4
Site Security and Interim Works		10.0	10.0					
Section 5 sub total Non BSC to Date + PM costs to go	248.0	252.0	252.0		251.0	251.0	257.0	242.0
Sections 1+2+3+4+5 = Total Costs	773.4	687.1	645.0		1144.7	1032.9	910.1 +	1055.2

50% of the Delta High to Low

679.3

Notes

1. Settlement Agreement
2. Independent Certifier assessment
3. Period 2 2011/12 costs to date less Infrastructure and Vehicles
4. All items on site of £5m per annum for Project. The amount of this cost is not a separate cost.
5. CAF certified to date from McGrigors sheet plus total to go for original contract sum
6. Source McGrigors report Separation section excluding item 1 in note 1
7. Source McGrigors report Continue with Infraco section excluding item in note 1
8. Site assessment (Dennis Murray email 22-06-11)
9. Risk s identified at mediation from PPP that could still be apparent with a new contractor.
10. Additional Delay of one year as a result of using current contract mechanisms

Atkins  
Edinburgh Tram – Business Case Audit  
Final Report

July 2011

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# Edinburgh Tram – Business Case Audit Final Report

July 2011

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## Document History

JOB NUMBER:			DOCUMENT REF: Final Report.docx			
Revision	Purpose Description	Originated	Checked	Reviewed	Authorised	Date
2	Final Report	LM	SF	PR	SF	070711
1	Draft Final Report (incorporating most recent JRC outputs)	LM	SF	PR	SF	280611
0	Draft Final Reports	LM	SF	PR	SF	230611

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**Appendix A - Data and Report Inputs**

**Appendix B – JRC Standard Outputs**

**Appendix C – STAG Outputs**

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Table A.1 - Data and Report Inputs
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# Glossary of Terms

- BCR: Benefit / Cost Ratio
- EALI: Economic Activity and Locational Impacts
- EARL: Edinburgh Airport Rail Link
- HLM: High Level Model
- In Vehicle Time Weightings / Mode Coefficient: Representation in minutes / or as a factor of the relative attractiveness of a mode of transport
- Interchange Penalty: Representation in minutes of an interchange during a passenger's journey
- JRC: Edinburgh Tram Joint Revenue Commission
- Outturn Cost: The final cost of a project
- PV: Present Value
- SDS: Systems Design Contract
- STAG: Scottish Transport Appraisal Guidance
- TEE: Transport Economic Efficiency
- TEL: Transport Edinburgh Limited
- TELMoS: Transport, Economic, and Land-Use Model of Scotland
- tie: Transport Initiatives Edinburgh
- TMfS: Transport Model for Scotland
- VISUM / VISSIM: Transport modelling software
- WebTAG: Department for Transport's Transport Analysis Guidance
- WETA: West Edinburgh Transport Appraisal



# 1. Edinburgh Tram Business Case Audit

## Atkins

- 1.1 Atkins is the UK's largest engineering and design consultancy and has extensive experience in the planning, design, and delivery of mass rapid transit projects in the UK and overseas.

## Our Brief

- 1.2 We were commissioned by the City of Edinburgh Council (CEC) in April 2011 to undertake an independent review of the Edinburgh Tram Business Case. The audit's principal focus has been reviewing the work which the Joint Revenue Commission (JRC) has been undertaking in assessing the benefits that could be gained from the introduction of the proposed tram system in Edinburgh.
- 1.3 Key inputs to the audit have included: Edinburgh Tram Network Final Business Case Version 2 (2007), Edinburgh Tram – Business Case Update (2010), recent analysis on three route options undertaken by JRC in parallel with the audit, historic revenue and risk reports, and the current financial models for the tram.

## Options Tested

- 1.4 The JRC was commissioned by the City of Edinburgh Council in April 2011 to provide updated TEE analysis<sup>1</sup> for the following three tram routes options:
- The full Phase 1a, Edinburgh Airport to Newhaven;
  - Truncated Phase 1a, Edinburgh Airport to St Andrew Square; and
  - Truncated Phase 1a, Edinburgh Airport to Foot of the Walk.

## Business Case Components

- 1.5 Our business case audit has focussed on the updated TEE analysis that has been provided by the JRC during June 2011. In addition to quantifying the benefits and costs to Government via the TEE analysis STAG<sup>2</sup> requires that other relative benefits from a transport scheme are presented within the context of the following parameters:
- Environment;
  - Safety and Security;
  - Accessibility and Social Inclusion;
  - Transport and Land Use Integration;
  - Economic Regeneration; and
  - Economic Activity and Locational Impacts (EALI).
- 1.6 The Edinburgh Tram Network Final Business Case Version 2 (2007), and Edinburgh Tram – Business Case Update (2010) provide evidence of the relative benefits within each of these parameters; while these elements have not been updated by the JRC team, or reviewed in detail as part of this audit, we have drawn our overall conclusions acknowledging this wider context for the scheme.

<sup>1</sup> Transport Economic Efficiency, [http://www.transportscotland.gov.uk/stag/td/Part2/Cost\\_to\\_Government/12.7](http://www.transportscotland.gov.uk/stag/td/Part2/Cost_to_Government/12.7)

<sup>2</sup> Scottish Transport Appraisal Guidance (STAG), <http://www.transportscotland.gov.uk/stag/home>

## 2. Our Approach

### Key Questions

2.1 The approach we have adopted to undertake the business case audit has been developed around answering three questions:

- The tools used – are they fit for purpose?
- The assumptions used – are they reasonable?
- The outputs – do they look credible?

### Our Overall Approach

2.2 There are a number of overall principles that we adopted in undertaking the audit, which were essential in delivering the required outcome in the time available. These were:

- A pragmatic approach, avoiding the pursuit of technical purity for the sake of it, as opposed to where it relates materially to the strength of the business case;
- Open lines of communication with the JRC team. An open, co-operative approach that provided the outputs our work required without distracting them from developing three new BCRs<sup>3</sup>; and
- As with technical pragmatism (above), we needed to avoid being distracted with issues which are not material to the business case – we needed to review what had gone before but to ensure that our focus remained on issues that are contemporary, rather than those which are no longer significant in terms of the business case.

### Our Methodology

2.3 Our methodology for the study focussed at delivering the following seven tasks over a ten week programme:

**Task 1 - Data and report collation:** Our review was completely dependent upon collating the right information, and ensuring that we maintained a focus on information that was still pertinent.

**Task 2 – Review of the base year model:** The model was subject to a detailed audit in 2008, and enhancements were implemented on the basis of recommendations made at that time. We have not replicated the technical depth of that audit, but have reviewed those aspects of the model to which the outputs (the benefits in the TEE/BCR calculations) are most sensitive.

**Task 3 – Understanding the drivers of demand, revenue and benefits:** An early action was to establish a very clear focus on the key business case drivers, we developed a thorough understanding of the scale, nature, and source of the component benefits within the business case.

**Task 4 – Forecasting assumptions:** Concurrently with task 3 we reviewed the evidence underpinning the forecast assumptions.

**Task 5 – Review of appraisal parameters:** We undertook a review of the appraisal framework used to establish the relative merits of the scheme.

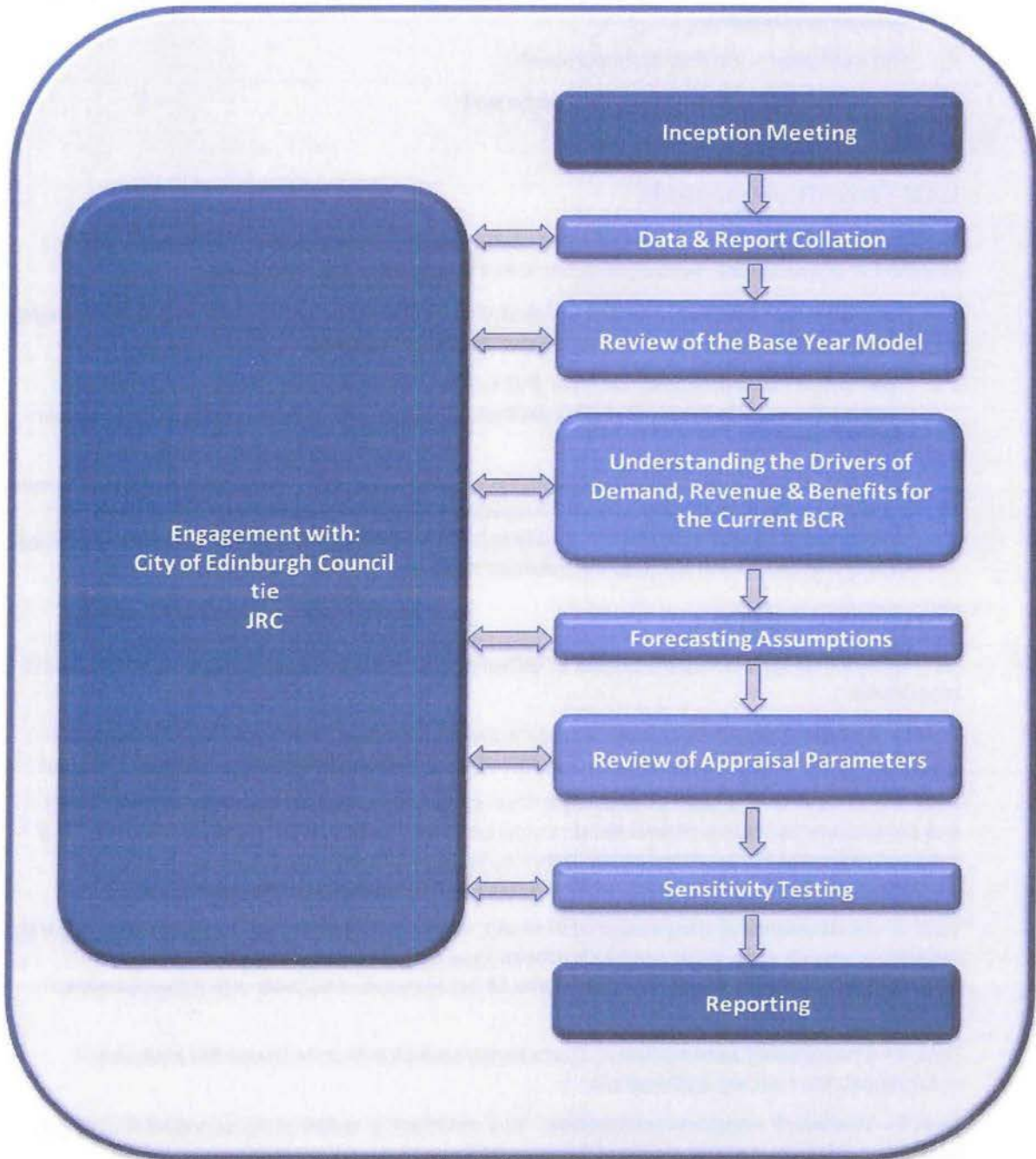
**Task 6 – Sensitivity testing:** We identified key areas of risk and uncertainty, and requested sensitivity testing from the JRC to help quantify the impact of these risks on the business case.

**Task 7 – Reporting:** We reported our outputs in three increments; a presentation to senior City of Edinburgh official on 14<sup>th</sup> June 2011, an Executive Summary Report on 22<sup>nd</sup> June 2011, and this Final Report on 30<sup>th</sup> July 2011.

<sup>3</sup> Benefit/Cost Ratio (BCR), [http://www.transportscotland.gov.uk/stag/td/Par:2/Cost\\_to\\_Government/12.7](http://www.transportscotland.gov.uk/stag/td/Par:2/Cost_to_Government/12.7)

2.4 Our methodology is illustrated in Figure 2.1 below.

Figure 2.1 - Methodology



### 3. Audit Inputs

#### Key Inputs

- 3.1 The audit has reviewed a wide range of documents and these are listed in Appendix A.
- 3.2 Key inputs to the audit have included: Edinburgh Tram Network Final Business Case Version 2 (2007), Edinburgh Tram – Business Case Update (2010), recent analysis on three route options undertaken by JRC in parallel to the audit, historic revenue and risk reports, and the current financial models for the tram.
- 3.3 The figure below highlights some of the key sources of information used in the audit.

Figure 3.1 – Key Documents



## Options Tested

- 3.4 The JRC was commissioned by the City of Edinburgh Council in April 2011 to provide updated TEE analysis for the following three tram routes options:
- The full Phase 1a, Edinburgh Airport to Newhaven;
  - Truncated Phase 1a, Edinburgh Airport to St Andrew Square; and
  - Truncated Phase 1a, Edinburgh Airport to Foot of the Walk.
- 3.5 Our business case audit has focussed on this updated TEE analysis.

## JRC Standard Outputs

- 3.6 The JRC has produced standard outputs that contain information for the following:
- Tram patronage and revenue mode shift;
  - Ramp up and recession impacts on patronage and revenue; and
  - Patronage flows and capacity.
- 3.7 These outputs have also been recently refreshed for the three tram options listed above and are contained in Appendix B of this report for reference.
- 3.8 An early requirement of our work was to examine the distribution of forecast demand and benefits for the scheme. This was to provide a focus for later stages of review; in line with the principles of our approach (see section 2.2) we needed to focus our attention on those aspects of the performance of the scheme which were most influential in terms of the business case. Our initial review of the standard outputs highlighted the importance of the elements of demand discussed below.

## Ingliston Park and Ride and Future Committed Development

- 3.9 When the standard outputs are analysed they clearly identify the importance of the Ingliston Park and Ride, and the future committed development (particularly in the north and west of Edinburgh) in driving demand for the tram.
- 3.10 The tram patronage and revenue mode shift tables in Appendix B show the modes which tram users are forecast to have used in the absence of the tram. These show that the predominant transfer is from bus, as might be expected, however, they also show that a large proportion of the total demand would otherwise have used car for their journey. Looking at these in combination with the boarding and alighting plots; show that the **Ingliston Park and Ride** is by far the busiest stop for eastbound trips in the AM peak, confirming the importance of the Park & Ride site as a source of peak hour demand for the each of the options tested. In particular it forms a very significant proportion of the AM peak demand for the St Andrew Square option.
- 3.11 The significance of the major **committed future developments** is illustrated in the boarding/alighting plots in Appendix B (the full Phase 1a outputs are particularly useful as they disaggregate demand along the whole corridor – extracts for these are provided in Fig 3.2 to 3.5 on the following pages), which show significant growth in use of stops associated with new committed development in the north and west of Edinburgh – such as stops at the east end of the route, and Edinburgh Park.

Figure 3.2 – Eastbound Boarding and Alighting 2011 AM Peak, Full Phase 1a  
(Source JRC - June 2011)

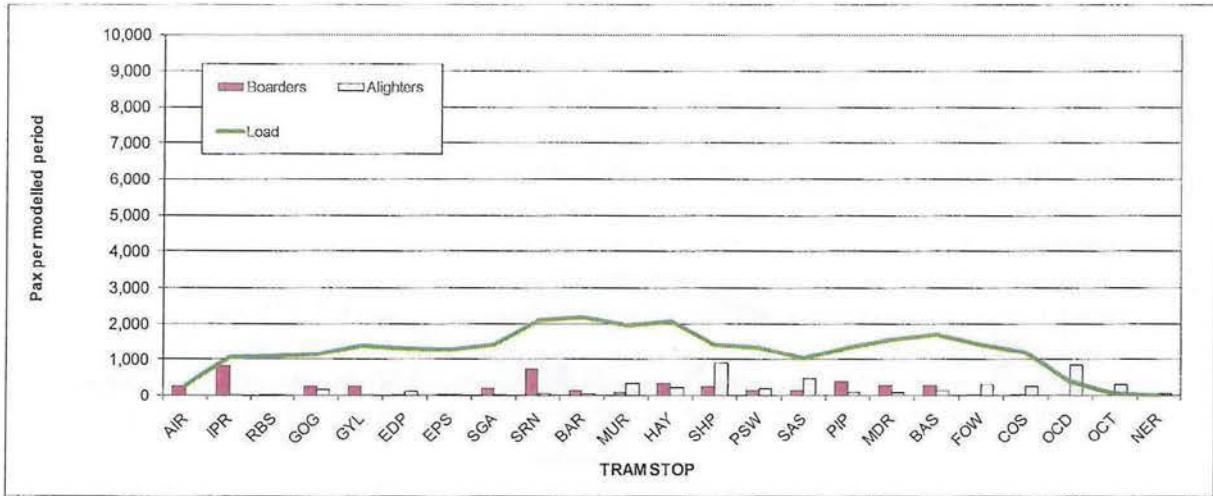


Figure 3.3 – Westbound Boarding and Alighting 2011 AM Peak, Full Phase 1a  
(Source JRC - June 2011)

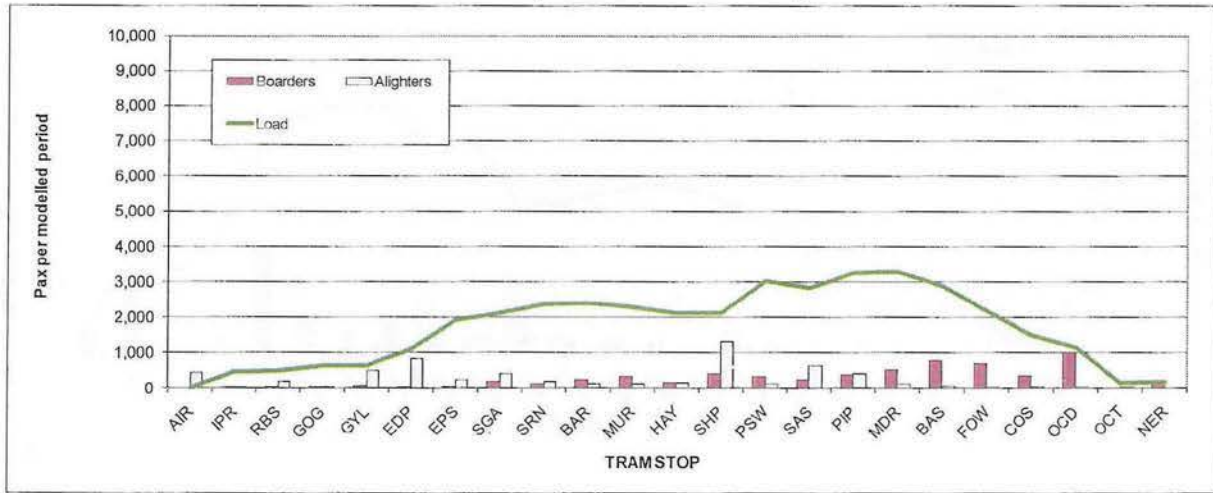


Figure 3.4 – Eastbound Boarding and Alighting 2031 AM Peak, Full Phase 1a  
(Source JRC - June 2011)

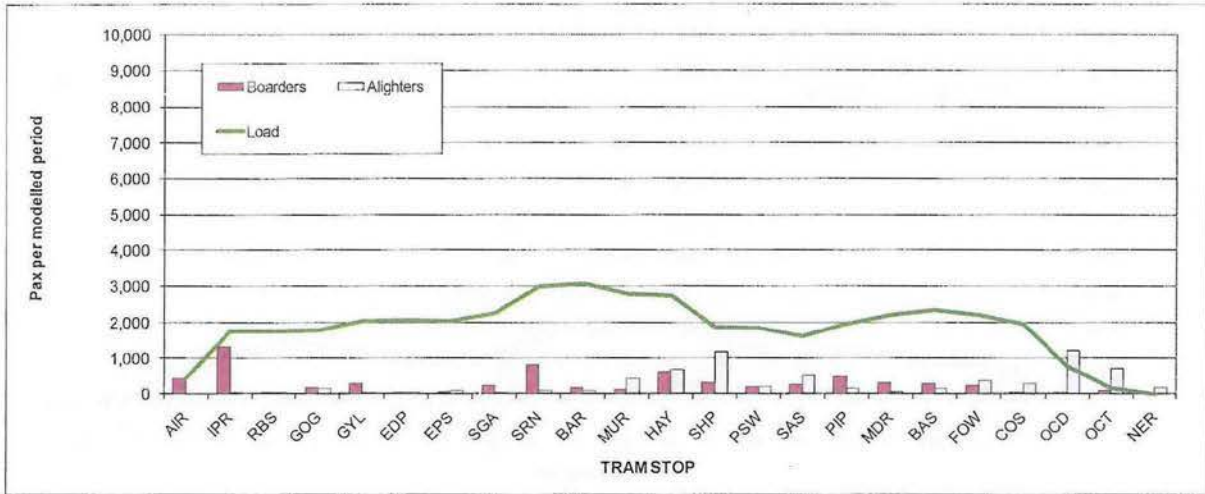
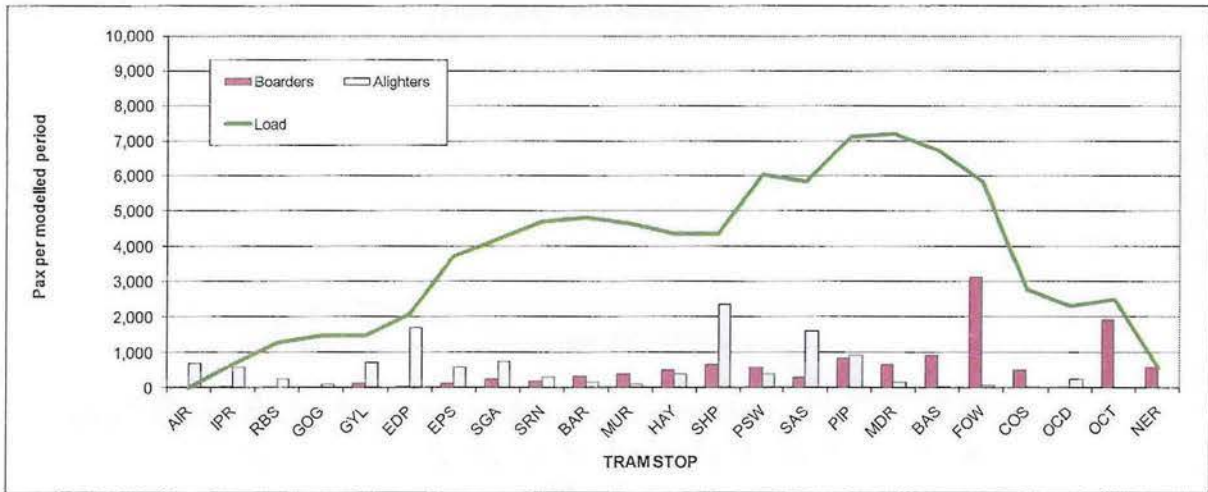


Figure 3.5 – Westbound Boarding and Alighting 2031 AM Peak, Full Phase 1a  
(Source JRC - June 2011)



## Business Case Components

- 3.12 In addition to quantifying the benefits and costs to Government via the TEE analysis STAG requires that other relative benefits from a transport scheme are presented within the context of the following parameters:
- Environment;
  - Safety and Security;
  - Accessibility and Social Inclusion;
  - Transport and Land Use Integration;
  - Economic Regeneration; and
  - Economic Activity and Locational Impacts (EALI).

- 3.13 The Edinburgh Tram Network Final Business Case Version 2 (2007), and Edinburgh Tram – Business Case Update (2010) provide evidence of the relative benefits within each of these parameters; while these elements have not been updated by the JRC team, or reviewed in detail as part of this audit, we have drawn our overall conclusions acknowledging this wider context for the scheme.

## Scheme Costs

- 3.14 The scheme’s capital and revenue costs are a key input to the TEE analysis. The updated capital costs used by the JRC are presented in the table below. These have been an important input to our work, but we have not undertaken an audit of the costs. Tram operating costs and savings associated with reducing bus provision have been provided to the JRC from TEL.

Table 3.1 - Updated Capital Costs<sup>4</sup>

Outturn Costs £m	Phase 1a	St Andrew Square	Foot of the Walk
Infrastructure costs already spent (sunk costs)	461	405	461
Vehicle costs	62	42	50
Remaining infrastructure costs	294	262	264
<b>Total capital costs</b>	<b>817</b>	<b>709</b>	<b>775</b>

## Clarifications

- 3.15 The timescales associated with the audit meant that it was necessary to work in parallel with the JRC team and dovetail the audit with the ongoing TEE analysis.
- 3.16 Throughout the audit a series of progress meetings were organised and attended by representatives from Atkins, the JRC, TEL, and the City of Edinburgh Council. These meetings had two key objectives:
- To ensure that the audit was fully aligned with the JRC programme; and
  - To provide a forum for addressing clarification questions that were raised by the audit team during May and June 2011.

## Benchmarking

- 3.17 Atkins have extensive experience of working on mass rapid transit projects around the world and have brought together knowledge that is pertinent to Edinburgh to help us sense check the

<sup>4</sup> Provided by CEC, outturn costs.



Edinburgh Tram's Business Case. In particular it is important to be clear on what the risk factors actually are for a mass rapid transit system in the UK.

- 3.18 Experience of other tram systems in the UK has highlighted a number of areas of risk in relation to tram demand forecasts:
- Modelling uncertainty / Inaccurate model forecasts;
  - Competitive response from other modes;
  - Fares;
  - Park and Ride;
  - The size of the transport market;
  - Tram performance and quality; and
  - New developments.
- 3.19 Once areas of risk have been established it is common practice to quantify the potential impact of the risk through sensitivity testing, before identifying appropriate mitigation actions that are within the control of the scheme promoter and scheme operator – such as providing seamless interchange, high quality Park and Ride facilities, and competitive fares and journeys times.
- 3.20 As part of our audit we have paid particular regard to the known areas of risk for schemes of this nature outlined above, and our sensitivity tests have been defined accordingly.

## 4. The Tools Used – Are They Fit for Purpose?

### The Tools Used

- 4.1 Our assessment of the appropriateness of the tools used has focussed on the modelling suite and the appraisal methodology.

### The Modelling Suite

- 4.2 The modelling suite comprises a number of elements, including the High level Model (HLM), which is a strategic multi-modal demand, network assignment and distribution/mode choice model developed using VISUM software.
- 4.3 The HLM is the main source of data for the assessment of demand, revenue, and user and non-user impacts which drives the benefits side of the TEE/BCR calculations, and, as such, has been the focus of our review of the tools used.
- 4.4 The model was subject to a detailed audit in 2008, and enhancements were implemented on the basis of recommendations made at that time. We have not replicated the technical depth of that audit, but have reviewed aspects of the HLM to which the outputs (the benefits in the TEE/BCR calculations) are most sensitive. This has included the quality of the representation of highway and public transport network performance, and the behavioural parameters which drive mode choice.

### Fit for Purpose?

- 4.5 Our overall assessment of the HLM is that it is an appropriate tool for the purposes of informing the TEE/BCR assessment. We have however identified some areas of relative weakness (not unusual in a model of this size and complexity), which we have used to interpret output and influence the focus of sensitivity testing requested, as shown in Section Six of this report .

### Appraisal Methodology

#### Scottish Transport Appraisal Guidance

- 4.6 The Scottish Transport Appraisal Guidance (STAG) was first published in 2003 and it went through a major refresh in 2008.
- 4.7 STAG provides a best practice framework for:
- Identifying **problems and opportunities** with a transport and land-use system;
  - Setting **SMART transport planning objectives** that express the outcomes sought;
  - Generating, sifting and developing **options** that can deliver the transport planning objectives;
  - **Appraising** the relative merits of options; and
  - **Evaluating** completed strategies and schemes.
- 4.8 The appraisal element of STAG allows transport planners to provide decision makers with evidence of a scheme's relative merits against the following criteria:
- Transport Planning Objectives;
  - Environment;
  - Safety;
  - Economy;
  - Integration; and

- Accessibility and Social Inclusion.

### Tram Scheme Appraisal

- 4.9 The STAG appraisal for the Phase 1a was finalised in 2007, and built upon STAG work done for tram lines 1 and 2. The table in Appendix C summarises the relative merits of Phase 1a as presented in 2007, and also comments on how this was updated for the Edinburgh Tram – Business Case Update (2010).
- 4.10 We have reviewed the STAG outputs and have found the scheme appraisal methodology to be in line with standard good practice, and with the requirements of STAG.

### Appraisal Refresh

- 4.11 Atkins recognises that since the STAG appraisal was undertaken that there has been a number of changes in the context within which the appraisal was undertaken; most notably within the policy context, and in particular the prominence of carbon abatement policies that have emerged as a result of the Climate Change (Scotland) Act 2009<sup>5</sup>. There has also been a change in the nature of the options being tested.
- 4.12 It is therefore recommended that consideration is given to refreshing the wider appraisal to ensure that the full benefits of the tram scheme are captured within a contemporary context.

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<sup>5</sup> <http://www.scotland.gov.uk/Topics/Environment/climatechange/scotlands-action/climatechangeact>

## 5. The Assumptions Used – Are They Reasonable?

### The Assumptions Used

5.1 A number of assumptions have been made by the JRC in the development of the business case. The key assumptions that we consider to have the most significant influence on the business case relate to the following areas:

- The composition of the transport network – now and in the future;
- The demand for transport – now and in the future; and
- Traveller responses to the tram.

### The Composition of the Transport Network – Now and in the Future

5.2 The modelling tools used by the JRC to generate outputs have been updated periodically to reflect changes in the existing transport network, and the nature of the network in the future. A number of assumptions have been made regarding the infrastructure and operational characteristics for both the highway and public transport components of the transport network.

5.3 In order to inform and validate these assumptions the JRC has engaged with a number of key stakeholders who are best placed to provide a view on the scale and magnitude of the variables associated with the transport network. Representatives for the following organisation contributed - CEC, SDS tie, Lothian Buses, and Transport Scotland.

5.4 On the basis that they had been validated by local stakeholders, we were broadly satisfied with these assumptions, however, it should be noted that we have not undertaken our own detailed review of the model's public transport network representations.

### Competitive Response from Other Modes

5.5 The JRC ran a scenario test on an earlier version of the model (in 2006) to assess the impact of competition on the tram business case. The test assumed that (non-TEL) operators would continue to run the current level of bus service frequency. Tram demand and revenues were most sensitive to a competitive response on sections of the tram network around Leith Walk. There were, however, reductions in patronage on all sections, including the Airport – St. Andrew's Square route.

5.6 The view of the JRC is that such a competitive response is highly unlikely: the increase in operating costs far outweighed the potential benefits for a competing operator, and "the development of well-balanced bus/tram integration plans would appear to limit the scope for effective competition to a very significant degree."<sup>6</sup>

5.7 Given the history of bus operations in Edinburgh, we tend to share this view but with certain caveats. The reduction in bus services on corridors where the tram will run means the tram system must offer at least the same level of reliability as Lothian Buses – any failure to do so could quickly lead to dissatisfaction among public transport users, leaving the door open for competitive response from other operators. A 60 year appraisal period also means there is the potential for changes to take place in the operating agreement for bus and tram – the integrated approach to fares and overall operations could change in the future in a way that is not anticipated at present – leaving a high-cost tram operator exposed in a competitive market.

<sup>6</sup> JRC Revenue and Risk Report (Steer Davies Gleave / Colin Buchanan, December 2006)

- 5.8 We considered it prudent to recommend a sensitivity test that replicated potential competition for the tram from a bus operator between the city centre and the airport.

## The Demand for Transport – Now and in the Future

### New Development

- 5.9 The new tram system will open up development opportunities and is considered integral by the City of Edinburgh Council to the future growth of Edinburgh. In turn, the new development will add to the overall patronage of the tram system. Forecasts for the amount of demand that will stem from the new developments have recently been downgraded. This reflects the change in economic conditions since the original modelling was undertaken.
- 5.10 The original development assumptions which were utilised within the 2006 model were updated in 2010 to inform the Business Case refresh and again in 2011 for the most recent TEE analysis.
- 5.11 The existing assumptions reflect the current advice from CEC planners and reflect the need to take account of known changes in development figures and the current economic climate and its impact on development in Edinburgh. An adjustment has also been made to the predicted future patronage forecasts to reflect recession impacts on bus patronage in Edinburgh, this has been derived based on adjustments proposed by TEL that reflect Lothian Buses recent experience of the bus market in Edinburgh.
- 5.12 As identified in Section Three of this report, the delivery of committed major future development (particularly in the north and west of Edinburgh) will drive much of the future demand for the tram.

### Development Assumptions

- 5.13 Key elements in developing the model included collecting data to input into a base year model and forecasting development in the future years of 2011 and 2031. The development assumptions were made using data available from the City of Edinburgh Council (CEC) via local plans, structure plans, planning applications, and workshops held with Council officials.

### Future Year Planning Data and Model Development

- 5.14 The model suite the JRC developed was based upon a number of data input variants, these included:
- TELMoS<sup>7</sup> Data – the TELMoS data was used for background developments within the TMfS zones;
  - Major Developments – The developments which were considered to be ‘major’ by CEC were input individually and overrode the TELMoS data for certain zones.

Table 5.1 shows the difference in 2011 development estimates assumed to occur by 2031 when the ‘major’ development data supplied by CEC overrode that of the TELMoS model.

<sup>7</sup> TELMoS (Transport, Economic and Land-Use Model of Scotland), is a multi-purpose forecasting toolkit developed by Transport Scotland to assist in the investigation and assessment of different policies and strategies on land-use and transport provision

Table 5.1 – Changes in Development Estimates<sup>8</sup>

Development Type	Development Estimates		Difference in Development
	Total Development Using TELMoS Data <sup>9</sup>	Total Development Using CEC Large Development Data	
Housing (Units)	50,397	49,992	-400
Office Business (GFA <sup>10</sup> )	837,211	1,277,808	440,598
Retail (GFA)	305,847	353,955	48,081
Commercial / Leisure (GFA)	~	277,750	277,750
Hotel (Beds)	1,159	5,084	3,925

- 5.15 The JRC has established all development assumptions with input from CEC planners; using CEC Development Schedules, which set out all development occurring in the city, and track individual developments which are currently within the CEC planning system.
- 5.16 For each major development assumption the original data has come from a CEC document such as a Local Plan or Structure Plan and has been agreed with or updated by a CEC planning officer.
- 5.17 It was noted by the JRC that the CEC are in the process of producing a Strategic Plan for the city and that these plans often quote high development targets which are ambitious compared to past completion rates. It is the JRC’s view that the completion rates utilised within the model replicated historic data rather than the Strategic Plan targets to ensure that prudent levels of growth were utilised within the model.

**Changing Development Assumptions**

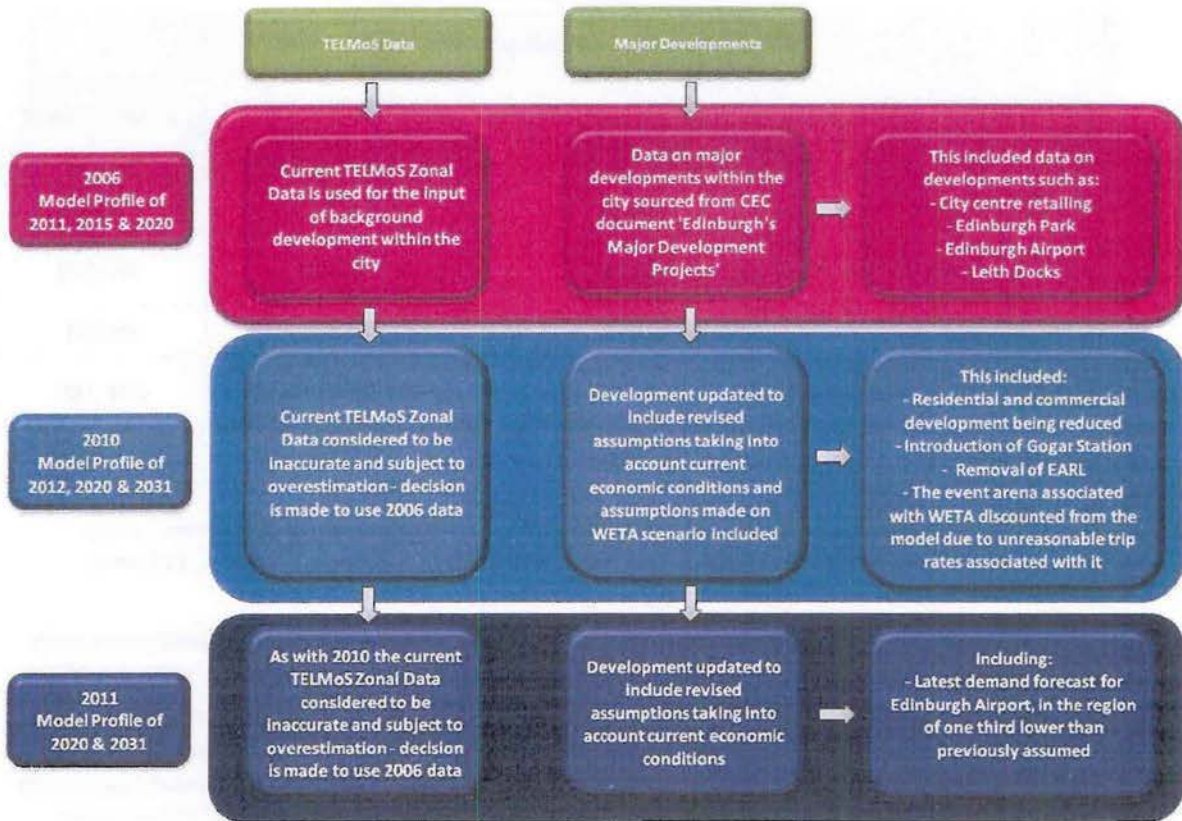
- 5.18 The original development assumptions which were utilised within the 2006 model were updated in 2010 to inform the Business Case refresh and again in 2011 when the model was used to obtain new BCRs.
- 5.19 The changes in development assumptions which have been incorporated into the business case and the period they were incorporated can be seen in Figure 5.1.
- 5.20 It can be seen from Figure 5.1 that a number of development assumptions have been updated from the original assumptions made in 2006 and the development assumptions being utilised within the 2011 analysis are different in many ways.

<sup>8</sup> All data from JRC document ‘Future Year Planning Data July 2010 60% WETA.xls’

<sup>9</sup> The figures within this column are the total for each type of development if the developments considered to be ‘major’ by CEC are not used to overwrite TELMos data for the appropriate zones.

<sup>10</sup> Gross Floor Area is measures as metres squared

Figure 5.1 – Changes in Development Assumption



- 5.21 The development assumptions have been updated as it was necessary to take account of known changes in development figures and the current economic conditions and the effect on development induced. An example of this is the patronage forecast for Edinburgh Airport in 2031; patronage was originally estimated at 26 million<sup>11</sup> for the analysis undertaken in 2006 and has been reduced to approximately 17 million<sup>12</sup> for the current analysis.
- 5.22 The development assumptions have been updated in line with the current assumptions of CEC, proposed Masterplans for the area and current build-out assumptions. It has been assumed by the JRC, in consultation with CEC, that although the growth in development has been lowered due to recent economic conditions it is the rate of growth that is the main aspect which will change rather than actual development numbers / size.
- 5.23 Figure 5.2 and 5.3 show the change in residential and commercial development which has been assumed to occur from the original assumptions made for the 2007 business case and the amended assumptions in 2010 taking into account the current economic climate. The development is shown in relation to the west, north, and city centre areas.

<sup>11</sup> Source: Aviation White Paper published by the UK Government in 2003

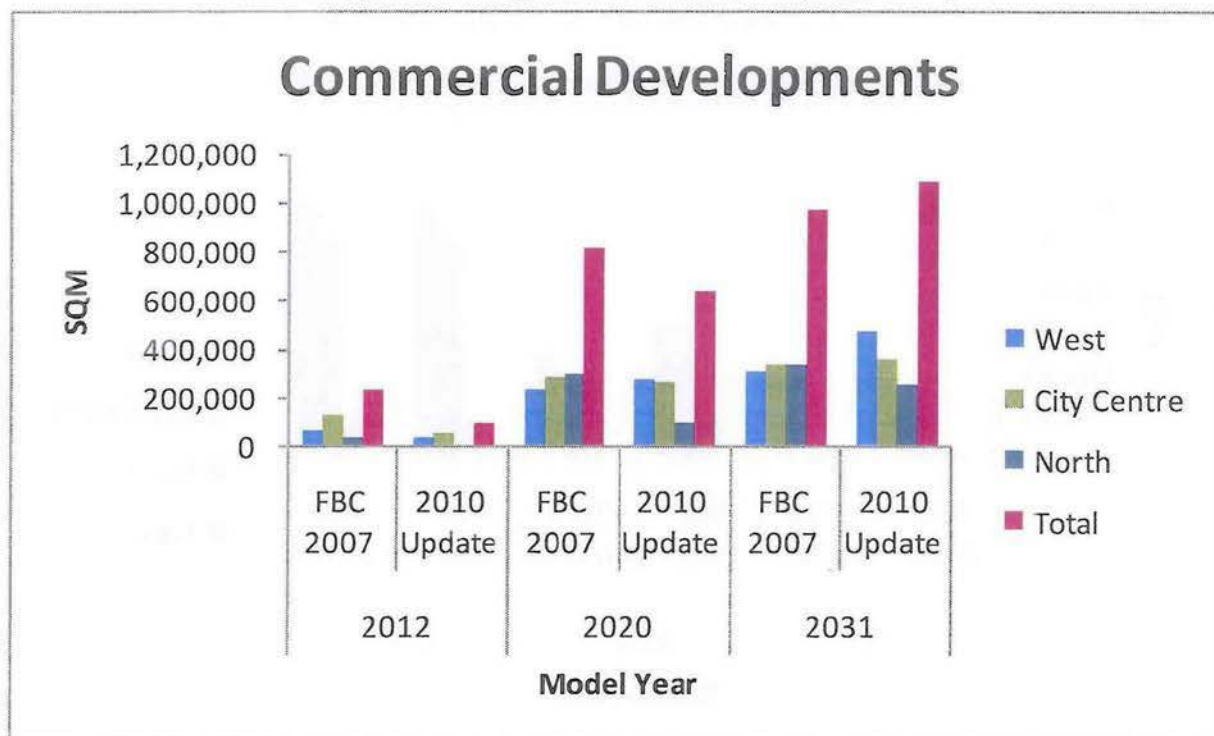
<sup>12</sup> Figure interpolated from data supplied by BA for patronage in 2011, 2020, and 2041.

Figure 5.2 – Changes in Residential Development Assumption





Figure 5.3 - Changes in Commercial Development Assumption



5.24 It can be seen from the graphs that the total development estimated to be complete by 2020 is lower for both commercial and residential developments in the 2010 Business Case update and that by 2031 it can be seen that the residential development has 'caught up' with the previous assumptions made in 2007 and that commercial development completions have increased slightly within the 2010 assumptions.

5.25 It should be noted that although it has been assumed, in general, that all forecast development will occur by the modelled year of 2031 with regards to the west of Edinburgh the decision made by the JRC was to utilise the 60% WETA estimates. This set of development inputs estimates that 60% of WETA development will be complete by 2031 rather than 100%. This was considered by the JRC and the CEC to be a conservative estimate of growth in the west of Edinburgh and most suitable for the model.

5.26 The assumption that development and build rates will increase as the economy recovers are fundamental to the achievement of the assumed development. Give the importance of the major developments (particularly in the north and west of Edinburgh) in driving future demand for the tram we have recommended that a sensitivity test is undertaken to replicate a 'worst case' development scenario.

5.27 Although it is accepted that this pessimistic scenario (where none of the major development is delivered) is unlikely to occur we do believe that this provides a tangible context for the assessment of this risk.

**Ingliston Park and Ride**

5.28 We have identified in Section Three of this report the importance of the Ingliston Park and Ride site in driving tram demand and we have focussed some of our attention at ensuring that the assumptions within the business case are robust.

5.29 The role of high quality Park and Ride, similar to the Ingliston Park and Ride site, in facilitating strong tram demand is apparent in schemes across the UK:

- The Sheffield Supertram showed the risk inherent in not providing high-quality Park and Ride facilities, which accounted for around 4% of the shortfall in Supertram patronage.

Subsequently, the Sheffield Supertram system has boosted patronage, helped in part by the opening of new Park and Ride sites directly on the Supertram routes: five sites offering a total of more than 1,500 spaces for tram-based park and ride, with trams every ten minutes;

- Nottingham Express Transit has over 3,000 spaces available for tram-based Park and Ride; and
- Tyne and Wear Metro achieves around 80% utilisation of its 2,200 Park and Ride spaces.

5.30 There are risks surrounding the forecasting of Park and Ride demand: it is a notoriously difficult to model accurately and can overestimate the abstraction from car where parking is left unconstrained at the city centre destination, or the total journey costs are inaccurately specified.

**Forecast Park and Ride Demand**

5.31 The Edinburgh Tram forecasts are based on a bespoke spreadsheet model out with the high-level VISUM model. The demand forecasts for the Ingliston Park and Ride are presented below:

**Table 5.2 - Modelled Ingliston P&R Demand - Inbound to City Centre (Source JRC - June 2011)**

	Opening Year AM Peak 0700 - 0900	2031 AM Peak 0700 - 0900	Opening Year Inter Peak 1000 - 1200	2031 Inter Peak 1000 - 1200
No Tram	432	790	27	62
With Tram	739	1166	63	69

5.32 The JRC modelled forecasts inbound demand in the year of opening to be in the order 460 passengers ( $432^{am} + 27^{inter\ peak}$ ). Using vehicle occupancy of 1.15 this gives the number of vehicles to be in the order of 400. Once the JRC applies the recession factor this gives an adjusted forecast of 350 cars parking and using a bus service to the city centre.

**Current Bus Based Park and Ride Demand**

5.33 The existing demand at Ingliston Park and Ride is in the order of 470 cars per day<sup>13</sup>, this is equivalent to around 540 trips (again using occupancy of 1.15). The JRC have consulted with the Park and Ride operators and they estimate that 2/3 of current demand is destined for the city centre, which equates to around 350 cars parking and using Park and Ride bus services to access the city centre.

5.34 This suggests the forecasting model used is giving reasonable estimates of city centre Park and Ride demand.

**Ingliston Park and Ride – Tram Forecasts 2011 & 2031**

5.35 Table 5.4 also presents the JRC’s forecast total demand from the Ingliston Park and Ride that will be generated by the introduction of the tram. The uplift in demand has been benchmarked against similar UK scheme and it is also recognised that the JRC have been prudent in assuming in the modelling that there will be no real increase in city centre parking charges, or a reduction in city centre parking capacity.

**Traveller Responses to the Tram**

5.36 Finally, the JRC has made a number of assumptions relating to various parameters that will influence a traveller’s propensity to use the tram – these include factors such as the travellers’ value of time, the relative attractiveness of the tram as a mode of travel, and the impact of having to interchange.

<sup>13</sup> JRC June 2011

## Fares

- 5.37 In relation to fares, the main risk is that they are set too high relative to existing bus fares and for the level of service provided. Additionally, a lack of flexibility and/or integration with bus fares can reduce ridership. When Sheffield Supertram services commenced, premium fares greater than bus fares were charged, but there was an unwillingness to pay for a service that was not perceived as offering reliability. The original forecast of ridership had also assumed an integrated bus and Supertram fare structure that failed to materialise. Issues around fares explained around 3% of the shortfall in Supertram demand relative to forecasts.
- 5.38 The Edinburgh Tram system will benefit from being a fully-integrated system operated by TEL. A consistent approach to pricing means problems experienced in Sheffield are unlikely to be repeated. The potential for shortfall in Edinburgh depends on the quality of service provided, or if the responsiveness of passengers to fare increases is inaccurately forecast. Real fares growth of RPI+1% has been assumed for future year tram and bus forecasts. Average fares per kilometre are consistent with other tram systems: roughly £0.70/km, compared with £0.77/km in Sheffield and £0.75/km in Manchester.
- 5.39 The JRC assessed the elasticity of patronage to real fares growth as part of their risk and revenue forecasting work in 2008. The test assumed fares grow by RPI+1.5% and that the assumption would affect bus and tram users – the intention was to establish whether public transport users would switch to car as a result. The sensitivity test on fares showed that relatively few passengers switched to car (i.e. public transport users were unresponsive to small fare increases). The JRC acknowledges that this is due in part to the high mode share of bus in Edinburgh and the existing cost of motoring being high due to parking charges and fuel costs. The JRC also notes anecdotally that “Lothian Buses has experienced minimal patronage loss in response to modest fares rises historically”.

## Tram Performance

- 5.40 The performance of the tram system in terms of run times and frequencies is critical to its ability to achieve forecast patronage. Journey times and frequencies were key factors in explaining the poor performance of Sheffield Supertram, together accounting for 16% of the shortfall in demand<sup>14</sup>. Specifically, the model forecasts assumed 30% quicker journey times and 33% higher tram frequencies than were ultimately delivered – at the same time as competing bus operators increased substantially the frequency of buses on Supertram corridors. The poor run times relative to the forecasts were due to a number of factors: poor or no priority for trams at signals, over-cautious tram drivers, lengthy dwell times at stops, little run time monitoring, and the failure to take account of the steep gradients on parts of the Supertram network.
- 5.41 The Edinburgh Tram forecast run times are based on Parsons Brinkerhoff designs, supported by VISSIM microsimulation modelling. The models assume that delays to trams are minimised without a significant impact on other traffic, and that full priority is given to tram at junctions. Run times are held fairly constant into the future, reflecting this level of priority – a reasonable assumption based on experience elsewhere.
- 5.42 Table 5.5 compares forecast run times and frequencies on the Edinburgh Tram system with observed values on other UK tram systems.

<sup>14</sup> The Transport Economist Volume 26 Number 3, Autumn 1999

Table 5.3 – Comparison of Forecast Run Times with Actual Run Times on other UK Tram Systems

Journey time	Edinburgh Tram	Sheffield Supertram	Nottingham	Manchester Metrolink
Speed range, kph (shared track)	16.25 – 37.09	10.1 – 22.8	8.8 – 32.0	
Average speed, kph (shared track)		17.9	14.8	
Speed range, kph (segregated)		24.3 – 32.6	22.4 – 60.1	
Average speed, kph (segregated)		28.4	34.7	
Tram frequency	8/16tph	6-10tph	8tph	8-12tph

- 5.43 The proposed tram frequency of 8tph on the outer sections is in line with other systems – on the city centre (Haymarket to Ocean Terminal) section it is much higher than elsewhere, reflecting the desire to substantially improve the public transport service in this location, particularly along the congested Princes Street section. The high frequency is also required to ensure that the popular bus services removed from service are adequately replaced.
- 5.44 The run times also look reasonably consistent with other locations – although the Sheffield and Nottingham systems both have sections where speeds are substantially lower than the lowest Edinburgh tram, which in part reflects the relatively high proportion of the Edinburgh tram route (particularly for the St Andrew Square option) that runs off street.

**Tram Modelling Parameters**

- 5.45 THE JRC has derived key forecast behaviour parameters from stated preference surveys and these include:
  - A value of time of 4.76 pence per minute;
  - Weightings on walk and wait times of 1.91 and 2.55;
  - In vehicle time weightings of 0.75 for rail, 0.77 for tram and 1.00 for bus; and
  - Interchange penalty of 12 minutes.
- 5.46 We have benchmarked the assumptions used by the JRC and are content that they are appropriate for use in the development of the business case. The parameters used to assess the scope for transfer to tram from other modes are cautious compared to similar schemes elsewhere, and we note that there may be some scope for greater shift to tram than has been forecast.
- 5.47 However, in the interest of prudence we also recommended that a sensitivity test was undertaken to assess the impact of lowering the relative attractiveness of the tram as a mode of transport.

## 6. The Outputs – Do They Look Credible?

### The Outputs From 2011 Analysis

6.1 The outputs which the 2011 analysis has supplied can be broken into the following main categories:

- Tram demand / revenue;
- Impacts on public transport users;
- Impacts on road users; and
- Value for money (TEE tables and BCR).

### Tram Demand and Revenue

6.2 While we have not undertaken a detailed review of the 2010 Financial Model, we have sought to reassure ourselves that the demand and revenue figures emerging from the current JRC work can be reconciled with corresponding numbers informing the 2010 financial assessment. This is because the level and profile of demand is critical to the financial performance of the scheme. It is important to ensure that changes and enhancements to the model for the purpose of the current tests have not given rise to a significantly lower set of demand forecasts, potentially contradicting earlier conclusions from the Financial Model in relation to the financial viability of the scheme.

6.3 For the two options where a direct comparison can be made, Phase 1a and St Andrew Square, the new demand forecasts are broadly in line with (or – in later years – exceed) the demand levels in the Financial Model, and are therefore consistent with the demand inputs to the Business Case Review of 2010.

### Impacts on Public Transport Users

6.4 In terms of overall public transport demand levels at 2011 we are also satisfied that these appear plausible relative to the observed figures that we understand to have been verified by Lothian Buses during a similar check undertaken at 2010.

6.5 In addition to the overall demand levels, we have also examined supporting material (contained within Appendix B, and discussed in Section Three of this report) relating to the scale, distribution and source of demand. We found these outputs broadly plausible, but noted:

- The unusually high proportion of those forecast to use tram whose previous mode was car (for the St. Andrew Square option of the order of 40%). This is only likely to be deliverable with the level of quality of service (both for those switching directly to tram, or those using P&R) envisaged within the model, in terms of comfort, journey time and reliability; and
- The prominence of 'counter-peak' movement with the St Andrew Square option, with a significant element of demand travelling outbound from the city centre in the morning peak to access areas such as Edinburgh Park.

### Impacts on Road Users

6.6 We have reviewed the emerging TEE tables (as set on the next page) and a number of supporting outputs relating to the level and distribution of impacts upon both users and non-users of the scheme. We have found these broadly plausible, but as identified in Section Four when we discussed the model we would make the following observations:

- The distribution of non-user impacts (impacts upon car users) appears broadly in line with expectations. However, in our experience the overall level is difficult to quantify, and we would view this as particularly the case with the tools used for this assessment, given some of the weaknesses in the highway element of the model. For this reason we would express caution in comparing the relative merits of options where non-user benefits form a key

component. The JRC team has stated that no future junction optimisation has taken place to address specific points of congestion due to traffic re-assignment, and we accept that this may over-state disbenefits (particularly on the Phase 1a assessment).

- We believe the level and distribution of user benefits look broadly plausible. These benefits will however be driven directly by the level of demand for, and transfer to tram, and are therefore sensitive to issues such as future development and propensity to switch. This has been explored through sensitivity testing.

## Value for Money

- 6.7 A benefit to cost ratio of less than one suggests that the economic return would be less than the investment, even when appraised over 60 years. The BCR of the options taking into account the full costs and benefits have been found in the current analysis to be less than 1. In other words completing the project will incur more expenditure with an overall return of less than one.
- 6.8 However, to abandon a scheme where such a large proportion of the costs have been sunk would represent a zero-return on a large investment. In this case when the analysis is being carried out after sunk costs have occurred it is conventional and reasonable (as set out in STAG and WebTAG appraisal guidance) to account for sunk costs in the scheme appraisal for a fair comparison between investment opportunities.
- 6.9 The analysis if JRC's updated business case also appraises the full benefits against only the costs of completion and operation then the BCRs for the three options are:
- The full Phase 1a, Edinburgh Airport to Newhaven, **BCR = 1.30**
  - Truncated Phase 1a, Edinburgh Airport to St Andrew Square, **BCR = 1.85**
  - Truncated Phase 1a, Edinburgh Airport to Foot of the Walk, **BCR = 1.21**
- 6.10 We would however express caution in using the relative BCRs for the three options tested to inform decision-making on the relative merits of the alternative options, particularly in light of the significant differential performance in terms of non-user impacts, and the degree of confidence which can be attached to this element of the appraisal.

Table 6.1 - Updated TEE Outputs (Source – JRC, June 2011)

£m Present Value, 2002 prices	Revised Phase 1a		St Andrew Square		Foot of the Walk	
	Full Costs	Minus Sunk Costs	Full Costs	Minus Sunk Costs	Full Costs	Minus Sunk Costs
Public transport user benefits	541	541	340	340	493	493
Other road user benefits	-196	-196	74	74	-156	-156
Private sector provider effects	81	81	68	68	60	60
<b>PV of Scheme Benefits</b>	<b>427</b>	<b>427</b>	<b>482</b>	<b>482</b>	<b>397</b>	<b>397</b>
<b>PV of Scheme Costs</b>	<b>663</b>	<b>327</b>	<b>597</b>	<b>261</b>	<b>707</b>	<b>329</b>
Net PV	-237	100	-115	221	-310	68
<b>Benefit Cost Ratio to Government</b>	<b>0.64</b>	<b>1.30</b>	<b>0.81</b>	<b>1.85</b>	<b>0.56</b>	<b>1.21</b>

## 7. Risk and Uncertainty

### Risks & Uncertainty

- 7.1 The audit has established that there are a number of specific areas in the business case where there is a degree of risk and uncertainty, as with any modelling work.

### Sensitivity Testing

- 7.2 Below we summarise our areas of concern, and the outputs from the sensitivity testing that was undertaken to help quantify the impact of these risks on the business case.

### New Committed Development

- 7.3 The analysis suggests that much of the future demand / benefit relates to new committed development, this is an area of inevitable uncertainty which could have a possible impact on revenue and the economic case for the tram scheme.
- 7.4 A 'worst case' zero growth sensitivity has demonstrated that the tram demand would reduce by around one-third in 2031.

### Competition

- 7.5 There is a risk that a bus operator could establish a service to run in competition with the tram between the city centre and the airport, and a sensitivity test has been undertaken to replicate this by using the Service 100 as a proxy for competition.
- 7.6 The outputs from the sensitivity testing suggest that tram revenue would decrease by around 6%.

### Levels of Service

- 7.7 Much will depend on the relative 'levels of service' the tram provides the travelling public. A sensitivity test has been undertaken to replicate a less favourable differential for the tram when compared with the bus.
- 7.8 The sensitivity shows that the tram demand and revenue could reduce by around 12%.

### Impacts on Benefit Costs Ratio for St Andrew Square Option

- 7.9 The relative impacts of these sensitivity tests on the BCR are presented in Table 7.1 for St Andrew Square. It can be seen that even allowing for these downbeat assumptions, once sunk costs are taken account of, there remains an economic case for the St Andrew Square option, on the basis that each of these pessimistic tests still delivers a BCR of greater than 1.

Table 7.1 – Impact of Sensitivity Tests on BCR for St Andrew Square Option  
(Source – JRC, June 2011)

£m Present Value, 2002 prices	St Andrew Square			
	Minus Sunk Costs	Mode Constant Increased	Competition	Zero Growth
Public transport user benefits	340	289	362	227
Other road user benefits	74	47	74	49
Private sector provider effects	68	64	76	45
<b>PV of Scheme Benefits</b>	<b>482</b>	<b>400</b>	<b>511</b>	<b>321</b>
<b>PV of Scheme Costs</b>	<b>261</b>	<b>281</b>	<b>358</b>	<b>290</b>
Net PV	221	119	154	32
<b>Benefit Cost Ratio to Government</b>	<b>1.85</b>	<b>1.42</b>	<b>1.43</b>	<b>1.11</b>



## 8. Conclusions

### Business Case Audit

- 8.1 This audit has provided a review of historic and current business case work undertaken by the JRC for the Edinburgh Tram.
- 8.2 It has asked and answered three questions:
- The tools used – are they fit for purpose?
  - The assumptions used – are they reasonable?
  - The outputs – do they look credible?

### The Tools Used – Are They Fit for Purpose?

- 8.3 Our overall assessment of the HLM is that it is an appropriate tool for the purposes of informing the TEE / BCR assessment. We have however identified some areas of relative weakness (not unusual in a model of this size and complexity), which we have used to interpret output and influence the focus of sensitivity testing requested.
- 8.4 We have reviewed the STAG outputs and have found the scheme appraisal methodology to be in line with standard good practice, and with the requirements of STAG.
- 8.5 Atkins recognises that since the STAG appraisal was undertaken that there has been a number of changes in the context within which the appraisal was undertaken; most notably within the policy context, and in particular the prominence of carbon abatement policies that have emerged as a result of the Climate Change (Scotland ) Act 2009. There has also been a change in the options being tested.
- 8.6 We believe that the STAG indicators that have not been updated as part of the recent work may be expected to be the same as before, or indeed, in some cases, stronger. It is therefore recommended that consideration is given to refreshing the wider appraisal to ensure that the full benefits of the tram scheme are captured within a contemporary context.

### The Assumptions Used – Are They Reasonable?

- 8.7 We have benchmarked the assumptions used by the JRC and are content that they are appropriate for use in the development of the business case. The parameters used to assess the scope for transfer to tram from other modes are cautious compared to similar schemes elsewhere, and we note that there may be some scope for greater shift to tram than has been forecast.

### The Outputs – Do They Look Credible?

- 8.8 We have reviewed the emerging TEE tables and a number of supporting outputs relating to the level and distribution of impacts upon both users and non-users of the scheme. We have found these broadly plausible, but would make the following observations:
- The distribution of non-user impacts (impacts upon car users) appears broadly in line with expectations. However, in our experience the overall level is difficult to quantify, and we would view this as particularly the case with the tools used for this assessment, given some of the weaknesses in the highway element of the model. For this reason we would express caution in comparing the relative merits of options where non-user benefits form a key component. The JRC team has stated that no future junction optimisation has taken place to address specific points of congestion due to traffic re-assignment, and we accept that this may over-state disbenefits (particularly on the Phase 1a assessment).
  - We believe the level and distribution of user benefits look broadly plausible. These benefits will however be driven directly by the level of demand for, and transfer to tram, and are therefore sensitive to issues such as future development and propensity to switch. This has been explored through sensitivity testing.

## Risk and Uncertainty

- 8.9 We have identified three key areas of risk and uncertainty that could have an impact on the business case. These relate to new committed development, potential competition, and the level of service provided by the tram.
- 8.10 Even allowing for downbeat assumptions, once sunk costs are taken account of, there remains an economic case for the St Andrew Square option.

## Conclusions

- 8.11 Our overall conclusions from our review are:
- The tools and assumptions adopted and the outputs from the analysis are broadly fit for purpose, in line with our expectations, and comparable to experience on other schemes.
  - We have identified a number of areas of risk and uncertainty. Sensitivity testing has been used to quantify the impact of these areas of risk and uncertainty on the business case for the St Andrew Square option. Even allowing for these downbeat assumptions, once sunk costs are taken account of, there remains an economic case for the St Andrew Square option, on the basis that each of these pessimistic tests still delivers a BCR of greater than 1.

## Appendix A - Data and Report Inputs

Table A.1 - Data and Report Inputs

Year	Title	Author	Type	Date Received
<b>Business Case Documents</b>				
Oct 2006	JRC Edinburgh Tram – Overall Case Presentation	JRC	Doc	19.04.11
Dec 2007	Edinburgh Tram Network – Final Business Case Version 2	tie	Doc	07.04.11
2010	Edinburgh Tram – Business Case Update 2010	Edinburgh Tram	Doc	07.04.11
2007	Final Business Case Appendix IV Communications and Stakeholder Strategy	tie	Doc	28.04.11
<b>Audit Scotland Documents</b>				
June 2007	Audit Scotland Edinburgh Transport Projects Review	Audit Scotland	Doc	14.04.11
Feb 2011	Audit Scotland Edinburgh Trams Interim Report	Audit Scotland	Doc	14.04.11
<b>CEC Documents</b>				
Jan 2003	CEC Council Committee Report – Edinburgh Tram Network	CEC	Doc	28.04.11
Feb 2010	Edinburgh Tram – Council Decisions 2003 until 2010	Edinburgh Tram	Doc	28.04.11
2010	CEC Transport 2030 Vision	CEC	Doc	28.04.11
Apr 2011	West Edinburgh Draft Business Plan	CEC	Doc	04.05.11
2011	CEC Council Committee Edinburgh Tram Update 16.05.11	CEC	Doc	23.05.11
2011	CEC Council Committee Edinburgh Tram Update Committee Minutes 16.05.11	CEC	Doc	23.05.11
<b>Development Documents</b>				
2006	Edinburgh Major Development Projects 2006 – City Centre	CEC	Doc	05.05.11
2006	Edinburgh Major Development Projects 2006 – West Edinburgh	CEC	Doc	05.05.11
2006	Edinburgh Major Development Projects 2006 – South East Edinburgh	CEC	Doc	05.05.11
2006	Edinburgh Major Development Projects 2006 – North Edinburgh	CEC	Doc	05.05.11
2006	Edinburgh Major Development Projects	CEC	Doc	05.05.11

	2006 – Intro (summary)			
Feb 2010	Edinburgh Housing Market Monitoring Report	CEC	Doc	28.04.11
Apr 2011	Edinburgh International Action Plan	CEC	Xls	04.05.11
Apr 2011	Edinburgh International Implementation Plan	CEC	Doc	04.05.11
2006	Development Assessment for Tram Transport Model	JRC	Xls	06.05.11
2011	Development Monitor Tables Housing	CEC	Xls	06.05.11
Mar 2009	Scottish Enterprise East Region Economic Review	Scottish Enterprise	Doc	28.04.11
Mar 2011	Economic Performance Indicators (march 2011 Update)	Scot Govt	Doc	28.04.11
2010	Retail Development Schedule	CEC	PDF	06.05.11
2010	Student Housing Development	CEC	PDF	06.05.11
2010	Hotel Development Schedule	CEC	PDF	06.05.11
2010	Leisure Development Schedule	CEC	PDF	06.05.11
2010	Office Schedule	CEC	PDF	06.05.11
2010	Industry 2010 Completions and Planned Tables	CEC	PDF	06.05.11
2010	Industrial schedule 2010	CEC	Doc	06.05.11
STAG Documents				
Nov 2003	STAG2 Appraisal Line 1 - 2003	tie	Doc	28.04.11
Nov 2003	STAG2 Appraisal Line 1 - Appendices	tie	Doc	28.04.11
Dec 2007	Edinburgh Tram Network STAG2 Appraisal Report	JRC	Doc	28.04.11
Dec 2007	Edinburgh Tram Network STAG2 Appraisal Appendix	JRC	Doc	28.04.11
Miscellaneous Documents				
Dec 2008	Infraco Contract Summary	Edinburgh Tram	Doc	28.04.11
Dec 2005	Edinburgh Tram Noise and Vibration Policy	Edinburgh Tram	Doc	28.04.11
2006	TEL Planning of the Future – Strategic Business Plan	TEL	Doc	28.04.11

JRC Data				
<i>Due Diligence</i>				
Dec 2006	Model Construction and Application – Due Diligence Report	Scott Wilson	Doc	14.04.11
Dec 2006	Model Construction and Application – Due Diligence Summary Report	Scott Wilson	Doc	14.04.11
Mar 2008	Model Construction and Application – Due Diligence Update	Scott Wilson	Doc	14.04.11
~	Appendix A Highway Model Screenline Performance	~	Tab	14.04.11
~	Comparison Between Different Models	~	Tab	14.04.11
~	Appendix B – Low Level Models	~	Tab	14.04.11
June 2008	Modelling Technical Note	Halcrow	Doc	14.04.11
<i>Planning Data</i>				
2006	Future Year Trip Attraction	CEC / JRC	Xls	14.04.11
2010	Future Year Planning Data July 2010 60% WETA	CEC / JRC	Xls	14.04.11
2010	Future Year Planning Data July 2010 full WETA	CEC / JRC	Xls	14.04.11
2010	Future Year Planning Data July 2010 no WETA	CEC / JRC	Xls	14.04.11
<i>Risk Revenue Reports</i>				
2006	JRC Patronage & Revenue Risk Register	SDG	Tab	14.04.11
Dec 2006	Revenue & Risk Report 2006	JRC	Doc	14.04.11
Dec 2008	Revenue & Risk Report 2008	JRC	Doc	14.04.11
<i>Validation Reports</i>				
Nov 2006	VISUM model calibration and validation report 2006	JRC	Doc	14.04.11
Nov 2006	VISUM model calibration and validation report – Appendices 2006	JRC	Doc	14.04.11
Nov 2006	VISSIM model calibration and validation report 2008	JRC	Doc	14.04.11
Mar 2007	Scott Wilson Edinburgh Tram TSS – Response to JRC Comments on Due Diligence	Scott Wilson	Doc	14.04.11
Mar 2007	TSS Comment and	Scott	Doc	14.04.11

	Responses Table	Wilson		
Apr 2008	Vissim model calibration and validation report	JRC	Doc	14.04.11
Apr 2008	Visum model calibration and validation report	JRC	Doc	14.04.11
Apr 2008	Visum model calibration and validation report - Appendices	JRC	Doc	14.04.11
<i>Other Reports</i>				
Mar 2006	Edinburgh Tram Stated Preference Report	SDG	Doc	14.04.11
Oct 2008	Progression of forecasts from previous Revenue & Risk Report	SDG	Doc	14.04.11
Sep 2010	Updated Tram Patronage & Revenue Forecasting	JRC	Doc	14.04.11
<i>Financial Model</i>				
2010	TEL Business Plan 2010 St Andrew Square	JRC	Xls	
2010	TEL Business Plan 2010 Phase A1	JRC	Xls	
2010	Guide to Financial Model	TEL	PPT	
2004	Preliminary Financial Case – Line 1 2004	tie	Doc	28.04.11
2004	Preliminary Financial Case – Line 2 2004	tie	Doc	28.04.11
2010	TEL Business Plan Update 2010 - Presentation	TEL	PPT	14.04.11
2010	TEL Business Plan Update 2010 – Presentation Figures / Graphs	TEL	PPT	14.04.11
<i>JRC 2011 Analysis</i>				
2011	JRC Proposal for Updated Business case	JRC	Doc	14.04.11
2011	Programme for Edinburgh Tram Updated Business Case	JRC	Doc	19.04.11
2011	Key Modelling Appraisal Assumptions – High Level 2011	JRC	Doc	26.04.11
2011	Trip Ends (Zip File)	JRC	Zip	09.05.11
2011	Business Case Schedule & Key Assumptions	JRC	Doc	13.05.11
2011	P&R Summary	JRC	Xls	20.05.11
2011	JRC – Response to Atkins Memo of 11 May	JRC	Doc	23.05.11
2011	2011 AM DS Park & Ride	JRC	Xls	31.05.11

2011	Edinburgh Tram Business Case Update Draft Results Presentation	JRC	Doc	03.06.11
2011	Edinburgh Tram Business Case Update Draft Results Presentation	JRC	PPT	07.06.11
2011	JRC Forecast and Economic Output Phase 1a	JRC	Doc	06.06.11
2011	JRC Forecast and Economic Output St Andrew Square	JRC	Doc	06.06.11
2011	VISUM Tram Journey Times	JRC	Xls	06.06.11
2011	JRC Response to clarification questions - 7th June	JRC	Doc	08.06.11
2011	NUB Delay Plots	JRC	Doc	08.06.11
2011	Edinburgh Tram Business Case Update Draft results (Maps)	JRC	PPT	08.06.11
2011	Additional Information and Clarifications Presentation	JRC	PPT	08.06.11
2011	Edinburgh Tram Draft Appraisal Results as of Wednesday 15th June	JRC	PPT	15.06.11
2011	Edinburgh Tram Demand Growth Sensitivity	JRC	Xls	15.06.11
2011	Edinburgh Tram Financial Performance St Andrew Square	JRC	Xls	16.06.11
2011	Edinburgh Tram Draft Appraisal Results as of Wednesday 20th June	JRC	PPT	20.06.11
2011	Copy of bus cost comparisons	JRC	Xls	21.06.11
2011	Bus Savings Calculations	JRC	Xls	21.06.11
2011	Edinburgh Tram Draft Appraisal Results as of Wednesday 15th June	JRC	PPT	21.06.11
2011	Edinburgh Tram Summary Outputs for Atkins	JRC	PPT	21.06.11
2011	Edinburgh Tram Summary Outputs for Atkins	JRC	Xls	21.06.11
2011	Edinburgh Tram Financial Analysis St Andrew Square	JRC	Xls	22.06.11
2011	Edinburgh Tram Draft Appraisal Results as of Wednesday 28th June	JRC	PP	28.06.11
2011	Edinburgh Tram JRC Standard Outputs	JRC	Xls	28.06.11



# Appendix B – JRC Standard Outputs

**Edinburgh Tram Joint Revenue Committee**

Standard Output TEMPLATE

FILENAME: Standard\_Outputs\_S80d\_150611.xls User: ftorres

Test ID: S80d  
 Test Name: Full Scheme (1a) Option  
 Comment: All revenues in 2005 prices  
 Full scheme (1a) option - With Gogar; With Egip  
 Date/Time: 15 June 2011

Parameters/Assumptions:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Recession and street works factors	88.7%	87.3%	88.7%	90.0%	91.4%	92.8%	94.2%	95.7%	97.1%	98.6%	100.0%
Ramp-up profile (2011 start date)	75.0%	85.0%	92.0%	97.0%	99.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Ramp-up profile (2014 start date)	0.0%	0.0%	0.0%	75.0%	85.0%	92.0%	97.0%	99.0%	100.0%	100.0%	100.0%



Test description:  
Test ID: S80d  
Test Name: Full Scheme (1a) Option  
Date/Time: 15/06/2011  
Ramp-Up: Included (2011 start)  
Reversion Impact: Excluded

**TRAM PATRONAGE AND REVENUE MODE SHIFT**

**2011 Forecast Patronage (Hierarchical) by Geographical Segment (1,000 pax per year)**

Segment Number	Segment Description	Tram	Δ Bus	Δ Rail	Δ Car & Redistributed
SEG01	Airport to Catchment	328	-263	0	-65
SEG02	Catchment to Airport	281	-175	0	-107
SEG03	Inglisston to Catchment	449	-128	0	-321
SEG04	Catchment to Inglisston	17	-6	0	-11
SEG05	Granton Corridor to Catchment	183	-161	-2	-20
SEG06	Catchment to Granton Corridor	103	-82	-1	-16
SEG07	Leith Corridor to Catchment	3,518	-3,258	-18	-242
SEG08	Catchment to Leith Corridor	2,187	-2,074	-7	-106
SEG09	Gyle to Catchment	884	-659	-59	-138
SEG10	Catchment to Gyle	1,340	-1,030	-57	-254
SEG11	Murrayfield to Catchment	1,040	-895	0	-146
SEG12	Catchment to Murrayfield	503	-441	-4	-58
SEG13	City Centre to Catchment	1,744	-1,525	-55	-163
SEG14	Catchment to City Centre	3,703	-3,111	-57	-541
SEG15		0	0	0	0
SEG16		0	0	0	0
SEG17		0	0	0	0
SEG18	External to Catchment	1,814	-1,126	271	-1,057
SEG19	Catchment to External	1,614	-1,024	114	-704
SEG20	External to External	127	-412	186	118
SEG21	All journeys	11,802	-9,492	426	-2,736

**2011 Forecast Revenue by Geographical Segment (£1,000 per year (2005 prices))**

Segment Number	Segment Description	Tram	Δ Bus	Δ Rail
SEG01	Airport to Catchment	241	-193	0
SEG02	Catchment to Airport	206	-132	0
SEG03	Inglisston to Catchment	329	-97	0
SEG04	Catchment to Inglisston	12	-5	0
SEG05	Granton Corridor to Catchment	135	-122	-2
SEG06	Catchment to Granton Corridor	80	-70	0
SEG07	Leith Corridor to Catchment	2,584	-2,467	-26
SEG08	Catchment to Leith Corridor	1,607	-1,571	-10
SEG09	Gyle to Catchment	649	-529	-56
SEG10	Catchment to Gyle	984	-760	-69
SEG11	Murrayfield to Catchment	764	-677	0
SEG12	Catchment to Murrayfield	369	-334	-5
SEG13	City Centre to Catchment	1,281	-1,185	-60
SEG14	Catchment to City Centre	2,724	-2,355	-61
SEG15		0	0	0
SEG16		0	0	0
SEG17		0	0	0
SEG18	External to Catchment	1,406	-854	685
SEG19	Catchment to External	1,188	775	367
SEG20	External to External	94	-312	-132
SEG21	All journeys	8,668	-7,187	865

**2031 Forecast Patronage (Hierarchical) by Geographical Segment (1,000 pax per year)**

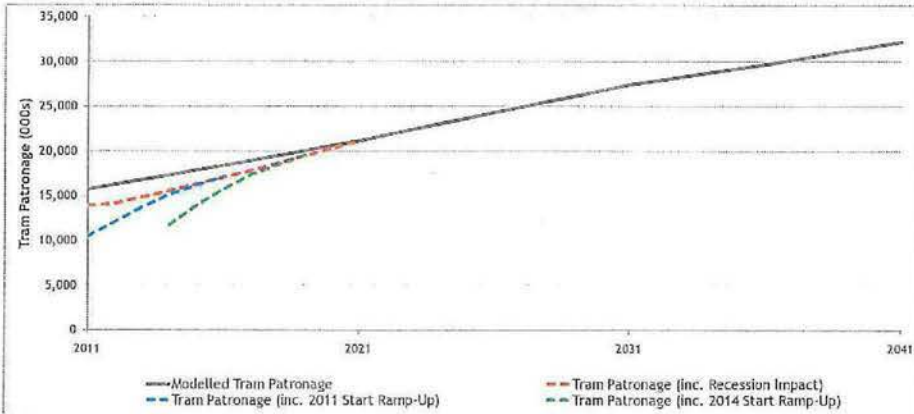
Segment Number	Segment Description	Tram	Δ Bus	Δ Rail	Δ Car & Redistributed
SEG01	Airport to Catchment	602	-422	0	-180
SEG02	Catchment to Airport	590	-318	0	-272
SEG03	Inglisston to Catchment	1,241	-340	0	-901
SEG04	Catchment to Inglisston	300	-48	0	-348
SEG05	Granton Corridor to Catchment	533	-360	-4	-169
SEG06	Catchment to Granton Corridor	321	-274	-3	-44
SEG07	Leith Corridor to Catchment	8,858	-8,188	-88	-645
SEG08	Catchment to Leith Corridor	4,724	-4,488	-21	-215
SEG09	Gyle to Catchment	2,033	-1,738	-135	-209
SEG10	Catchment to Gyle	3,373	-2,568	-166	-619
SEG11	Murrayfield to Catchment	1,662	-1,512	-3	-167
SEG12	Catchment to Murrayfield	923	-849	-8	-66
SEG13	City Centre to Catchment	3,575	-3,116	-167	-302
SEG14	Catchment to City Centre	6,384	-7,283	-149	-1,008
SEG15		0	0	0	0
SEG16		0	0	0	0
SEG17		0	0	0	0
SEG18	External to Catchment	4,991	-2,965	816	-2,842
SEG19	Catchment to External	3,618	-2,730	219	-1,105
SEG20	External to External	222	-822	132	467
SEG21	All journeys	27,446	-22,192	800	-6,054

**2031 Forecast Revenue by Geographical Segment (£1,000 per year (2005 prices))**

Segment Number	Segment Description	Tram	Δ Bus	Δ Rail
SEG01	Airport to Catchment	540	-350	0
SEG02	Catchment to Airport	528	-294	0
SEG03	Inglisston to Catchment	1,112	-314	0
SEG04	Catchment to Inglisston	269	44	0
SEG05	Granton Corridor to Catchment	478	-333	-10
SEG06	Catchment to Granton Corridor	289	-253	-6
SEG07	Leith Corridor to Catchment	7,974	-7,563	-140
SEG08	Catchment to Leith Corridor	4,233	-4,147	-40
SEG09	Gyle to Catchment	1,866	-1,606	-254
SEG10	Catchment to Gyle	3,023	-2,372	-375
SEG11	Murrayfield to Catchment	1,509	-1,397	-5
SEG12	Catchment to Murrayfield	827	-784	-16
SEG13	City Centre to Catchment	3,204	-2,679	-305
SEG14	Catchment to City Centre	7,513	-6,676	-278
SEG15		0	0	0
SEG16		0	0	0
SEG17		0	0	0
SEG18	External to Catchment	4,473	-2,739	4,222
SEG19	Catchment to External	3,242	-2,523	1,637
SEG20	External to External	159	-759	-1,144
SEG21	All journeys	24,585	-20,502	4,000

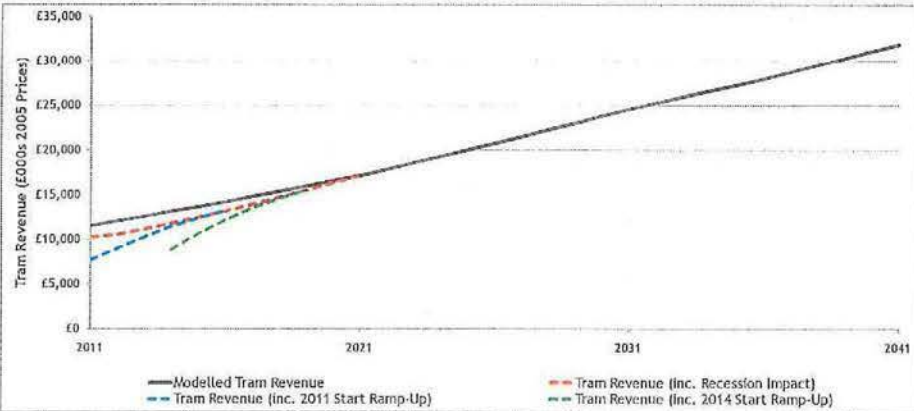
Tram Patronage (000s Boardings)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Modelled Tram Patronage	15,236	16,273	16,903	17,337	17,870	18,404	18,937	19,503	20,061	20,613	21,165	21,728	22,422	23,059	23,678	24,305
Tram Patronage (inc. Recession Impact)	12,920	14,269	14,897	15,491	16,127	16,760	17,397	18,069	18,699	19,314	19,931	20,559	21,199	21,859	22,500	23,108
Tram Patronage (inc. 2011 Start Ramp-Up)	10,415	11,973	13,765	15,225	16,104	17,070	17,867	18,659	19,479	20,314	21,165	21,939	22,422	23,059	23,678	24,305
Tram Patronage (inc. 2014 Start Ramp-Up)	0	0	0	11,201	13,878	15,331	17,331	18,473	19,479	20,314	21,165	21,939	22,422	23,059	23,678	24,305

Tram Patronage (000s Boardings)	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Modelled Tram Patronage	24,324	25,361	26,150	26,818	27,465	28,091	28,702	29,319	29,977	30,735	31,519	32,319	33,138	33,978	34,839
Tram Patronage (inc. Recession Impact)	24,914	25,757	26,190	26,618	27,446	27,934	28,562	29,119	29,777	30,495	31,138	31,828	32,550	33,298	34,078
Tram Patronage (inc. 2011 Start Ramp-Up)	24,914	25,561	26,190	26,818	27,446	27,934	28,562	29,119	29,777	30,495	31,138	31,731	32,359	32,927	33,527
Tram Patronage (inc. 2014 Start Ramp-Up)	24,914	25,561	26,190	26,818	27,446	27,934	28,562	29,119	29,777	30,495	31,138	31,731	32,359	32,927	33,527



Tram Revenue (000s 2005 Prices)	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Modelled Tram Revenue	11,557	12,058	12,558	13,116	13,657	14,202	14,750	15,301	15,855	16,524	17,171	17,881	18,592	19,303	20,013	20,724
Tram Revenue (inc. Recession Impact)	10,251	10,540	11,181	11,909	12,416	13,176	13,640	14,722	15,521	16,337	17,171	17,881	18,592	19,303	20,013	20,724
Tram Revenue (inc. 2011 Start Ramp-Up)	7,658	8,559	10,323	11,432	12,353	13,176	13,640	14,722	15,521	16,337	17,171	17,881	18,592	19,303	20,013	20,724
Tram Revenue (inc. 2014 Start Ramp-Up)	0	0	0	8,555	10,606	12,172	13,522	14,575	15,511	16,337	17,171	17,881	18,592	19,303	20,013	20,724

Tram Revenue (000s 2005 Prices)	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Modelled Tram Revenue	21,485	22,273	23,017	23,821	24,585	25,277	25,950	26,641	27,313	28,095	28,765	29,564	30,343	31,122	31,901
Tram Revenue (inc. Recession Impact)	21,490	22,273	23,017	23,821	24,585	25,277	25,950	26,641	27,313	28,095	28,765	29,564	30,343	31,122	31,901
Tram Revenue (inc. 2011 Start Ramp-Up)	21,490	22,273	23,017	23,821	24,585	25,277	25,950	26,641	27,313	28,095	28,765	29,564	30,343	31,122	31,901
Tram Revenue (inc. 2014 Start Ramp-Up)	21,490	22,273	23,017	23,821	24,585	25,277	25,950	26,641	27,313	28,095	28,765	29,564	30,343	31,122	31,901





**FLOWS AND CAPACITY**

**CHART 1**

2011	Model Period																						
DIR	IFR	RBS	GOD	GYL	EDP	EPS	SCA	SRH	BAH	MUR	HAY	SHW	PSW	SAS	PIP	MDR	BAS	FOW	COS	OOD	OCT	NER	
3,240	3,240	3,240	3,240	3,240	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660
264	831	18	242	245	18	23	150	728	154	55	352	212	530	150	343	291	283	44	25	10	0	0	
264	1,067	1,064	1,151	1,306	1,292	1,219	1,425	2,093	2,181	1,341	2,056	1,411	1,342	1,020	1,336	1,224	1,702	1,420	1,164	308	50	0	
0	1	2	174	1	122	58	44	60	67	335	206	155	192	412	77	73	155	317	259	137	319	50	
3,240	3,240	3,240	3,240	3,240	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660

**FACTORS USED**

Capacity	100%
Boarders	100%
Load	100%
Airflights	100%

**CHART 2**

2011	Model Period																						
DIR	IFR	RBS	GOD	GYL	EDP	EPS	SCA	SRH	BAH	MUR	HAY	SHW	PSW	SAS	PIP	MDR	BAS	FOW	COS	OOD	OCT	NER	
3,240	3,240	3,240	3,240	3,240	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660
0	452	477	625	637	1,091	1,000	2,111	2,351	2,464	2,281	2,115	2,112	3,032	2,531	3,218	3,271	2,876	2,101	1,574	1,139	150	179	
452	26	174	7	491	650	240	422	192	120	137	144	1,327	123	616	203	150	55	13	10	10	29	0	
3,240	3,240	3,240	3,240	3,240	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660	4,660

**FACTORS USED**

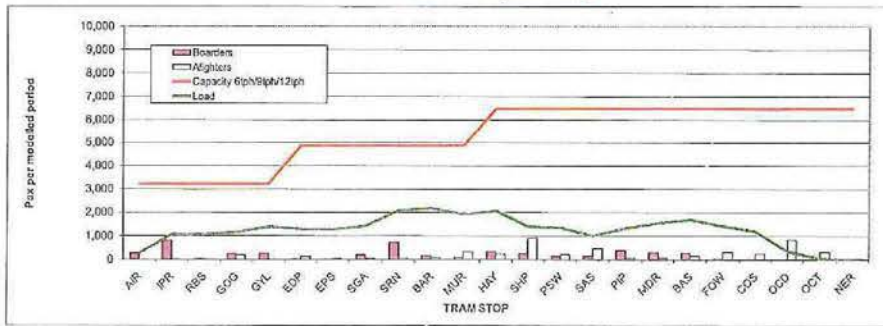
Capacity	100%
Boarders	100%
Load	100%
Airflights	100%

**SUPER PEAK FACTORS**

	2011 CAP	2011 PAX	2011 CAP	2011 PAX
AM	50%	0%	50%	0%
IF	5%	0%	0%	0%
PM	50%	0%	50%	0%

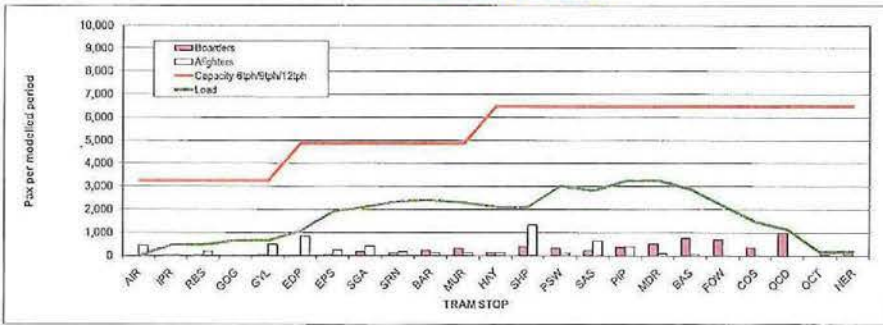
**2011 AM (Eastbound)**

**CHART 1**



**2011 AM (Westbound)**

**CHART 2**





**FLOWS AND CAPACITY**

CHART 1

IP (Per hour)	2011										Modelled Period												
STOP	ARR	IPR	RBS	GOG	GYL	EDP	EPS	SCA	SHW	BAR	MUR	HAY	SHR	PSW	SAS	PIP	MDR	BAS	FOW	COS	OCD	OCT	NER
Capacity 81ph/121ph	3,240	3,240	3,240	3,240	3,240	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860
Boarders	301	27	41	91	294	193	145	132	230	63	39	230	255	120	174	241	43	61	67	9	23	38	0
Load	301	327	350	430	681	799	816	1,042	1,197	1,167	1,172	1,208	1,347	1,218	961	1,111	1,090	814	673	503	166	51	0
Alighters	0	1	0	31	3	9	27	7	45	59	35	154	211	249	411	111	101	217	265	61	439	151	61
Capacity 81ph/121ph	3,240	3,240	3,240	3,240	3,240	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860

**FACTORS USED**

Capacity	100%
Boarders	100%
Load	100%
Alighters	100%

CHART 2

IP (Per hour)	2011										Modelled Period												
STOP	ARR	IPR	RBS	GOG	GYL	EDP	EPS	SCA	SHW	BAR	MUR	HAY	SHR	PSW	SAS	PIP	MDR	BAS	FOW	COS	OCD	OCT	NER
Capacity 81ph/121ph	3,240	3,240	3,240	3,240	3,240	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860
Boarders	0	1	7	41	15	33	55	19	38	83	25	83	173	169	159	93	125	227	253	77	6	630	59
Load	0	270	304	329	317	625	638	629	777	893	857	862	938	1,037	868	1,179	1,371	1,220	976	625	589	961	69
Alighters	270	33	33	55	234	69	139	114	189	41	15	144	273	61	420	285	22	57	33	19	0	19	0
Capacity 81ph/121ph	3,240	3,240	3,240	3,240	3,240	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860

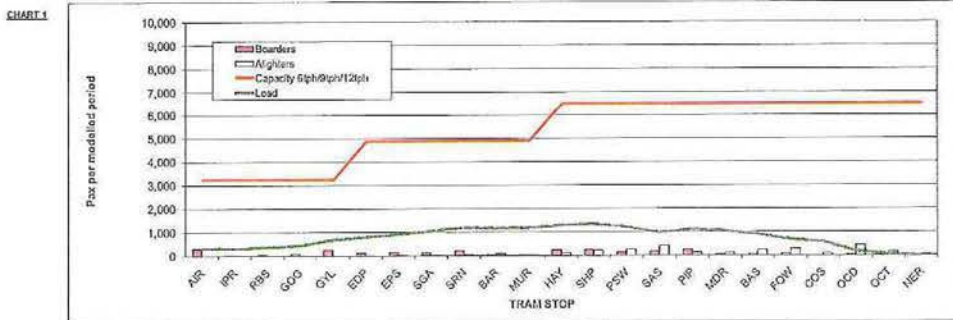
**FACTORS USED**

Capacity	100%
Boarders	100%
Load	100%
Alighters	100%

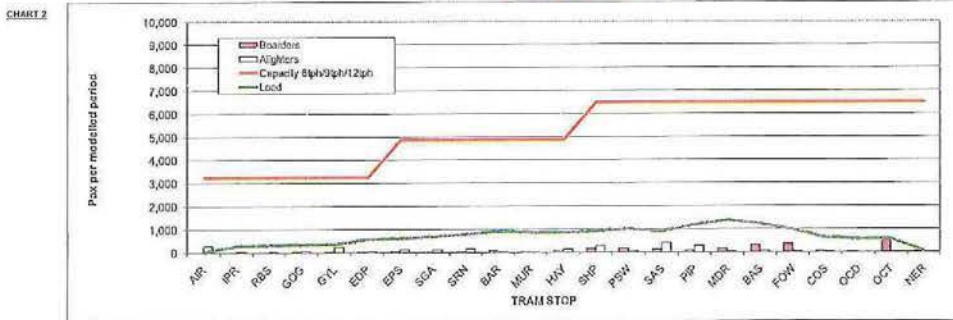
**SUPER PEAK FACTORS**

	2011 CAP	2011 PAX	2031 CAP	2031 PAX
AM	50%	0%	75%	0%
IP	0%	0%	0%	0%
PM	50%	0%	75%	0%

**2011 IP (Eastbound)**



**2011 IP (Westbound)**



**FLOWS AND CAPACITY**

**CHART 1**

AM (Eastbound)	2011				North Field																			
STOP	AM	IPR	RBS	GOC	GYL	EDP	EPS	SGA	SRN	BAR	MUR	HAY	SHP	PSW	SAS	PIP	MDR	BAS	FOV	COG	OCD	OCT	HER	
Capacity 6tpN/12tp	3,240	3,240	3,240	3,240	3,240	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650
Load	0	1,750	1,757	1,788	2,026	2,655	3,041	2,294	2,330	3,075	2,701	2,216	1,851	1,848	1,603	1,065	3,185	2,337	2,193	1,920	1,779	169	0	0
Boarders	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Alighters	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Capacity 6tpN/12tp	3,240	3,240	3,240	3,240	3,240	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650

**FACTORS USED**

Capacity	100%
Boarders	100%
Load	100%
Alighters	100%

**CHART 2**

AM (Westbound)	2011				North Field																			
STOP	AM	IPR	RBS	GOC	GYL	EDP	EPS	SGA	SRN	BAR	MUR	HAY	SHP	PSW	SAS	PIP	MDR	BAS	FOV	COG	OCD	OCT	HER	
Capacity 6tpN/12tp	3,240	3,240	3,240	3,240	3,240	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650
Load	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Boarders	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Alighters	0	692	1,278	1,472	1,472	3,059	3,738	4,217	4,718	5,832	4,557	4,268	4,339	6,041	5,642	7,115	7,227	6,704	5,855	2,763	2,332	2,460	567	0
Capacity 6tpN/12tp	3,240	3,240	3,240	3,240	3,240	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650	4,650

**FACTORS USED**

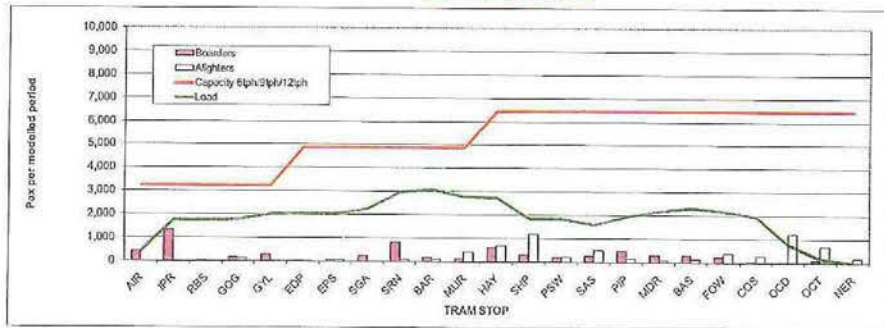
Capacity	100%
Boarders	100%
Load	100%
Alighters	100%

**SUPPER PEAK FACTORS**

	2011 CAP	2011 PAX	2011 CAP	2011 PAX
AM	50%	0%	75%	0%
IP	0%	0%	0%	0%
PM	100%	0%	75%	0%

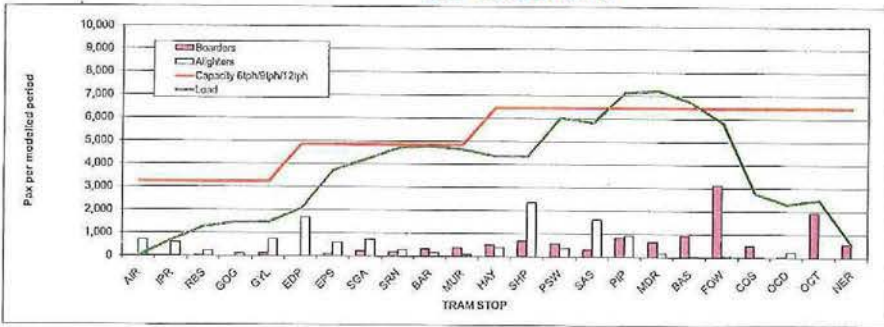
**2011 AM (Eastbound)**

**CHART 1**



**2011 AM (Westbound)**

**CHART 2**



**FLows AND CAPACITY**

**CHART 1**

IP (Westbound)	2011																Modelled Period															
STOP	AIR	IPR	RBS	GOG	GVL	EDP	EPS	SGA	SRN	BAR	MUR	HAY	SHI	PSW	SAS	PIP	MOR	BAS	FOW	COS	CCD	OCT	NER									
Capacity 6ph/12ph	3,240	3,240	3,240	3,240	3,240	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890									
Boarders	337	267	86	78	501	127	414	154	235	75	50	434	393	152	375	416	50	25	81	0	152	0	0									
Load	337	267	726	710	1,213	1,332	1,537	1,795	1,942	1,857	1,851	2,017	2,034	2,015	1,854	2,145	2,060	1,862	1,547	1,317	817	139	0									
Alighters	0	2	12	31	13	8	163	16	76	112	96	293	331	126	602	154	125	218	335	176	308	491	158									
Capacity 6ph/12ph/12ph	3,240	3,240	3,240	3,240	3,240	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890									

**FACTORS USED**

Capacity	100%
Boarders	100%
Load	100%
Alighters	100%

**CHART 2**

IP (Westbound)	2011																Modelled Period															
STOP	AIR	IPR	RBS	GOG	GVL	EDP	EPS	SGA	SRN	BAR	MUR	HAY	SHI	PSW	SAS	PIP	MOR	BAS	FOW	COS	CCD	OCT	NER									
Capacity 6ph/12ph	3,240	3,240	3,240	3,240	3,240	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890									
Boarders	0	21	17	0	48	118	121	35	70	159	24	175	270	251	281	130	241	228	323	116	1,419	194	133									
Load	0	410	367	621	621	1,064	1,034	1,339	1,452	1,578	1,473	1,445	1,696	1,910	1,783	2,268	2,477	2,270	2,050	1,776	1,687	324	130									
Alighters	410	509	41	184	511	118	427	147	183	26	18	281	483	123	767	319	33	65	39	27	47	0	0									
Capacity 6ph/12ph/12ph	3,240	3,240	3,240	3,240	3,240	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890	4,890									

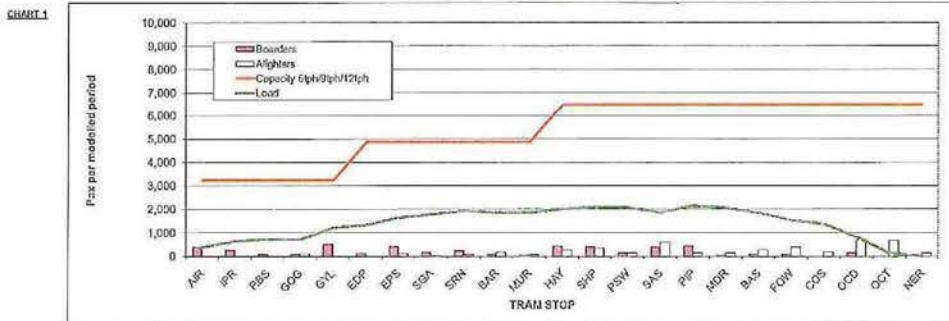
**FACTORS USED**

Capacity	100%
Boarders	100%
Load	100%
Alighters	100%

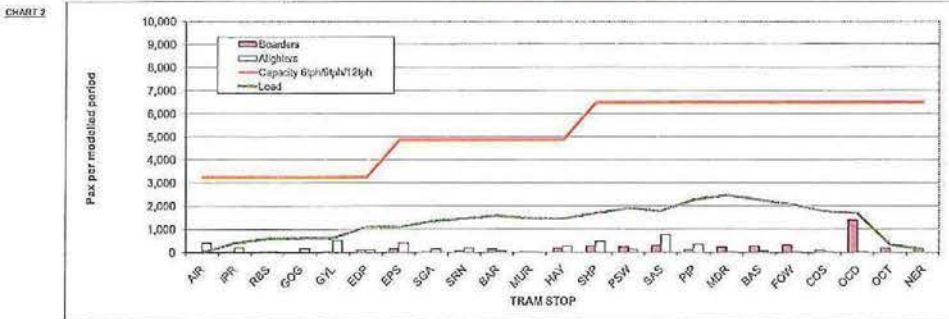
**SUPER-PEAK FACTORS**

	2011 CAP	2011 PAX	2011 CAP	2011 PAX
AM	50%	0%	75%	0%
IP	0%	0%	0%	0%
PM	50%	0%	75%	0%

**2011 IP (Eastbound)**



**2011 IP (Westbound)**





**Edinburgh Tram Joint Revenue Committee**

Standard Output TEMPLATE

FILENAME: Standard\_Outputs\_SB1a\_130811.xls User: fiorres

Test ID: SB1a  
 Test Name: St. Andrew Square  
 Comment: All revenues in 2005 prices  
 St. Andrew option - With Gogar; With Egip  
 Date/Time: 13 June 2011

Parameters/Assumptions:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Recession and street works factors	86.7%	87.3%	88.7%	90.0%	91.4%	92.8%	94.2%	95.7%	97.1%	98.6%	100.0%
Ramp-up profile (2011 start date)	75.0%	85.0%	92.0%	97.0%	99.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Ramp-up profile (2014 start date)	0.0%	0.0%	0.0%	75.0%	85.0%	92.0%	97.0%	99.0%	100.0%	100.0%	100.0%

**TRAM PATRONAGE AND REVENUE MODE SHIFT**

**2011 Forecast Patronage (Hierarchical) by Geographical Segment (1,000 pax per year)**

Segment Number	Segment Description	Tram	Δ Bus	Δ Rail	Δ Car & Redistributed
SEG01	Airport to Catchment	316	-234	0	-84
SEG02	Catchment to Airport	267	-136	0	-131
SEG03	Ingliston to Catchment	449	-125	0	-323
SEG04	Catchment to Ingliston	17	-46	0	-10
SEG05	Granton Corridor to Catchment	111	-80	-2	-29
SEG06	Catchment to Granton Corridor	79	-62	-1	-16
SEG07	Leith Corridor to Catchment	268	-98	-1	-159
SEG08	Catchment to Leith Corridor	103	-90	-1	-12
SEG09	Gyle to Catchment	734	-564	-50	-120
SEG10	Catchment to Gyle	898	-730	-42	-224
SEG11	Murrayfield to Catchment	879	-704	0	-95
SEG12	Catchment to Murrayfield	391	-344	-4	-43
SEG13	City Centre to Catchment	922	-706	-53	-163
SEG14	Catchment to City Centre	1,818	-1,222	-58	-538
SEG15		0	0	0	0
SEG16		0	0	0	0
SEG17		0	0	0	0
SEG18	External to Catchment	1,210	-534	168	-844
SEG19	Catchment to External	708	-600	105	-313
SEG20	External to External	77	-142	154	-89
SEG21	All journeys	5,666	-3,767	321	-2,220

**2011 Forecast Revenue by Geographical Segment (£1,000 per year (2005 prices))**

Segment Number	Segment Description	Tram	Δ Bus	Δ Rail	
SEG01	Airport to Catchment	233	-177	0	
SEG02	Catchment to Airport	196	-103	0	
SEG03	Ingliston to Catchment	329	-95	0	
SEG04	Catchment to Ingliston	12	-5	0	
SEG05	Granton Corridor to Catchment	31	-60	-3	
SEG06	Catchment to Granton Corridor	58	-47	-3	
SEG07	Leith Corridor to Catchment	180	-75	-3	
SEG08	Catchment to Leith Corridor	76	-68	-3	
SEG09	Gyle to Catchment	539	-427	-62	
SEG10	Catchment to Gyle	731	-653	-52	
SEG11	Murrayfield to Catchment	645	-594	0	
SEG12	Catchment to Murrayfield	287	-261	-5	
SEG13	City Centre to Catchment	677	-535	-62	
SEG14	Catchment to City Centre	1,335	-926	-69	
SEG15		0	0	0	
SEG16		0	0	0	
SEG17		0	0	0	
SEG18	External to Catchment	869	-404	823	
SEG19	Catchment to External	520	-379	388	
SEG20	External to External	57	-108	-230	
SEG21	All journeys	4,161	-2,852	831	

**2031 Forecast Patronage (Hierarchical) by Geographical Segment (1,000 pax per year)**

Segment Number	Segment Description	Tram	Δ Bus	Δ Rail	Δ Car & Redistributed
SEG01	Airport to Catchment	574	-372	0	-203
SEG02	Catchment to Airport	548	-246	0	-301
SEG03	Ingliston to Catchment	1,220	-311	0	-910
SEG04	Catchment to Ingliston	255	109	0	-365
SEG05	Granton Corridor to Catchment	280	-152	-5	-123
SEG06	Catchment to Granton Corridor	185	-130	-3	-52
SEG07	Leith Corridor to Catchment	496	-202	-8	-286
SEG08	Catchment to Leith Corridor	261	-133	-8	-120
SEG09	Gyle to Catchment	1,511	-1,139	-157	-215
SEG10	Catchment to Gyle	1,885	-1,402	-145	-336
SEG11	Murrayfield to Catchment	1,451	-1,276	-1	-174
SEG12	Catchment to Murrayfield	694	-551	-6	-87
SEG13	City Centre to Catchment	1,740	-1,239	-167	-334
SEG14	Catchment to City Centre	3,496	-2,339	-176	-982
SEG15		0	0	0	0
SEG16		0	0	0	0
SEG17		0	0	0	0
SEG18	External to Catchment	2,546	-1,051	701	-2,198
SEG19	Catchment to External	1,374	-951	160	-593
SEG20	External to External	93	-437	79	-269
SEG21	All journeys	11,293	-7,131	602	-4,764

**2031 Forecast Revenue by Geographical Segment (£1,000 per year (2005 prices))**

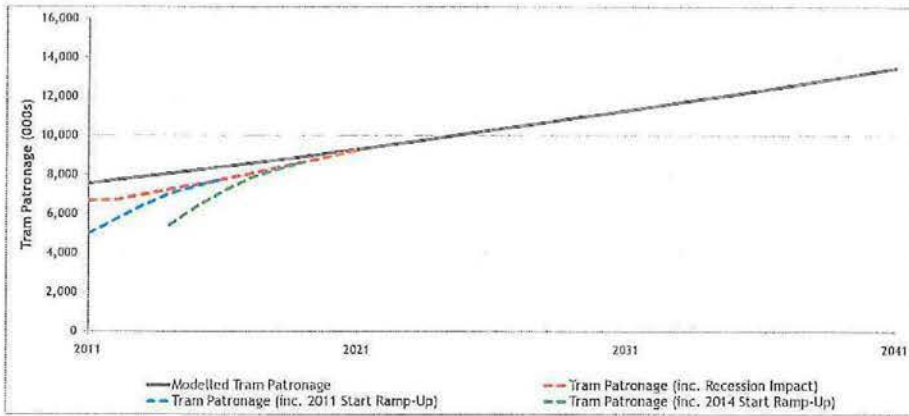
Segment Number	Segment Description	Tram	Δ Bus	Δ Rail	
SEG01	Airport to Catchment	515	-344	0	
SEG02	Catchment to Airport	491	-226	0	
SEG03	Ingliston to Catchment	1,094	-287	0	
SEG04	Catchment to Ingliston	229	101	0	
SEG05	Granton Corridor to Catchment	251	-140	-11	
SEG06	Catchment to Granton Corridor	165	-120	-5	
SEG07	Leith Corridor to Catchment	445	-167	-23	
SEG08	Catchment to Leith Corridor	234	-123	-17	
SEG09	Gyle to Catchment	1,354	-1,052	-305	
SEG10	Catchment to Gyle	1,688	-1,295	-305	
SEG11	Murrayfield to Catchment	1,301	-1,179	-2	
SEG12	Catchment to Murrayfield	577	-508	-12	
SEG13	City Centre to Catchment	1,559	-1,145	-338	
SEG14	Catchment to City Centre	3,133	-2,161	-339	
SEG15		0	0	0	
SEG16		0	0	0	
SEG17		0	0	0	
SEG18	External to Catchment	2,281	-971	4,000	
SEG19	Catchment to External	1,231	-879	1,410	
SEG20	External to External	88	-404	-1,514	
SEG21	All journeys	10,120	-6,586	3,217	



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Tram Patronage (000s Headings)																
Modelled Tram Patronage	7,951	7,745	7,835	8,051	8,216	8,405	8,552	8,719	8,925	9,111	9,283	9,458	9,639	9,829	10,020	10,210
Tram Patronage (inc. Recession Impact)	5,709	6,716	6,929	7,259	7,515	7,737	8,015	8,318	8,648	8,979	9,288	9,618	9,959	10,309	10,659	10,910
Tram Patronage (inc. 2011 Start Ramp-Up)	5,035	5,794	6,439	7,041	7,449	7,737	8,015	8,318	8,648	8,979	9,288	9,618	9,959	10,309	10,659	10,910
Tram Patronage (inc. 2014 Start Ramp-Up)	0	0	0	5,624	6,316	7,123	7,812	8,294	8,648	8,979	9,288	9,618	9,959	10,309	10,659	10,910

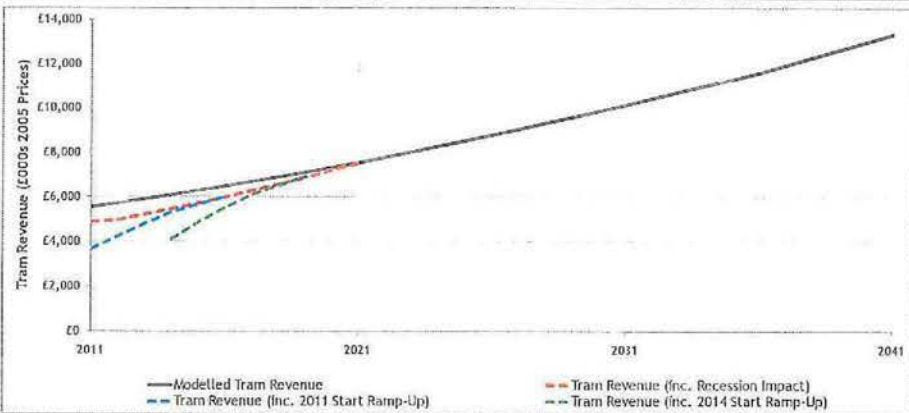
	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Modelled Tram Patronage	10,491	10,692	10,892	11,093	11,293	11,500	11,707	11,914	12,120	12,327	12,535	12,743	13,011	13,279	13,487
Tram Patronage (inc. Recession Impact)	10,491	10,692	10,892	11,093	11,293	11,500	11,707	11,914	12,120	12,327	12,535	12,743	13,011	13,279	13,487
Tram Patronage (inc. 2011 Start Ramp-Up)	10,491	10,692	10,892	11,093	11,293	11,500	11,707	11,914	12,120	12,327	12,535	12,743	13,011	13,279	13,487
Tram Patronage (inc. 2014 Start Ramp-Up)	10,491	10,692	10,892	11,093	11,293	11,500	11,707	11,914	12,120	12,327	12,535	12,743	13,011	13,279	13,487



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Tram Revenue (000s 2005 Prices)																
Modelled Tram Revenue	5,548	5,730	5,835	6,104	6,234	6,413	6,600	6,807	7,116	7,425	7,585	7,783	8,058	8,278	8,526	8,774
Tram Revenue (inc. Recession Impact)	4,921	5,051	5,245	5,493	5,751	6,018	6,300	6,607	6,910	7,213	7,535	7,783	8,010	8,278	8,526	8,774
Tram Revenue (inc. 2011 Start Ramp-Up)	3,691	4,253	4,824	5,326	5,693	6,038	6,393	6,660	6,910	7,213	7,535	7,783	8,010	8,278	8,526	8,774
Tram Revenue (inc. 2014 Start Ramp-Up)	0	0	0	4,119	4,618	5,137	5,120	6,140	6,910	7,213	7,535	7,783	8,010	8,278	8,526	8,774

	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Modelled Tram Revenue	9,013	9,312	9,382	9,851	10,120	10,418	10,716	11,014	11,312	11,610	11,954	12,200	12,642	12,886	13,330
Tram Revenue (inc. Recession Impact)	9,013	9,312	9,592	9,851	10,120	10,418	10,716	11,014	11,312	11,610	11,954	12,200	12,642	12,886	13,330
Tram Revenue (inc. 2011 Start Ramp-Up)	9,013	9,312	9,592	9,851	10,120	10,418	10,716	11,014	11,312	11,610	11,954	12,200	12,642	12,886	13,330
Tram Revenue (inc. 2014 Start Ramp-Up)	9,013	9,312	9,592	9,851	10,120	10,418	10,716	11,014	11,312	11,610	11,954	12,200	12,642	12,886	13,330



**FLOWS AND CAPACITY**

CHART 1

[M] (Eastbound)	2011				Modelled Period																		
	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC		
STOP	3,200	3,240	3,240	3,240	3,240	4,000	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200
Capacity 6tpH/12tpH	3,200	3,240	3,240	3,240	3,240	4,000	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200
Boarders	355	401	419	416	452	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
Load	263	1,058	1,059	1,306	1,503	1,417	1,251	1,425	2,075	2,123	1,877	1,853	855	453	0	0	0	0	0	0	0	0	0
Alighters	0	1	8	42	153	111	43	43	76	63	318	255	852	157	493	0	0	0	0	0	0	0	0
Capacity 6tpH/12tpH	3,200	3,240	3,240	3,240	3,240	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000

FACTORS USED  
Capacity 100%  
Boarders 100%  
Load 100%  
Alighters 100%

CHART 2

[M] (Westbound)	2011				Modelled Period																		
	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC		
STOP	3,240	3,240	3,240	3,240	3,240	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Capacity 6tpH/12tpH	3,240	3,240	3,240	3,240	3,240	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Boarders	0	1	25	4	46	7	81	143	151	216	311	327	427	426	832	0	0	0	0	0	0	0	0
Load	0	432	455	573	370	543	1,722	1,566	2,089	2,071	1,952	1,777	1,613	1,229	832	0	0	0	0	0	0	0	0
Alighters	432	24	142	1	426	783	190	367	133	59	77	23	72	0	0	0	0	0	0	0	0	0	0
Capacity 6tpH/12tpH	3,240	3,240	3,240	3,240	3,240	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000

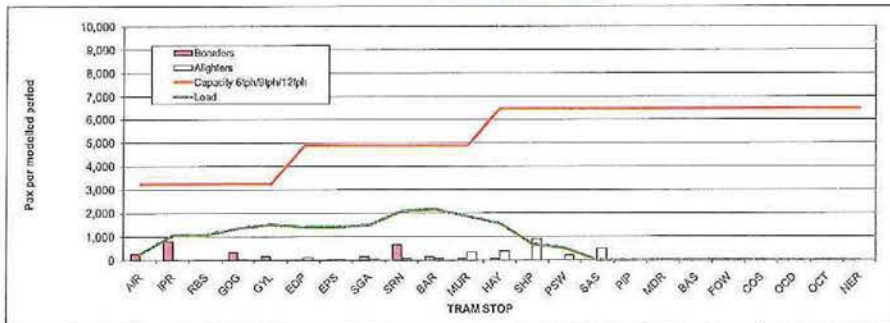
FACTORS USED  
Capacity 100%  
Boarders 100%  
Load 100%  
Alighters 100%

**SUPER-PEAK FACTORS**

	2011 CAP	2011 PAX	2011 CAP	2011 PAX
AM	50%	0%	75%	0%
IP	0%	0%	0%	0%
PM	50%	0%	75%	0%

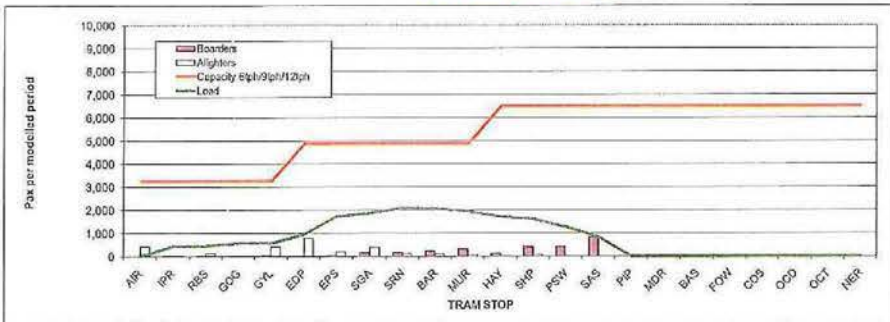
**2011 AM (Eastbound)**

CHART 1



**2011 AM (Westbound)**

CHART 2



**FLOW AND CAPACITY**

CHART 1

IP (Eastbound)	2011												Mod/Std Period											
STOP	AIR	IPR	RBS	GOG	GYL	EDP	EPS	SGA	SRN	BAR	MUR	HAY	SHR	PSW	SAS	PIP	MGR	BAS	FOW	COB	OCB	OCT	NER	
Capacity Eqh/10ph	3,240	3,240	3,240	3,240	3,240	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860
Boards	20	22	11	22	11	22	11	22	11	22	11	22	11	22	11	22	11	22	11	22	11	22	11	22
Load	291	320	331	421	640	751	649	932	1,053	892	831	917	737	410	0	0	0	0	0	0	0	0	0	0
Alighters	0	1	11	21	3	5	28	18	46	53	37	117	235	208	459	0	0	0	0	0	0	0	0	
Capacity Eqh/10ph/12ph	3,240	3,240	3,240	3,240	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	

FACTORS USED

Capacity	100%
Boards	100%
Load	100%
Alighters	100%

CHART 2

IP (Westbound)	2011												Mod/Std Period											
STOP	AIR	IPR	RBS	GOG	GYL	EDP	EPS	SGA	SRN	BAR	MUR	HAY	SHR	PSW	SAS	PIP	MGR	BAS	FOW	COB	OCB	OCT	NER	
Capacity Eqh/10ph	3,240	3,240	3,240	3,240	3,240	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860
Boards	0	2	11	76	0	13	19	23	30	123	23	55	59	197	324	0	0	0	0	0	0	0	0	0
Load	0	288	318	332	253	457	524	613	638	743	814	824	658	590	324	0	0	0	0	0	0	0	0	0
Alighters	285	31	33	0	234	60	103	68	129	25	8	16	11	0	0	0	0	0	0	0	0	0	0	
Capacity Eqh/10ph/12ph	3,240	3,240	3,240	3,240	3,240	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	

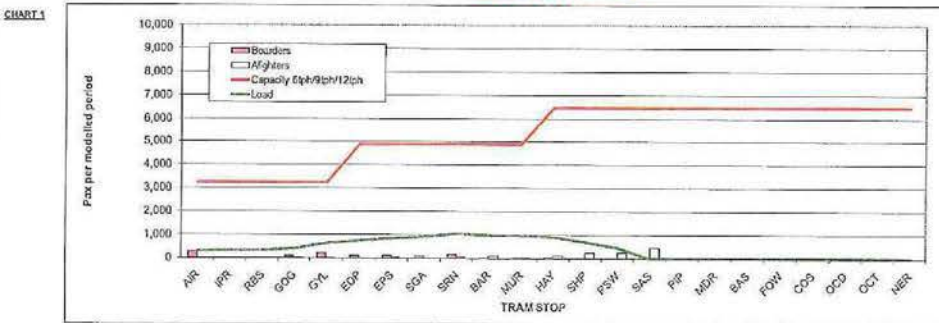
FACTORS USED

Capacity	100%
Boards	100%
Load	100%
Alighters	100%

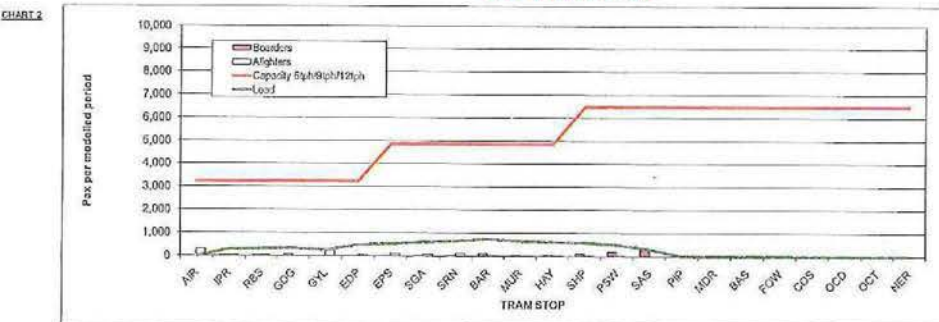
**SUPER PEAK FACTORS**

	2011 CAP	2011 PAX	2011 CAP	2011 PAX
AM	50%	0%	75%	0%
IP	0%	0%	0%	0%
PM	50%	0%	75%	0%

**2011 IP (Eastbound)**



**2011 IP (Westbound)**



**FLOWS AND CAPACITY**

**CHART 1**

Direction	2011	Forecast Period																				
STOP	AM	PM	0505	0520	0535	0550	0605	0620	0635	0650	0705	0720	0735	0750	0805	0820	0835	0850	0905	0920	0935	
Capacity 6ph/12ph	3,240	3,240	3,240	3,240	3,240	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800
Boards	0	1,328	15	241	159	31	67	183	735	167	69	69	24	0	0	0	0	0	0	0	0	0
Load	0	1,720	1,721	1,952	1,805	1,859	1,891	2,000	2,559	2,765	2,421	2,657	693	655	0	0	0	0	0	0	0	0
Flights	0	3	23	19	14	8	23	19	65	20	115	70	138	238	815	0	0	0	0	0	0	0
Capacity 6ph/12ph/12ph	3,240	3,240	3,240	3,240	3,240	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800

**FACTORS USED**

Capacity	100%
Boards	100%
Load	100%
Flights	100%

**CHART 2**

Direction	2011	Forecast Period																				
STOP	AM	PM	0505	0520	0535	0550	0605	0620	0635	0650	0705	0720	0735	0750	0805	0820	0835	0850	0905	0920	0935	
Capacity 6ph/12ph	3,240	3,240	3,240	3,240	3,240	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800
Boards	0	1,328	15	241	159	31	67	183	735	167	69	69	24	0	0	0	0	0	0	0	0	0
Load	0	1,720	1,721	1,952	1,805	1,859	1,891	2,000	2,559	2,765	2,421	2,657	693	655	0	0	0	0	0	0	0	0
Flights	0	3	23	19	14	8	23	19	65	20	115	70	138	238	815	0	0	0	0	0	0	0
Capacity 6ph/12ph/12ph	3,240	3,240	3,240	3,240	3,240	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800

**FACTORS USED**

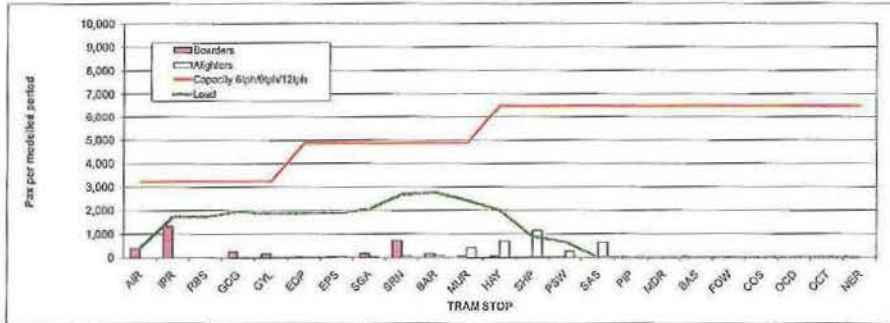
Capacity	100%
Boards	100%
Load	100%
Flights	100%

**SUPER PEAK FACTORS**

	2011 CAP	2011 PAX	2011 CAP	2011 PAX
AM	50%	0%	75%	0%
PM	0%	0%	0%	0%
PM	50%	0%	75%	0%

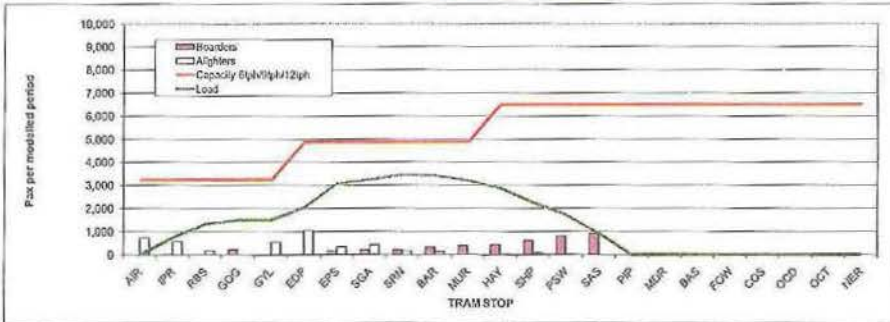
**2031 AM (Eastbound)**

**CHART 1**



**2031 AM (Westbound)**

**CHART 2**



**FLOW AND CAPACITY**

**CHART 1**

IP (Eastbound)	2011										Modelled Period												
STOP	AIR	IPR	RBS	GOG	GVL	EDP	EPS	SGA	SRH	BAR	MUR	HAY	SHW	PSW	SAS	PIP	MDR	BAS	FOW	COS	ODD	OCT	NER
Capacity @ph/12ph	3,200	3,200	3,200	3,200	3,200	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800
Boarders	374	248	50	119	275	163	314	105	169	43	23	45	48	1	0	0	0	0	0	0	0	0	0
Load	374	241	690	695	1,019	1,174	1,388	1,477	1,665	1,494	1,444	1,222	708	615	0	0	0	0	0	0	0	0	0
Airframes	0	2	13	33	14	0	102	18	27	109	60	231	261	275	232	0	0	0	0	0	0	0	0
Capacity @ph/12ph	3,200	3,200	3,200	3,200	3,200	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800

**FACTORS USED**  
 Capacity: 100%  
 Boarders: 100%  
 Load: 100%  
 Airframes: 100%

**CHART 2**

IP (Westbound)	2011										Modelled Period												
STOP	AIR	IPR	RBS	GOG	GVL	EDP	EPS	SGA	SRH	BAR	MUR	HAY	SHW	PSW	SAS	PIP	MDR	BAS	FOW	COS	ODD	OCT	NER
Capacity @ph/12ph	3,200	3,200	3,200	3,200	3,200	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800
Boarders	0	22	13	31	35	17	26	34	87	167	44	103	111	314	402	0	0	0	0	0	0	0	0
Load	0	303	251	585	585	665	920	1,110	1,160	1,245	1,124	1,031	665	216	402	0	0	0	0	0	0	0	0
Airframes	303	193	93	0	334	69	297	84	142	26	11	26	22	0	0	0	0	0	0	0	0	0	0
Capacity @ph/12ph	3,200	3,200	3,200	3,200	3,200	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800

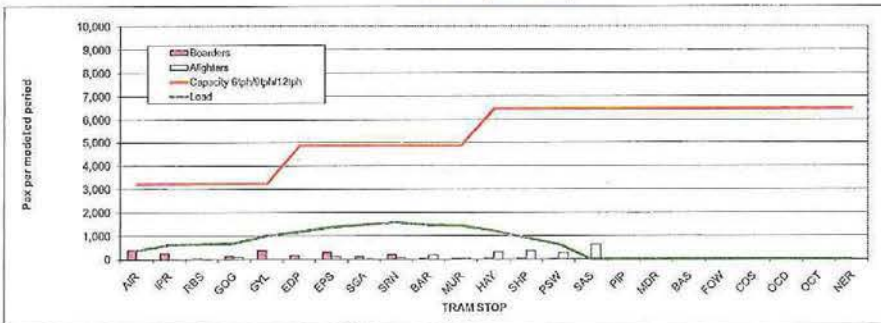
**FACTORS USED**  
 Capacity: 100%  
 Boarders: 100%  
 Load: 100%  
 Airframes: 100%

**SUPER PEAK FACTORS**

	2011 CAP	2011 PAX	2031 CAP	2031 PAX
AIR	50%	0%	75%	0%
IP	0%	0%	0%	0%
PA	50%	0%	75%	0%

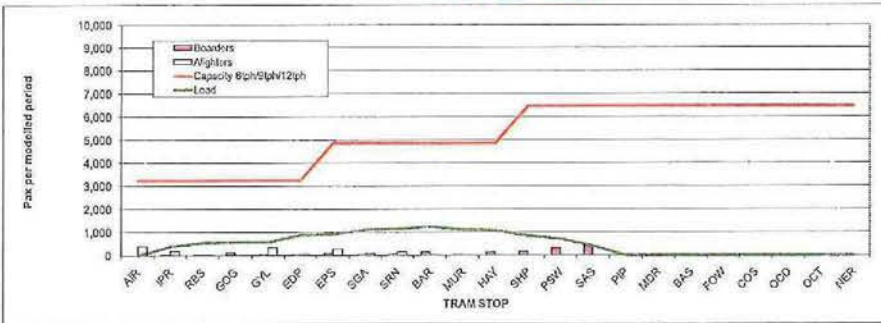
**2031 IP (Eastbound)**

**CHART 1**



**2031 IP (Westbound)**

**CHART 2**



**Edinburgh Tram Joint Revenue Committee**

Standard Output TEMPLATE

FILENAME: Standard\_Outputs\_SC1\_130811.xls User: forres

Test ID: SC1  
 Test Name: Foot of the Walk Option  
 Comment: All revenues in 2005 prices  
 Foot of the Walk option - Without Gogar; With Egip  
 Date/Time: 13 June 2011

Parameters/Assumptions:	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Recession and street works factors	88.7%	87.3%	88.7%	90.0%	91.4%	92.8%	94.2%	95.7%	97.1%	98.6%	100.0%
Ramp-up profile (2011 start date)	75.0%	85.0%	92.0%	97.0%	99.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Ramp-up profile (2014 start date)	0.0%	0.0%	0.0%	75.0%	85.0%	92.0%	97.0%	99.0%	100.0%	100.0%	100.0%



**TRAM PATRONAGE AND REVENUE MODE SHIFT**

**2011 Forecast Patronage (Hierarchical) by Geographical Segment (£,000 pax per year)**

Segment Number	Segment Description	Tram	Δ Bus	Δ Rail	Δ Car & Redistributed
SEG01	Airport to Catchment	328	-256	0	-72
SEG02	Catchment to Airport	261	-169	0	-112
SEG03	Ingliston to Catchment	455	-135	0	-321
SEG04	Catchment to Ingliston	17	-8	0	-11
SEG05	Granton Corridor to Catchment	154	-132	-2	-21
SEG06	Catchment to Granton Corridor	56	-77	-1	-18
SEG07	Leith Corridor to Catchment	1,808	-1,582	-18	-208
SEG08	Catchment to Leith Corridor	853	-769	-7	-67
SEG09	Gyle to Catchment	812	-641	-48	-123
SEG10	Catchment to Gyle	1,222	-915	-60	-226
SEG11	Murrayfield to Catchment	636	-769	0	-100
SEG12	Catchment to Murrayfield	391	-351	-3	-37
SEG13	City Centre to Catchment	1,330	-1,124	-57	-149
SEG14	Catchment to City Centre	2,925	-2,351	-55	-519
SEG15		0	0	0	0
SEG16		0	0	0	0
SEG17		0	0	0	0
SEG18	External to Catchment	1,346	-752	281	-876
SEG19	Catchment to External	972	-538	101	-535
SEG20	External to External	107	-429	154	160
SEG21	All Journeys	8,201	-6,375	410	-2,236

**2011 Forecast Revenue by Geographical Segment (£1,000 pax year (2005 prices))**

Segment Number	Segment Description	Tram	Δ Bus	Δ Rail
SEG01	Airport to Catchment	241	-194	0
SEG02	Catchment to Airport	205	-128	0
SEG03	Ingliston to Catchment	334	-102	0
SEG04	Catchment to Ingliston	13	-5	0
SEG05	Granton Corridor to Catchment	113	-100	-2
SEG06	Catchment to Granton Corridor	70	-58	0
SEG07	Leith Corridor to Catchment	1,328	-1,197	-26
SEG08	Catchment to Leith Corridor	634	-598	-9
SEG09	Gyle to Catchment	596	-485	-55
SEG10	Catchment to Gyle	853	-693	-73
SEG11	Murrayfield to Catchment	652	-597	0
SEG12	Catchment to Murrayfield	267	-265	-5
SEG13	City Centre to Catchment	977	-851	-63
SEG14	Catchment to City Centre	2,149	-1,780	-59
SEG15		0	0	0
SEG16		0	0	0
SEG17		0	0	0
SEG18	External to Catchment	939	-569	659
SEG19	Catchment to External	714	-407	356
SEG20	External to External	79	-324	-170
SEG21	All Journeys	6,023	-4,827	921

**2031 Forecast Patronage (Hierarchical) by Geographical Segment (1,000 pax per year)**

Segment Number	Segment Description	Tram	Δ Bus	Δ Rail	Δ Car & Redistributed
SEG01	Airport to Catchment	600	-413	0	-187
SEG02	Catchment to Airport	588	-303	0	-285
SEG03	Ingliston to Catchment	1,255	-343	0	-911
SEG04	Catchment to Ingliston	237	66	0	363
SEG05	Granton Corridor to Catchment	467	-247	-4	-216
SEG06	Catchment to Granton Corridor	271	-163	-3	-104
SEG07	Leith Corridor to Catchment	3,511	-2,663	-68	-781
SEG08	Catchment to Leith Corridor	1,489	-1,240	-20	-229
SEG09	Gyle to Catchment	1,842	-1,501	-143	-198
SEG10	Catchment to Gyle	2,785	-1,991	-192	-603
SEG11	Murrayfield to Catchment	1,423	-1,277	-4	-142
SEG12	Catchment to Murrayfield	677	-622	-7	-48
SEG13	City Centre to Catchment	2,490	-2,053	-160	-278
SEG14	Catchment to City Centre	5,480	-4,244	-156	-1,079
SEG15		0	0	0	0
SEG16		0	0	0	0
SEG17		0	0	0	0
SEG18	External to Catchment	3,002	-1,464	881	-2,220
SEG19	Catchment to External	1,836	-1,147	153	-842
SEG20	External to External	138	-848	124	589
SEG21	All Journeys	18,562	-11,856	579	-5,186

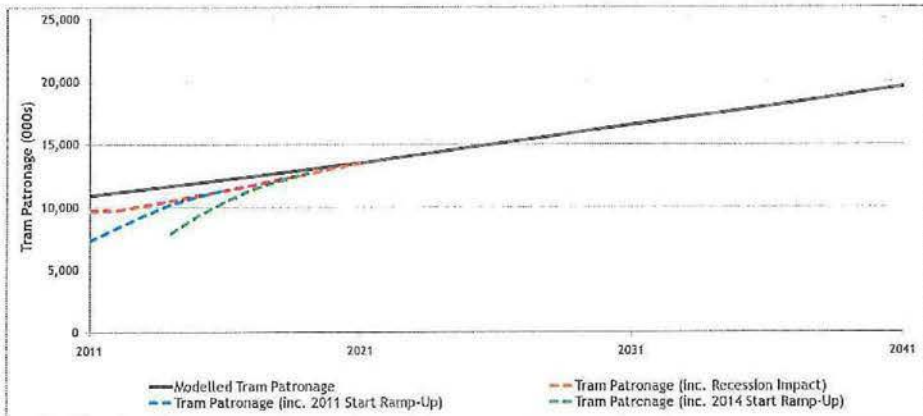
**2031 Forecast Revenue by Geographical Segment (£1,000 per year (2005 prices))**

Segment Number	Segment Description	Tram	Δ Bus	Δ Rail
SEG01	Airport to Catchment	538	-352	0
SEG02	Catchment to Airport	527	-250	0
SEG03	Ingliston to Catchment	1,124	-317	0
SEG04	Catchment to Ingliston	268	61	0
SEG05	Granton Corridor to Catchment	419	-228	-10
SEG06	Catchment to Granton Corridor	243	-151	-6
SEG07	Leith Corridor to Catchment	3,146	-2,460	-140
SEG08	Catchment to Leith Corridor	1,335	-1,145	-38
SEG09	Gyle to Catchment	1,650	-1,387	-268
SEG10	Catchment to Gyle	2,496	-1,839	-389
SEG11	Murrayfield to Catchment	1,275	-1,180	-5
SEG12	Catchment to Murrayfield	607	-574	-14
SEG13	City Centre to Catchment	2,232	-1,896	-314
SEG14	Catchment to City Centre	4,911	-3,921	-289
SEG15		0	0	0
SEG16		0	0	0
SEG17		0	0	0
SEG18	External to Catchment	2,690	-1,352	3,683
SEG19	Catchment to External	1,545	-1,050	1,300
SEG20	External to External	122	-784	-1,347
SEG21	All Journeys	14,842	-11,045	2,801

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Tram Patronage (000s Boardings)																
Modelled Tram Patronage	10,534	11,261	11,447	11,763	11,900	12,216	12,482	12,747	13,013	13,278	13,544	13,810	14,076	14,342	14,608	14,874
Tram Patronage (Inc. Recession Impact)	9,631	9,773	10,149	10,531	10,917	11,311	11,758	12,193	12,635	13,076	13,514	13,951	14,388	14,825	15,262	15,699
Tram Patronage (Inc. 2011 Start Ramp-Up)	7,374	8,167	9,382	10,217	10,818	11,341	11,758	12,153	12,525	12,876	13,216	13,544	13,862	14,170	14,468	14,756
Tram Patronage (Inc. 2014 Start Ramp-Up)	0	0	0	7,160	8,189	10,424	11,665	12,921	14,185	15,456	16,732	18,012	19,296	20,584	21,876	23,172

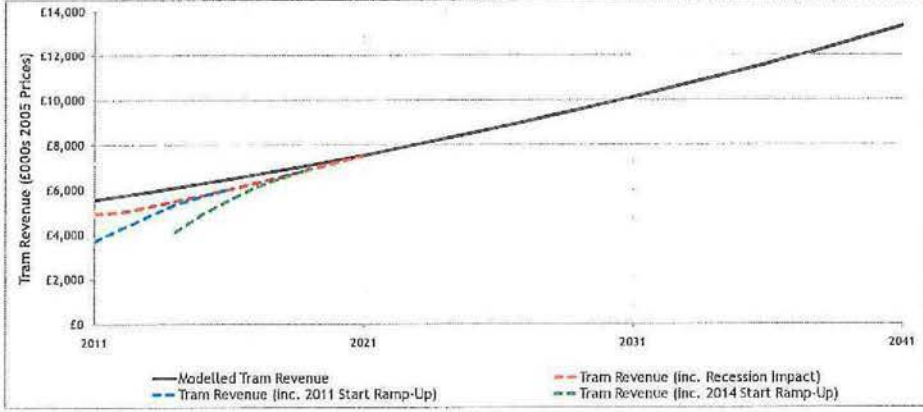
	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Tram Patronage (000s Boardings)															
Modelled Tram Patronage	15,355	15,657	15,959	16,260	16,562	16,863	17,164	17,465	17,766	18,067	18,368	18,669	18,970	19,271	19,572
Tram Patronage (Inc. Recession Impact)	13,365	13,667	13,969	14,270	14,572	14,873	15,174	15,475	15,776	16,077	16,378	16,679	16,980	17,281	17,582
Tram Patronage (Inc. 2011 Start Ramp-Up)	15,355	15,657	15,959	16,260	16,562	16,863	17,164	17,465	17,766	18,067	18,368	18,669	18,970	19,271	19,572
Tram Patronage (Inc. 2014 Start Ramp-Up)	15,355	15,657	15,959	16,260	16,562	16,863	17,164	17,465	17,766	18,067	18,368	18,669	18,970	19,271	19,572



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Tram Revenue (£000s 2005 Prices)																
Modelled Tram Revenue	6,039	6,331	6,576	6,820	7,064	7,308	7,552	7,796	8,040	8,284	8,528	8,772	9,016	9,260	9,504	9,748
Tram Revenue (Inc. Recession Impact)	5,142	5,249	5,403	5,557	5,711	5,865	6,019	6,173	6,327	6,481	6,635	6,789	6,943	7,097	7,251	7,405
Tram Revenue (Inc. 2011 Start Ramp-Up)	5,142	6,167	6,995	7,731	8,465	9,200	9,934	10,668	11,402	12,136	12,870	13,604	14,338	15,072	15,806	16,540
Tram Revenue (Inc. 2014 Start Ramp-Up)	0	0	0	5,878	7,038	8,200	9,362	10,524	11,686	12,848	14,010	15,172	16,334	17,496	18,658	19,820

	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Tram Revenue (£000s 2005 Prices)															
Modelled Tram Revenue	13,116	13,638	14,160	14,682	15,204	15,726	16,248	16,770	17,292	17,814	18,336	18,858	19,380	19,902	20,424
Tram Revenue (Inc. Recession Impact)	11,236	11,638	12,040	12,442	12,844	13,246	13,648	14,050	14,452	14,854	15,256	15,658	16,060	16,462	16,864
Tram Revenue (Inc. 2011 Start Ramp-Up)	13,116	13,638	14,160	14,682	15,204	15,726	16,248	16,770	17,292	17,814	18,336	18,858	19,380	19,902	20,424
Tram Revenue (Inc. 2014 Start Ramp-Up)	13,116	13,638	14,160	14,682	15,204	15,726	16,248	16,770	17,292	17,814	18,336	18,858	19,380	19,902	20,424



FLOW AND CAPACITY

CHART 1

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Capacity Gph/10ph	3,240	3,240	3,240	3,240	3,240	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850
Boarders	263	615	23	0	205	21	23	231	181	123	59	11	183	14	15	37	76	39	0	0
Load	263	1,077	1,055	1,035	1,373	1,330	1,335	1,621	2,221	2,311	2,655	1,857	1,111	305	493	641	547	399	0	0
Alighters	0	0	1	8	0	13	4	25	16	60	63	342	410	629	167	459	79	70	92	395
Capacity Gph/10ph/12ph	3,240	3,240	3,240	3,240	3,240	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850

FACTORS USED

Capacity	100%
Boarders	100%
Load	100%
Alighters	100%

CHART 2

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Capacity Gph/10ph	3,240	3,240	3,240	3,240	3,240	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850
Boarders	0	1	19	0	25	7	37	182	116	200	399	265	337	327	224	363	513	603	1,003	0
Load	0	437	452	522	622	1,324	1,907	2,118	2,354	2,568	2,959	2,699	1,843	2,502	2,212	2,371	2,160	1,680	1,003	0
Alighters	437	28	178	0	458	921	237	395	331	53	193	149	946	37	335	162	43	6	0	0
Capacity Gph/10ph/12ph	3,240	3,240	3,240	3,240	3,240	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850	4,850

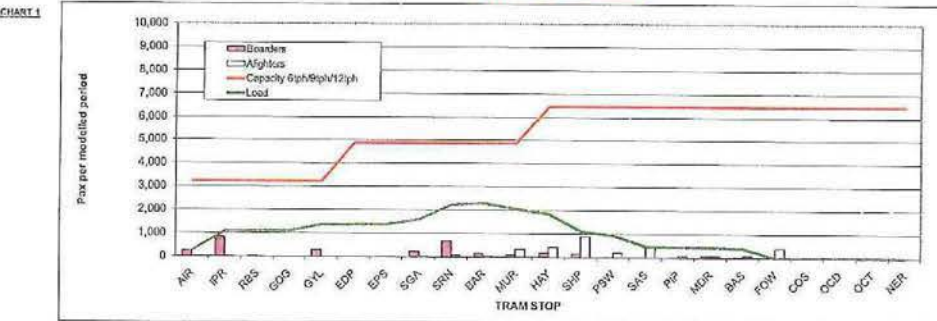
FACTORS USED

Capacity	100%
Boarders	100%
Load	100%
Alighters	100%

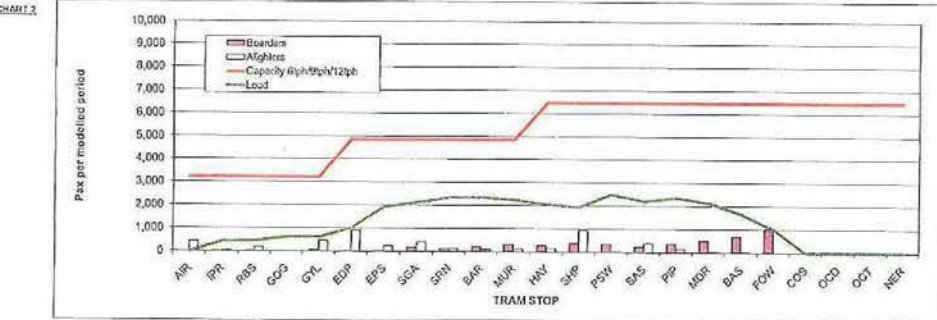
SUPER PEAK FACTORS

	2011 CAP	2011 PAX	2021 CAP	2021 PAX
AM	50%	0%	75%	0%
PM	0%	0%	0%	0%
PH	50%	0%	75%	0%

2011 AM (Eastbound)



2011 AM (Westbound)





**FLOW AND CAPACITY**

**CHART 1**

IP (Eastbound)	2011												Model Period											
	APR	IPR	RBS	GOG	GYL	EDP	EPS	SOA	SRN	BAR	MUR	HAY	SHI	PSW	SAS	PIP	MOR	BAS	FOW	COS	OCD	OCT	NER	
STOP	3,240	3,240	3,240	3,240	3,240	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	
Capacity 6ph/12ph	299	28	48	0	285	123	150	83	156	37	33	161	100	62	56	63	14	7	0	0	0	0	0	
Boarders	299	323	366	356	676	744	833	853	1,032	1,033	1,032	1,072	1,043	1,033	645	590	497	309	0	0	0	0	0	
Load	0	1	6	0	28	5	25	7	45	27	21	126	192	133	115	137	97	155	309	0	0	0	0	
Alighters	3,240	3,240	3,240	3,240	3,240	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	
Capacity 6ph/12ph/12ph																								

**FACTORS USED**  
 Capacity: 100%  
 Boarders: 100%  
 Load: 100%  
 Alighters: 100%

**CHART 2**

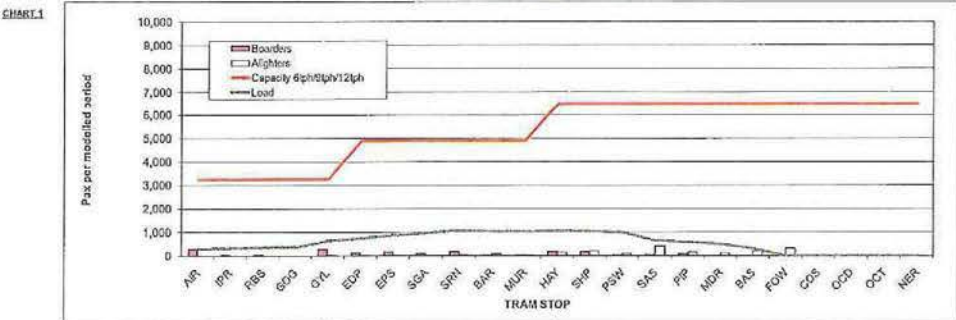
IP (Eastbound)	2011												Model Period											
	APR	IPR	RBS	GOG	GYL	EDP	EPS	SOA	SRN	BAR	MUR	HAY	SHI	PSW	SAS	PIP	MOR	BAS	FOW	COS	OCD	OCT	NER	
STOP	3,240	3,240	3,240	3,240	3,240	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	
Capacity 6ph/12ph	0	1	6	0	22	13	28	16	29	27	28	22	134	174	153	96	153	210	303	0	0	0	0	
Boarders	0	285	319	348	348	674	697	726	848	798	759	822	844	679	566	714	570	303	0	0	0	0	0	
Load	285	35	35	0	208	62	122	16	130	27	22	104	176	12	137	144	8	5	0	0	0	0	0	
Alighters	3,240	3,240	3,240	3,240	3,240	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	4,860	
Capacity 6ph/12ph/12ph																								

**FACTORS USED**  
 Capacity: 100%  
 Boarders: 100%  
 Load: 100%  
 Alighters: 100%

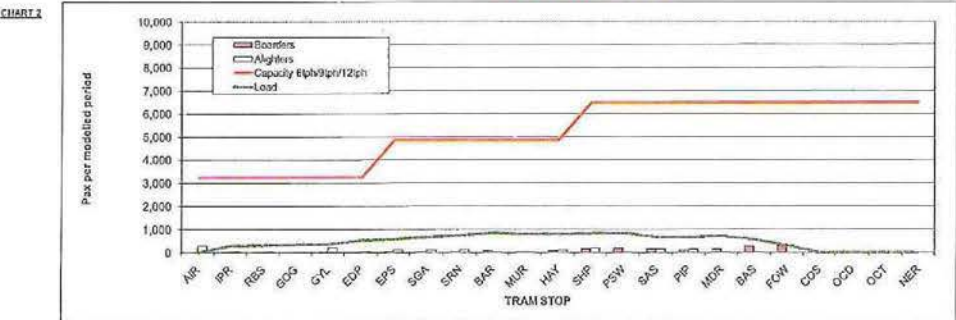
**SUPERPEAK FACTORS**

	2011 CAP	2011 PAX	2031 CAP	2031 PAX
AM	50%	0%	75%	0%
IP	0%	0%	0%	0%
PM	50%	0%	75%	0%

**2011 IP (Eastbound)**



**2011 IP (Westbound)**







**FLOW AND CAPACITY**

**CHART 1**

IP (Eastbound)	2011											Model Period												
STOP	AIR	IPR	RBS	COG	GYL	EDP	EPS	SGA	SRN	BAR	MUR	HAY	SHP	PSW	SAS	PIP	MOR	BAS	FOW	COS	ODD	OCT	NER	
Capacity 6ph/10ph	3,240	3,240	3,240	3,240	3,240	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680
Boarders	205	205	87	0	315	168	432	107	200	49	43	143	228	52	91	91	99	8	0	0	0	0	0	
Load	358	814	731	731	1,165	1,374	1,736	1,630	1,658	1,367	1,268	1,768	1,621	1,552	220	762	670	418	0	0	0	0	0	
Allighters	0	2	10	0	52	9	74	13	62	149	63	233	375	127	629	283	123	263	416	0	0	0	0	
Capacity 6ph/10ph/12ph	3,240	3,240	3,240	3,240	3,240	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	

**FACTORS USED**

Capacity	100%
Boarders	100%
Load	100%
Allighters	100%

**CHART 2**

IP (Westbound)	2011											Model Period											
STOP	AIR	IPR	RBS	COG	GYL	EDP	EPS	SGA	SRN	BAR	MUR	HAY	SHP	PSW	SAS	PIP	MOR	BAS	FOW	COS	ODD	OCT	NER
Capacity 6ph/10ph	3,240	3,240	3,240	3,240	3,240	3,240	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680
Boarders	0	2	15	0	50	18	88	25	45	148	42	144	200	234	293	114	207	268	485	0	0	0	0
Load	0	318	642	605	695	970	1,638	1,313	1,358	1,423	1,270	1,235	1,220	1,299	1,079	1,012	527	750	485	0	0	0	0
Allighters	379	205	30	0	418	62	253	168	147	51	27	119	210	15	232	54	8	4	0	0	0	0	
Capacity 6ph/10ph/12ph	3,240	3,240	3,240	3,240	3,240	3,240	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680	4,680

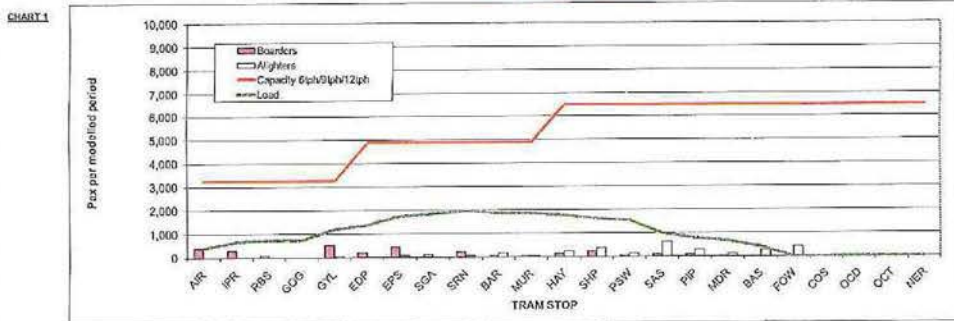
**FACTORS USED**

Capacity	100%
Boarders	100%
Load	100%
Allighters	100%

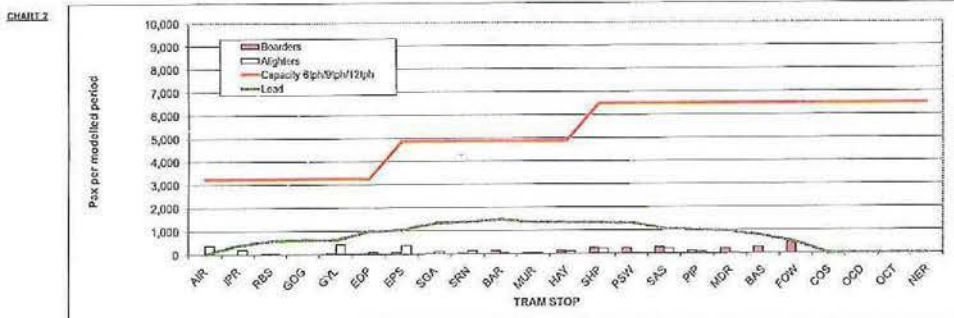
**SUPER-PEAK FACTORS**

	2011 CAP	2011 PAX	2031 CAP	2031 PAX
AM	50%	0%	75%	0%
IP	0%	0%	0%	0%
PM	50%	0%	75%	0%

**2031 IP (Eastbound)**



**2031 IP (Westbound)**



# Appendix C – STAG Outputs

Table C.1 - STAG Outputs

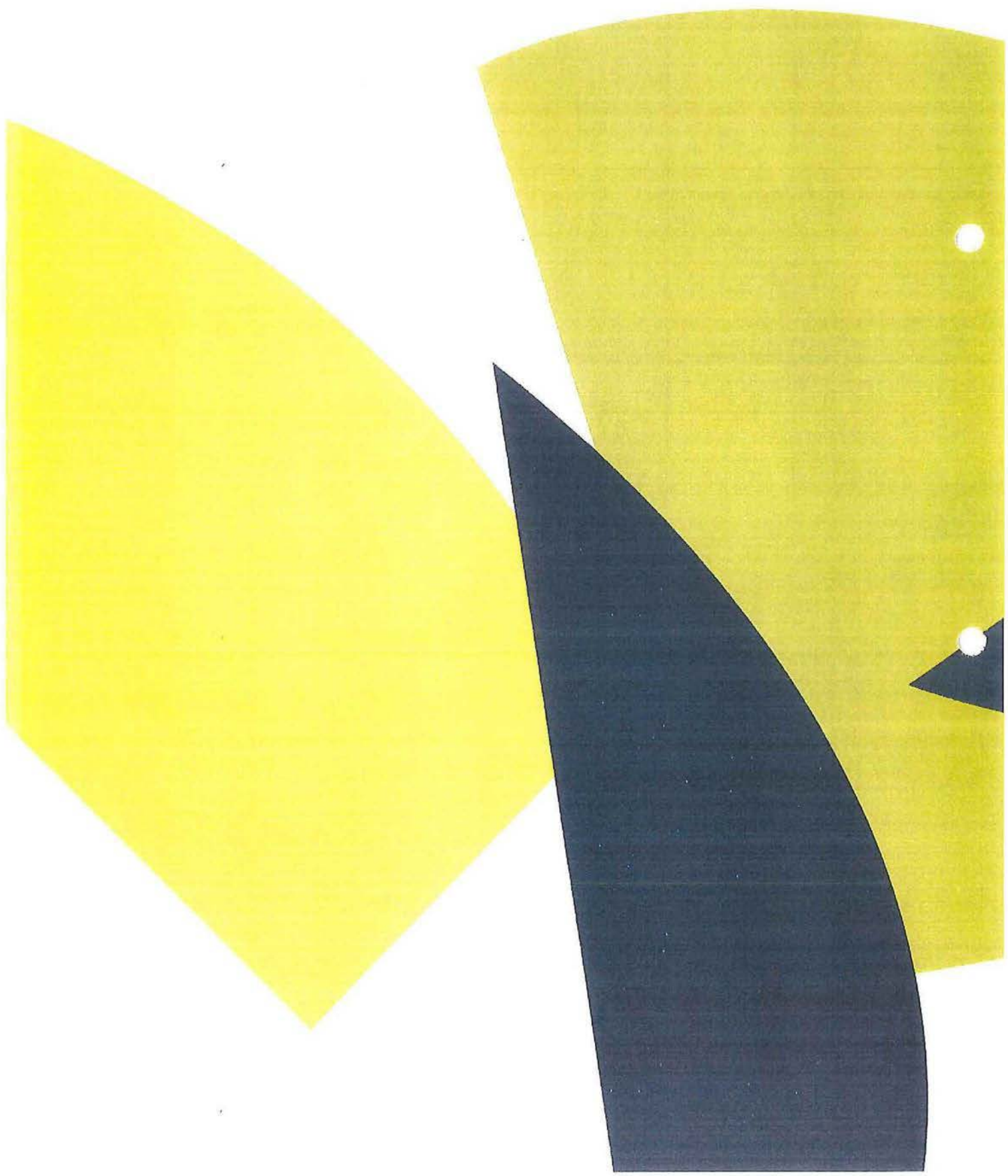
		2007 Business Case			Change in 2010 Update
Criteria	Sub Criteria	Input Assumptions	Tools	Outputs	
Environment	Emissions & Air Quality (Positive)	UK Air Quality Data and Statistics Database	DMRB empirical method	Changes in traffic emissions of NO2 and PM10 (Local Air Quality) Total change in Carbon Dioxide (CO2) emissions from road traffic (Global Air Quality) Generation of electricity to power the tram (Global Air Quality)	Need for reducing the carbon impact has increased New Air Quality Action Plan (AQAP) for city centre being created Economic viability of procuring sustainable electricity for tram being investigated
	Noise (Positive)	Code of Construction Practice Noise & Vibration Policy Link-by-link traffic flow Composition and speed Population catchment	Calculation of Road Traffic Noise GOMMMS noise annoyance-response relationships Calculation of Railway Noise	Changes in the number of people annoyed by noise Changes in the number of people experiencing significant changes in noise levels	No change
	Visual Amenity (Negative)		A Design Manual	Vehicles and tracks etc designed to minimise the visual impact of the tram	No change
	Habitats (Neutral)			Loss of some areas of habitat and sections of the wildlife corridor adjacent to the main Glasgow/Edinburgh Badgers at Gogar affected by both construction and operation	No change
	Water Quality (minor negative), Drainage (Neutral) Flood Defence (Neutral)	Water courses likely to be affected (SEPA classification); Gogar Burn (fair to poor), Water of Leith (good to fair)			Comprehensive mitigation programmes

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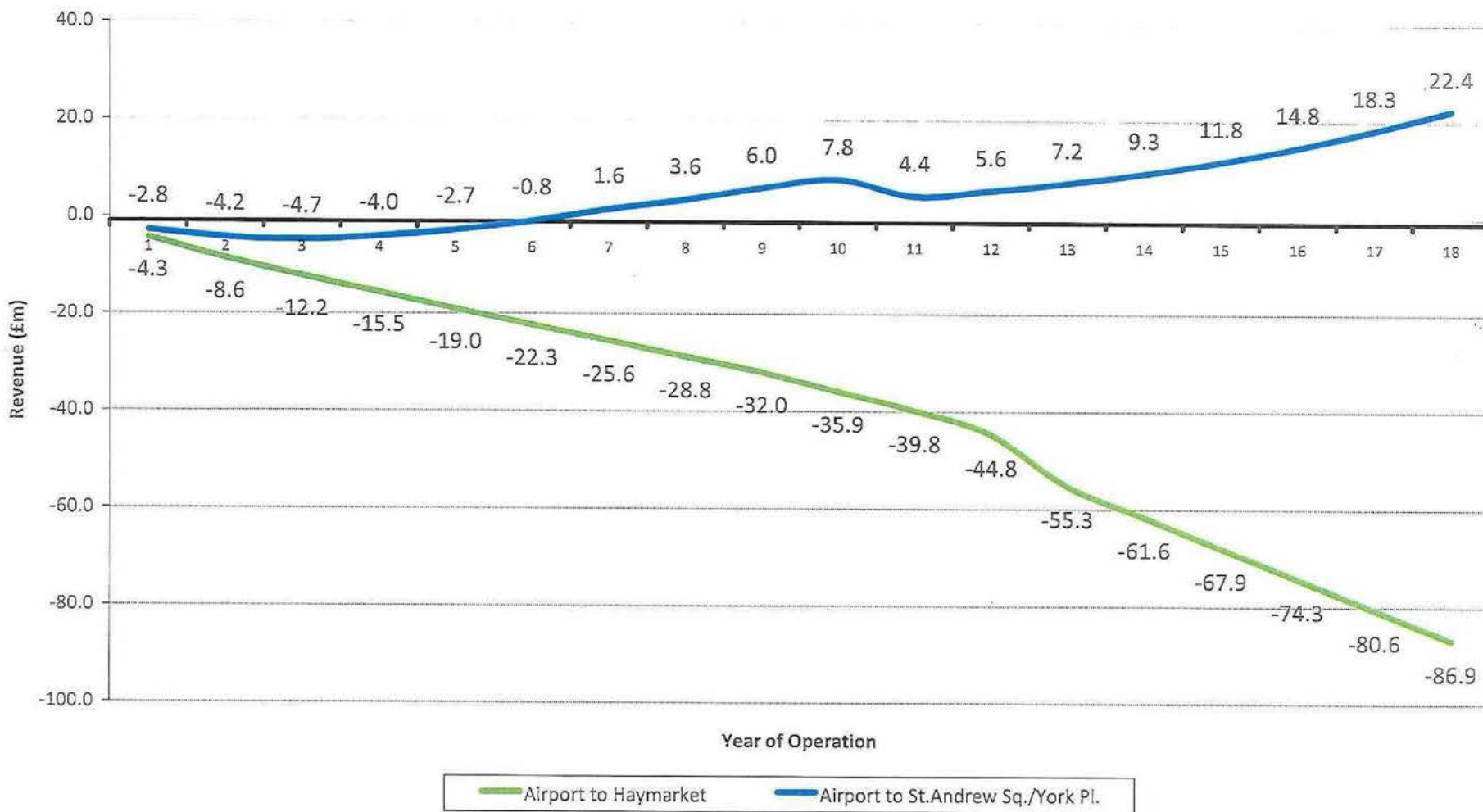


		2007 Business Case			Change in 2010 Update
Criteria	Sub Criteria	Input Assumptions	Tools	Outputs	
Safety and Reliability	Accidents (Negative)	JRC transport model on vehicle-kms travelled and the road types on which these occur. Standard accident rates by severity level: fatal, severe, slight and damage to property.	A spreadsheet model Standard rates and methodology from NESAs	Estimate changes in personal injuries Resultant impact on accident levels the total accidents benefit as a result of changed traffic by year and in terms of a total present value benefit	No change
	Security (Positive)	Review of the street environment in the vicinity of potential stops/interchanges	Qualitative analysis using Webag 3.4.2	Lighting and street furniture will be designed to provide maximum safety and security CCTV system will be in place at all stops and on all vehicles Assumed that there will be help points at all stops Use of inspectors on the trams	No change
	Reliability / Capability (Positive)	Tram considered to be more reliable			Increased need for buses leads to increased congestion / reduced reliability
Accessibility and Social Inclusion	(Positive)		Modelled to show accessibility graphs	Increased accessibility across the city Increases access to jobs etc for certain areas of the city Service integration patterns with buses designed to maximise accessibility	No change
Transport and Land Use Integration	(Positive)		Qualitative Analysis	Phase 1A will enhance the opportunity for integrated ticketing arrangements. Scheme will enhance existing transport interchange facilities and also provide new transport interchange opportunities.	Cancellation of EARL now included; Inclusion of the Edinburgh Gateway

		2007 Business Case			Change in 2010 Update
Criteria	Sub Criteria	Input Assumptions	Tools	Outputs	
Economic Regeneration	(Positive)	Development and job market growth expected to grow or come online quicker due to tram			Reduction in development rate expected Introduction of WETA analysis Change in airport growth
Economic Activity and Locational Impacts (EALI)	150 jobs (Positive)		Analysis was undertaken of the gross employment impacts		No change



Cumulative Revenue Forecasts for Tram: Haymarket and St. Andrew Square/York Place

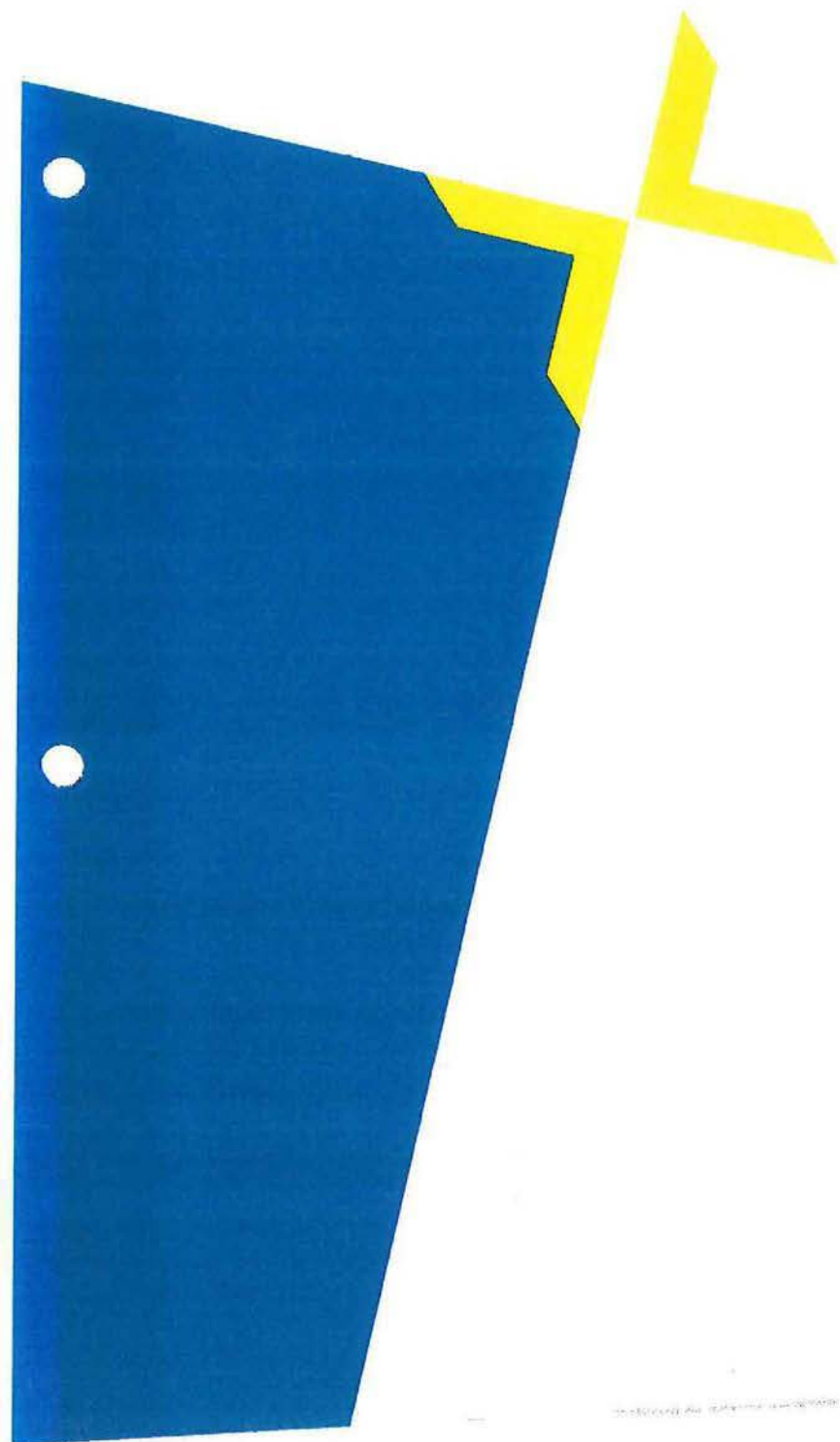


CITY OF EDINBURGH COUNCIL

Post Settlement Agreement Budget

Budget Report

19<sup>th</sup> August 2011



**CITY OF EDINBURGH COUNCIL**  
**Post Settlement Agreement Budget**  
**Budget Report**  
**19th August 2011**

Document status					
Revision	Date	Status or comment	Prepared by	Checked by	Authorised by
	16.08.2011	First Draft	J Findlay	K Willins	P Sherry
01	17.08.2011	Rev A	K Willins		

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## **1.0 INTRODUCTION**

- 1.1 Faithful+Gould was asked to carry out a review of the Budget for the delivery of the Edinburgh Trams project following the Settlement Agreement.
- 1.2 The review would consider the robustness of the financial assessment as presented to the City of Edinburgh Council on the 30<sup>th</sup> June 2011. It would challenge the figures as presented and the assumptions made at arriving at those figures. Based on the findings a revised budget would be presented to the City of Edinburgh Council for its consideration.
- 1.3 Due to the time constraints (effectively 3 weeks) the review relied on previously quantified items and project data. This was then challenged, to assess its reliability and relevance. A risk workshop was also held to explore all areas of the project to ensure that all avenues of risk, that may have a financial impact of this project going forward, were considered.
- 1.4 Faithful+Gould did not review or analyse the contractual basis of the project, but did query certain aspects of the draft MOV5 (Settlement Agreement Memorandum of Understanding) and in particular took into account the 'exclusions' (see Appendix D) when evaluating the risk profile.
- 1.5 The report is written with the assumption that those reading it have a detailed knowledge of the project and the parties involved.



## 2.0 EXECUTIVE SUMMARY

2.1 Based on the analysis of base costs, review of associated risks and discrete risks Faithful+Gould would recommend the following budget level. This figure is made up of various budgets from various sources and Faithful+Gould are relying on these budgets being correct as time does not permit the final checking of these budgets.

**Post Settlement Agreement Budget** **£742.92M**

2.2 This value represents the 80<sup>th</sup> percentile – the 80% confidence level – for project funding or budget purposes.

2.3 The base costs values with regard to Infracore are all at an advanced stage and due to the tight timescales leaves very little negotiating room. This has been highlighted by the responses from the Contractor in the On-Street Works Section.

### 2.4 **Budget**

The budget has been arrived at by consultation with various parties and covers all costs associated with the completion of the Tram Project – see Appendix A

### 2.5 **Delay by Utilities**

The Re-routing of the utilities is still causing concern and is a high risk to the project in in cost and time, monies have been set aside to cover any delays but costs from this work is very much a floating cost. The work involved with the utilities must have good management on the client side to try and minimise any delays.

### 2.6 **Interface Risk**

The current costs presented for the on-street works for Siemens are extremely high and not value for money, as its well in excess of the original costs for the works. Unfortunately all the materials are on site and paid for by the client. To complete the works any change of contractor on this element of works probably creates a very high risk due to any fault with the existing materials and any warranty for the works.

### 2.7 **On-Street Works**

We are of the opinion that the on street work costs are grossly inflated by INFRACO both for the civil work and the Siemens works. The Siemens position is explained in paragraph 2.6 above. Siemens hold a "golden key" due to the materials being on site and already paid in full. With regards to the civil works the cost is also grossly inflated and the contractor has allowed for the very worst case scenario for all works. If this was a competitive tender then we would expect some of the risk to be taken by the contractor to secure the works. We have highlighted areas that we think are overpriced.

- Traffic Management Works
- Indirect Cost
- Capping Layer in Excavations
- Paving Slabs – all priced as new
- Seimens Package

2.8

**Recommendations**

Due to the circumstances and contractual agreement presently in place for this project it is almost impossible to change contractors. The grossly inflated prices from INFRACO for the on street works indicate that it would almost be more cost effective to carry out this section of works on a cost plus basis. If this was an option it would require more management from the clients side to closely monitor all the works being undertaken, to make sure the correct labour was on site and the contractor was working efficiently. If managed properly this can be quite successful but can lead to disputes on efficiency of labour etc. This should be considered, and would also nullify any costs that INFRANCO have built into their costs for carrying out the remedial works on Princess Street which is possibly part of the issue why their costs are grossly inflated (which should be INFRACO cost).

### 3.0 METHODOLOGY

3.1 The project falls into six main elements (listed below). Five of these elements relate to specified work areas with their own associated risks. The sixth element being for discrete risks that are either general risks or risks that affect the whole of the project.

- Off-Street Works (Lump Sum)
- On-Street Works
- Utilities
- CAF
- Project Management Costs
- Risk Allocation

3.2 Overarching these elements is the MOV5 or Settlement Agreement Memorandum of Understanding between the Client organisation tie Ltd and the Contractor organisation Infraco. Although, Faithful+Gould's scope of work did not cover a review of the revised contract in MOV5, Faithful+Gould was made aware of proposed 'exclusions' to that agreement and took those into consideration when evaluating the risk profile of the project.

3.3 The Off-Street Works (Lump Sum) relate to all costs and works prior to the MOV5 date of 1<sup>st</sup> September 2011 and a lump sum agreement to complete the works from Edinburgh Airport to Haymarket Station. These have been the focus of extensive mediation between the parties and as such it was felt that, in the available time, Faithful+Gould should concentrate on the risks associated with the agreed lump sum, insofar as future expenditure and specified risks that could effect this element of work.

3.4 The On-Street Works relates to works between Haymarket Station and York Place. At the time of this report the budget for this element of the works had not been agreed between the Client and Infraco. This allowed Faithful+Gould to carry out a more in-depth review of the figures being proposed by the contractor.

This review took the format of a 'tender review' where we considered the breakdown of the contractor's submission and were able to review sub-contract prices. We also compared the prices with the previously noted budget.

3.5 The Utilities element covered all areas of the project and by its nature could have a major effect on the project. A significant amount of work was ongoing to identify anticipated utility risks. This ongoing work was used as a basis for informed analysis of the risks in this area.

3.6 The CAF costs had been agreed and so the review of this element of the works was limited to associated risks that may occur.

3.7 The Project Management Costs relate to expenditure to date and future expenditure by the Client to all other parties excluding Infraco. Here the values of cost were provided by the Client. Faithful+Gould's role was to challenge these costs to ensure that consideration had been given to all aspects of this element and look for duplication of risk items.

3.8 Risk Allocation was the final element and covered two areas of work. Firstly 'Discrete Risks' were reviewed and assessed. Then finally all costs were modelled to achieve a risk profile for the project.

A Risk Workshop was then held on the 11<sup>th</sup> August 2011, to allow key individuals involved in the project (see Appendix A) an opportunity to challenge existing risks and

explore new risks. The workshop also allowed individuals attending to bring any new risks to the table.

As part of the Risk Allocation section, all items in all work elements were then risk profiled to give a probability of cost and to derive an anticipated budget for the Edinburgh Trams Project.

## 4.0 ELEMENTS OF WORK

### 4.1 Off Street Works

The value of the Base Costs for the On-Street Works, have been agreed at £362.5M. This has been achieved through extensive mediation (not part of the Faithful+Gould scope). Of this total value £194.99M has been committed in assessments with a further £19.68M committed as part of the ongoing 'Prioritised Works'. This leaves a total of £147.83M of works to be completed.

A saving against Forth Ports is anticipated and has been factored in to the risk profile.

### 4.2 On Street Works

#### 4.2.1 Budget Price

4.2.1.1 The budget was compiled by tie Ltd, using the difference between the valuation of work carried out to the end of March 2011 and the estimated cost to complete from the contract sum. Following the submission of prices by the contractor the budget had to be revised so that a more like for like comparison could be carried out. These revisions are listed under the heading Revised Budget. The table below details both the original and the revised budget values:

Section	Original Budget (ob)	Revised Budget (rb)	Notes
Bilfinger Berger BoQ	£9,274,383	£9,274,383	A
Siemens	£3,974,427	£3,974,427	B
Risk allowance	£1,391,156	£2,517,000	C
Adjustments	£1,125,453	£6,810,000	D(ob) D(rb)
Traffic Lights		£1,700,000	E
Changes		£2,000,000	F
Prelims -- BB	£2,550,455	£2,550,455	
Prelims - Siemens	£894,246	£894,246	
Deduct Siemens Materials		-£1,629,000	G
Sub total	£19,210,120		
Adjustments	£3,289,880		H
<b>Total</b>	<b>£22,500,000</b>	<b>£28,091,511</b>	

Notes:

- A BB price was arrived at by pricing a contemporary BOQ to reflect the IFC drawings updated at that time using Contract Rates.
- B Siemens value was derived pro rata from the Siemens contract Price analysis submitted at contract award stage.
- C The risk allowance of £2,517,000 is a consolidation of risk plus adjustments from the original budget (£1,391,156 + £1,258,844).

- D(ob) Allowance for risk on formation 10% of civils plus risk of downtime disruption etc of 5%
- D(rb) Revised Adjustment includes original budget price plus additional to cover capping layer to roads areas to cover poor ground conditions and new kerbing in lieu of re-use of existing.  
 It should be noted that the adjustment has been revised to reflect additional capping layer added by BB as worst case scenario. However, there is no evidence that should the worst case scenario not materialise, adjustment would be made to the remuneration value. It is our view that the additional cost of capping layer be treated as contingency and the actual requirement be based on re-measurement of the work carried out based on ground bearing capacity.  
 The kerbing allowance included in the revised adjustment figure is based on information that new kerbing has been included in the tender submission by BB. However, in the event that the existing kerbing is re-instated, there appears to be no mechanism to adjust remuneration to cover reuse. Again as with the capping layer, it is our view that remuneration is based on actual work done.
- E Traffic lights are a Provisional Sum in the Contract. Provisional Sums for site wide works (as this work is) were included in the Off Street tie assessment. Now the scope is split this may well have been overlooked in the separate price for on street and has therefore been added to the revised budget.
- F Includes work associated with turnback at St Andrews Square/ York Place and for a floating slab.
- G Materials associated with Siemens contract have already been certified. The Siemens tender therefore covers labour and preliminaries costs.
- H This was added by tie for budget purposes and partly reflects the adjustment to the slightly higher figure that Cyril Sweett arrived at.

**4.2.2 Civils, Systems and Trackwork**

4.2.2.1 The summary produced details the value of the Civil Works (Bilfinger Berger civil UK Ltd) together with the Systems and Trackwork (Siemens plc) is as follows:

Item	Description	Detailed Description	Amount
1	Bilfinger Berger civil UK Limited	Civils Work	£33,322,586
2	Siemens plc	Systems and Trackwork	£20,160,679
<b>Grand total</b>			<b>£53,483,265</b>