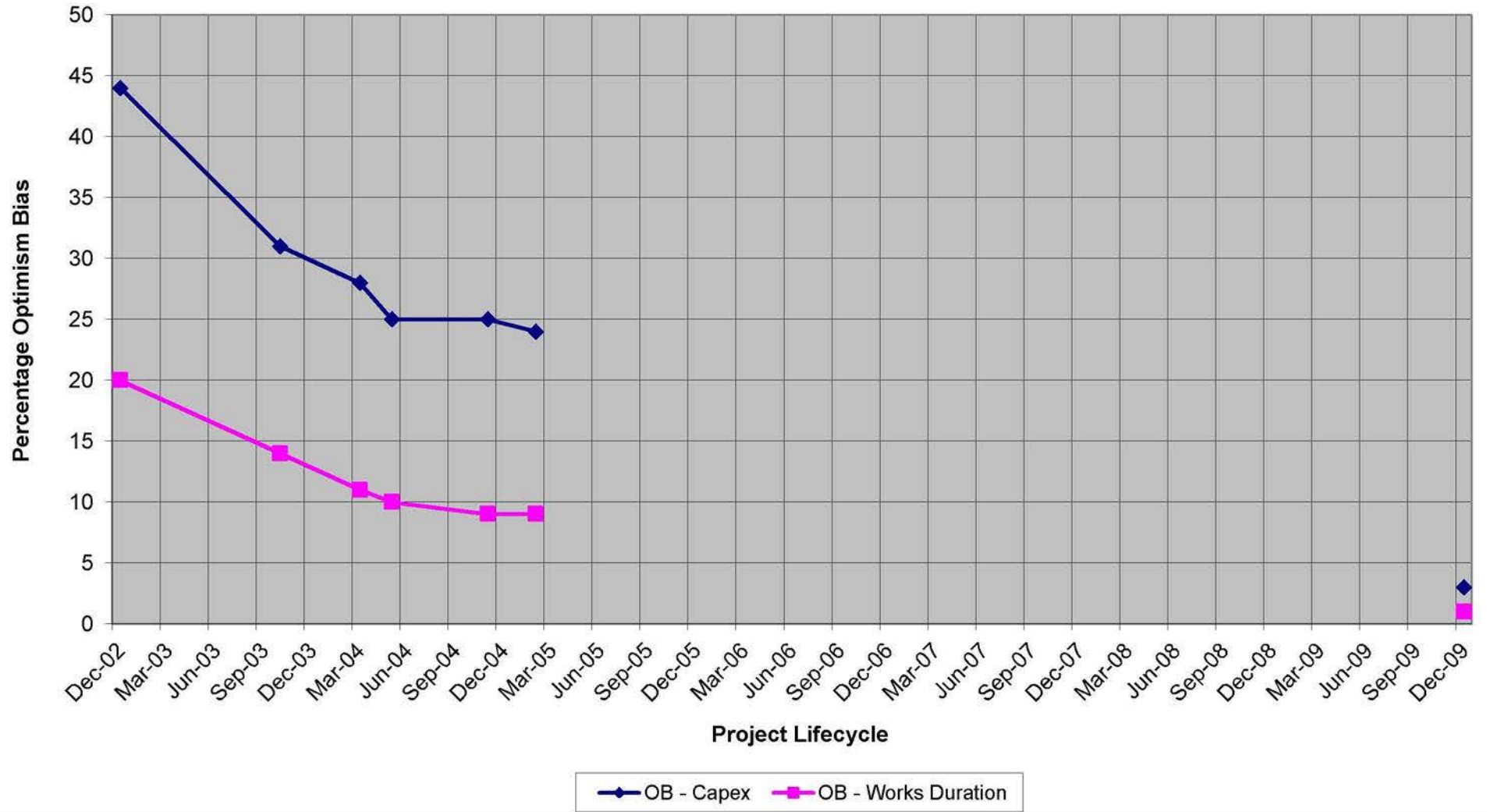


### Line 1 & 2 - Optimism Bias - Planning to Outturn



**tie Limited**  
**Line 1 and 2 Tram Schemes**  
**Project Risk Register**



Revision	Date	Prepared By	Comments
26	25-Jan-05	Mark Bourke	<p>Updated with comments from TET, tie (PAE), tie (OME) and DLA  TET comments added. New risks relating to interfaces, revenue, alignment, integration and Regulatory matters added Ref. 180 to 196  tie (OME) comments on risk strategy for ref.5,174,175,30,38,44,70,79,110 and 139 added. New risk ref.179 added. Responsibility for risk mitigation for risks ref.133,106,72,70,38 and 44 transferred from BDB to tie (OME).</p> <p>tie (PAE) comments on risk strategy for ref.4,5,6 and 130 added. Likelihood reduced post mitigation on all tie (PAE) risks. Mitigation factor increased on risk ref.4,5,6,34,177 and 130. DLA comments included incorporating revised mitigations, factors and description to risks Ref.20,41,68,71,172,87,95,165,110,142 and 147. New infraco procurement risks added ref.198 to 212  OB Profile Updated to Reflect OB for November 2004</p>
27	22-Feb-05	Mark Bourke	<p>Updated with comments from tie (PM) - risks ref.161, 17, 25 and 26 transferred to tie (UM), risks ref.22,160 and 162 transferred to tie (PRO), and updates to mitigation factors and due dates tie (PAL) mitigation strategy for risks ref.15,16 and 189 updated.  tie (PAE) mitigation strategy for risk ref.106 updated and new risk ref.213 added.  tie (OME) mitigation strategy for risks ref.175,173,179,44,70 and 72 updated with new risk ref.214 added  tie (MAD) new risks ref. 215 and 216 added and mitigation factors and dates for completion updated on all tie (MAD) risks  tie (FD) mitigation factors and due dates updated for all tie (FD) risks  tie (CFM) mitigation strategy updated for risks ref.86,121 and 132. Mitigation factors and due dates updated for all tie (CFM) risks.  MM&amp; FM comments added regarding responsibility from MM &amp; FM to mostly tie responsibility for mitigation in view of impending SDS/TSS commissions.  Responsibilities updated and new columns for pricing risak and indicating risk allocation added to Risk Register  tie (CM) new risks ref.217 to 221 added</p> <p>DLA comments on mitigation strategy, secondary responsibility and mitigation factors for risks ref.12,207,25,26,27,202,69,74,199,168,172,87,95,165,110,111,114,126,142,147 added.  TET new risk ref.222 added  tie (DM) new risks added ref.223 to 237  Charts updated</p>
28	03-Mar-04	Anita Salwan	<p>Updated to indicate the risk allocation and affected Contracts for consideration in QRA analysis and OBC production.</p>

**Updated to allow**























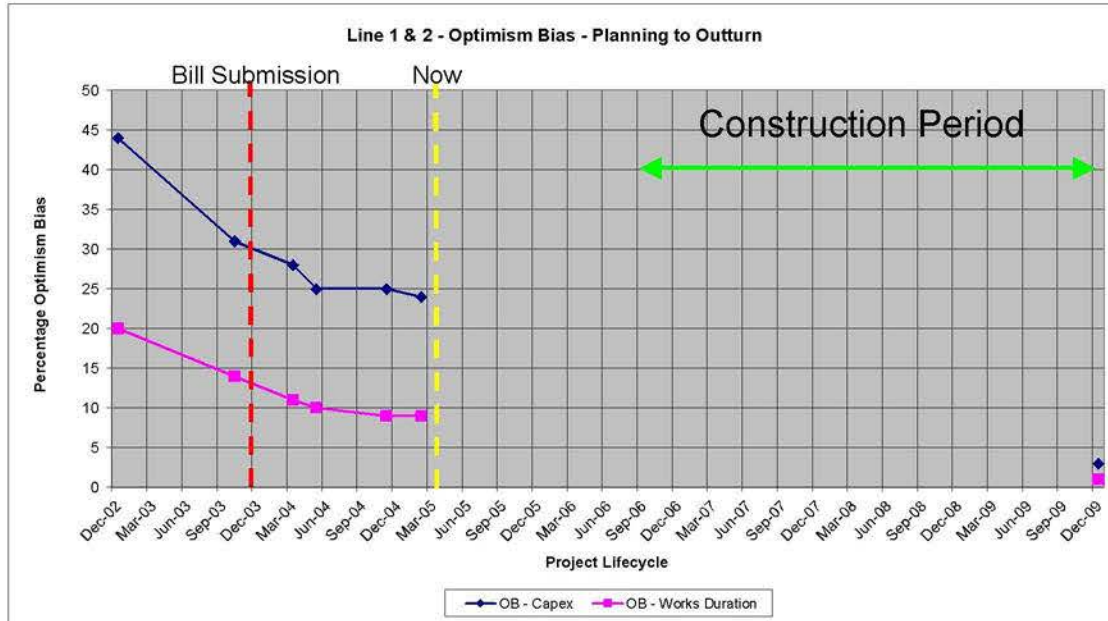
Ref	Description of Risk	Timing	Project	PROC.		PROJ. SPECIF.		CLIENT SPECIF.		ENV.		EXT. INFL.		RISK IMPACT		PRIOR TO MITIGATION		MITIGATED		Lead Responsibility for Mitigation	Secondary Support for Mitigation	Mitigation Strategy	Mitigation Factor	Status	Date to be actioned by	Current Likelihood - Probability	Minimum Risk Cost (€)	Most Likely Risk Cost (€)	Maximum Risk Cost (€)	Expected Risk Value (€)													
				Complexity of Contract	Late Contractor Inv. Design	Peer Contractor Capabilities	Government Confidence	Dispute & Claims Occurred	Information Management	Other Procurement Areas	Design Compliance	Degree of Innovation	Environmental Impact	Other Project Specific Areas	Inadequacy of the Business Case	Large Number of Stakeholders	Funding Availability	Project Management Team	Peer Project Intelligence												Other Client Specific Areas	Public Relations	Site Characteristics	Permits, Consents & Approvals	Other Environmental Areas	Political	Economic	Legislation & Regulation	Technology	Other External Influences	CAPEX	OPEX	Revenue
232	If progressing detailed design under SDC with eventual nomination to Infiraco may mean progress generally but will limit liability input from the Infiraco contractors. It may also lead to issues between the Infiraco and SDC over the adequacy of the design.	Procurement	Line 1 & 2																			ie (PRC)	DLA	Consideration of liability and adequacy of design will be obligations placed on the SDC Provider in the SDC Contract. During the procurement of Infiraco and in the Infiraco Contract the Infiraco will be asked to comment on price and ultimately take resp.	0.1	Active	Dec-06	0.76															
233	If approval authorities for the scheme are not established clearly, the project may be vulnerable to third parties with power over the project.	Procurement	Line 1 & 2																			ie (PRC)		Establish all credible bodies / authorities that may have influence over design acceptance and understand timescales and sequence of approvals required. Some elements of design may have to completed and fixed prior to nomination of SDC to the Infiraco? e.g.	0.6	Active	Dec-06	0.36															
234	If the programme is based on outdated documentation or documentation from consultants' contracts that contains a number of significant assumptions.	Planning	Line 1 & 2																			ie (PPM)		There is the potential that the current baseline is already out of date. Check the currency and appropriateness of all data sources that provide the current baseline programme. In particular, the current Construction Strategy Reports are both dated.	0.6	Active	Aug-05	0.56															
235	Failure to address necessary advanced works not related to Network Rail or utilities. If these matters are not addressed by means of advanced contracts, there is a significant risk of missing the opportunity of starting bulk earthworks in Spring 2006.	Procurement	Line 1 & 2																			ie (PRC)	ie (TMC)	For example, the Goggar depot site requires 200,000m <sup>3</sup> material excavation and disposal, requires a water main diversion and is also a cultural heritage site requiring archaeological investigation. Other than obvious areas of programme risk, transform th	0.3	Active	Dec-06	0.68															
236	Current risk register may be adequate for global consideration of risk, but the project would benefit from breaking implementation risk down into sub-projects to understand the programme and cost risks in necessary detail for construction purposes.	Procurement	Line 1 & 2																			ie (PRC)		Consider best way of achieving better detailed risk assessment and implement. It is recommended that this is not left to the Infiraco to undertake upon appointment as it will already be too late.	0.3	Active	May-05	0.62															
237	If there is no Planning Supervisor appointed under the CDM Regulations for the length of the project then there is a risk of not involving the project in the spirit of the regulations or enabling legislation.	Procurement	Line 1 & 2																			ie (PRC)		Potential for confusion over roles and obligations, particularly with interfaces to named schemes where he may or may not be the client. Clearly Planning Supervisor team (Tram projects only or all tram projects?) and appoint at the earliest opportunity	0.5	Active	May-05	0.50															
TOTALS				7	4	4	1	9	1	33	17	7	5	20	32	9	10	6	3	5	8	10	20	3	6	3	10	1	21	105	51	45	166	31	41	124	237	0.531012658	Annual				



**tie Limited**  
**Line 1 and 2 Tram Schemes**  
**Project Risk Register**  
**Profile of Optimism Bias**



A summary chart of the progress of reducing Optimism Bias is shown below that indicates a measure of progress in risk management.

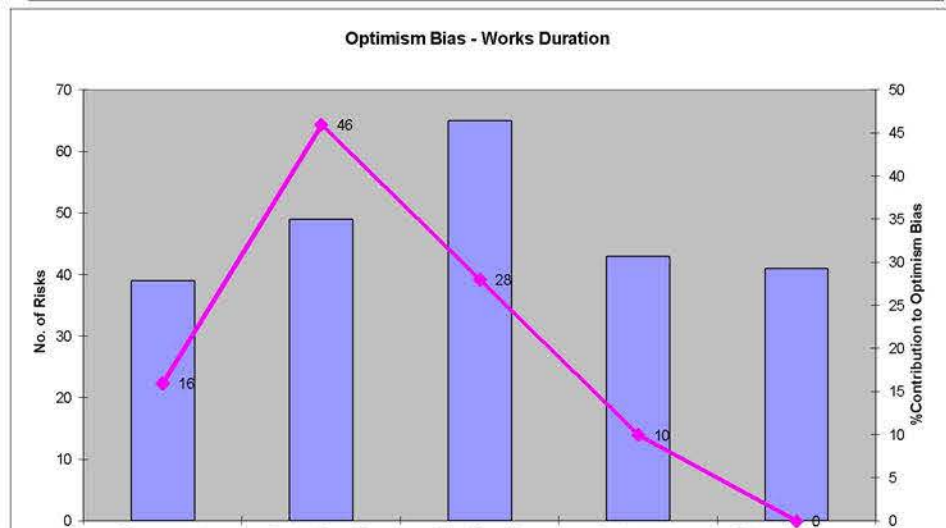
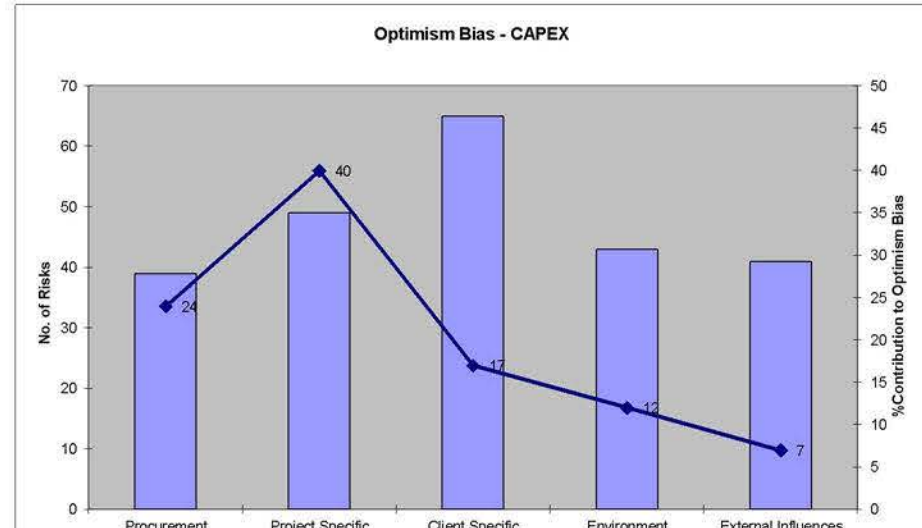
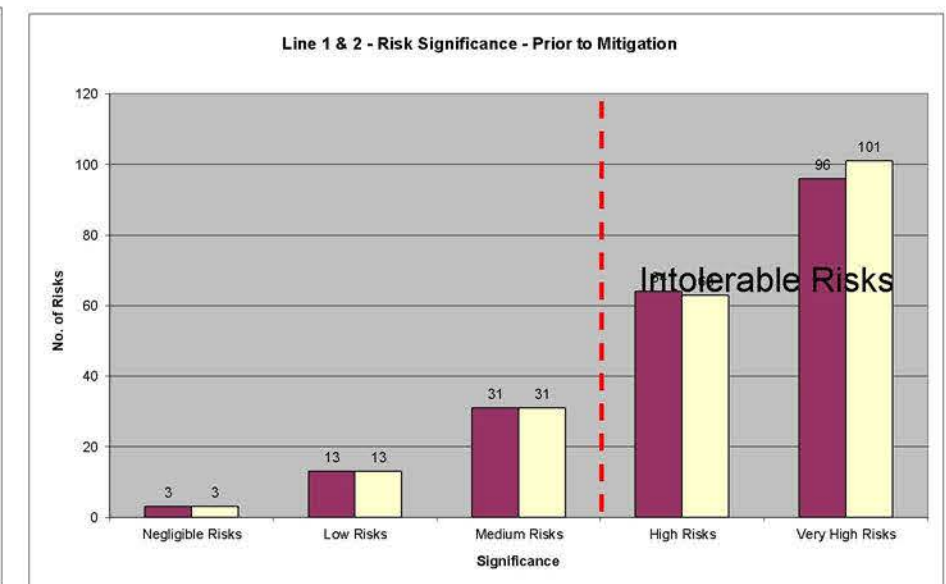
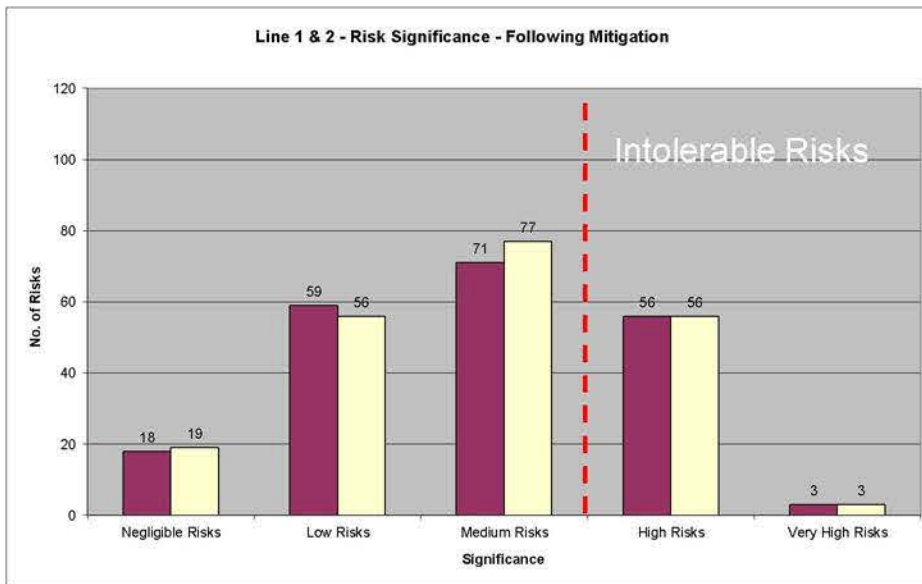
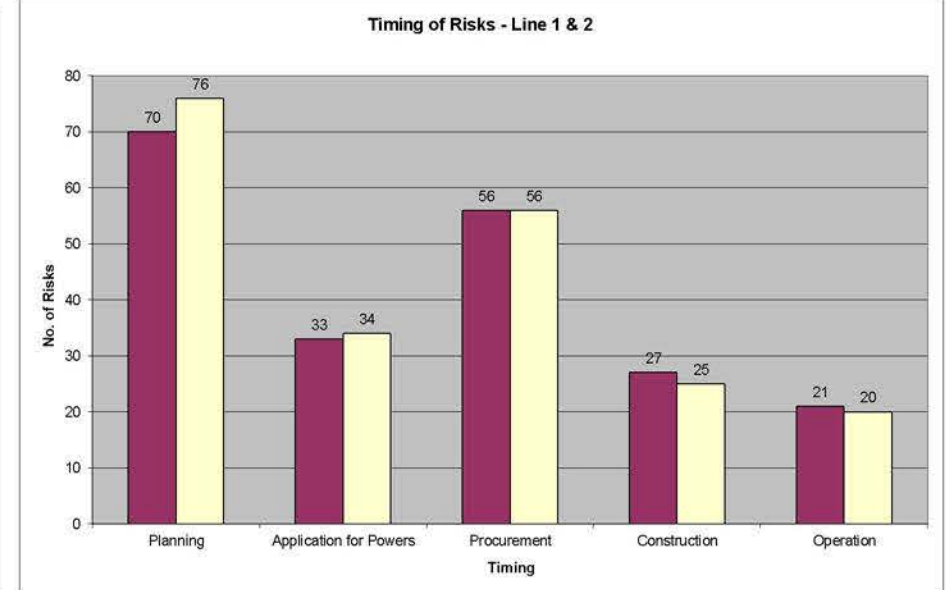
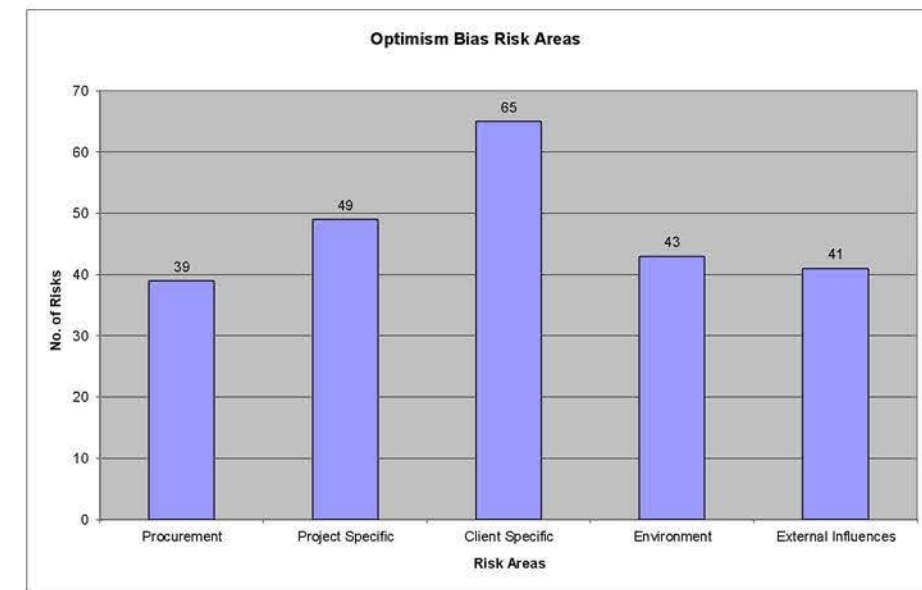
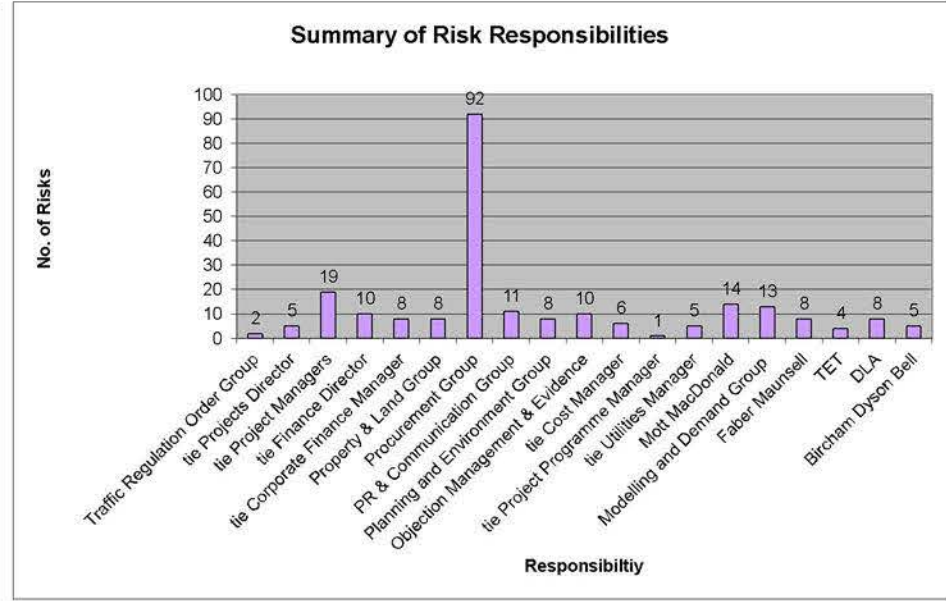
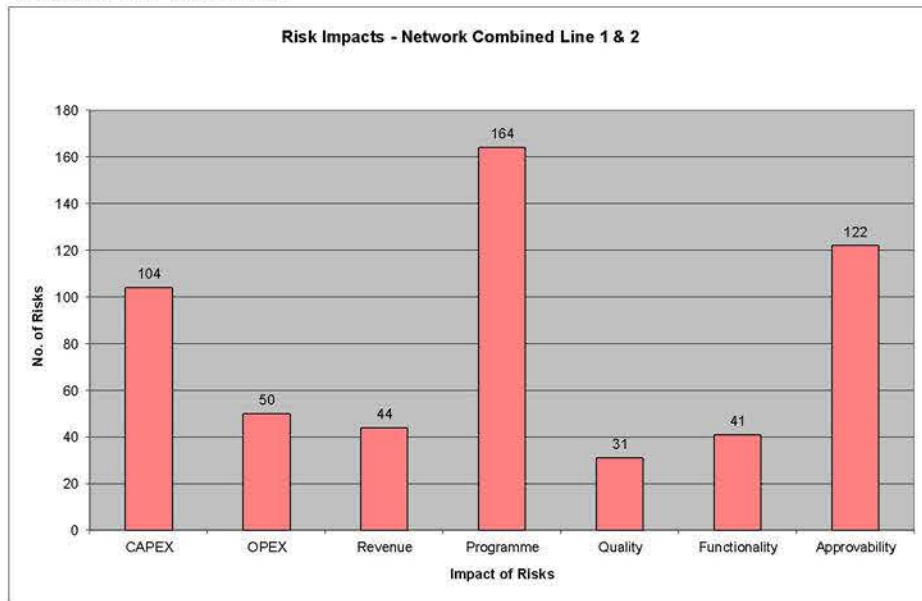


Event	Date	OB - capex	OB - works	Notes
Appointment of Advisors	Dec-02	44	20	Upper Bound Starting Values (HM Treasury)
Calculation of OB for STAG & PFCs	Oct-03	31	14	
OB Refresh	Mar-04	28	11	
OB Refresh	May-04	25	10	
OB Refresh	Nov-04	25	9	
OB Refresh	Feb-05	24	9	
Application for Funds	May-05			
Commencement of Construction	Jul-06			
Completion of Construction	Dec-09	3	1	Minimum Values (HM Treasury)





SUMMARY CHARTS





**tie Limited**  
**Line 1 and 2 Tram Schemes**  
**Project Risk Register**



**CALCULATION OF OPTIMISM BIAS**

**Line 1 & 2 STAG and Preliminary Financial Cases: OB Calculation**

The Optimism Bias included within the STAGs and Preliminary Financial Cases for both Lines 1 and 2 are noted as follows.

<b>Works Duration</b>	14%	which equates to	<b>5.0</b> months delay for a	<b>36</b> month construction period for both Line 1 and 2
<b>CAPEX</b>	31%	which equates to	<b>£ 68.2</b> million costs for a	<b>£220</b> million Capital Expenditure (excluding contingency) for Line 1
<b>CAPEX</b>	31%	which equates to	<b>£ 79.1</b> million costs for a	<b>£255</b> million Capital Expenditure (excluding contingency) for Line 2

It is noted that these estimates were based upon an assessment of the mitigation factors affecting both lines in October 2003 and allows 1% for cost of ongoing mitigation. It is noted that there are very little differences in risks, mitigation factors and timing between Line 1 and 2.

At that time, our overall (all risks) mitigation factor for the scheme was 0.34 (i.e. 34% complete) with a corresponding OB values as follows.

<b>Works Duration</b>	13 %
<b>CAPEX</b>	29 %

Adopting the OB Risk Areas, which exclude a number of areas where risk will potentially result in an increase in works duration and capital expenditure, the following calculation is performed.

	Complexity of Contract	Late Contractor Inv. Design	Poor Contractor Capabilities	Government Guidelines	Dispute & Claims Occurred	Information Management	Other Procurement Areas	Design Complexity	Degree of Innovation	Environmental Impact	Other Project Specific Areas	Inadequacy of the Business Case	Large Number of Stakeholders	Funding Availability	Project Management Team	Poor Project Intelligence	Other Client Specific Areas	Public Relations	Site Characteristics	Permits, Consents & Approvals	Other Environmental Areas	Political	Economic	Legislation & Regulation	Technology	Other External Influences
<b>Works Duration</b>		16							46		8		6		14			10								
<b>CAPEX</b>	3		21						22	18	10			6	7			9	3				7			
<b>Average Mitigation</b>																										
<b>Average Mitigation</b>	0	0	0.9						0.3	0.4	0.21		0.2		0.2			0.2	0.3				0.4			
<b>Modified Mitigation</b>	0	0	16	0	0	0	0	0	32	0	4.8	0	4.8	0	11	0	0	7.5	0	0	0	0	0	0	0	0
<b>Modified Mitigation</b>	0	3	0	0	2.1	0	0	0	22	13	7.9	0	0	0	5.6	0	7.2	2.1	0	0	0	4.6	0	0	0	0

77 Works Duration  
67 CAPEX

The OB can be estimated from the above assessment of mitigations as follows.

<b>Works Duration</b>	15 %
<b>CAPEX</b>	30 %

A bottom-up calculation of OB was undertaken to verify the order of risk assuming all capital risks occur and are reduced by the degree of mitigation of those risks. This used the maximum impact equal to upper bound OB values and degree of mitigation for each grade of risk. This calculation confirmed that for Line 1 of a capital cost of £220m and Line 2 of £255m excluding contingencies that the Optimism Bias was as follows.

<b>Line 1</b>	<b>CAPEX</b>	31 %
<b>Line 2</b>	<b>CAPEX</b>	30 %





CALCULATION OF OPTIMISM BIAS

March 2004: Optimism Bias Calculation

The calculations performed below are illustrative of the range of values that can be anticipated at present (6 months on from our original OB Calculation)

Line 1 Optimism Bias

Overall average mitigation for the scheme is **0.54** This would result in a reduction of starting values of 44% and 20% for OB Capex and Works Duration as follows.

Works Duration 9 %  
CAPEX 20 %

Selecting programme impact risks only the average mitigation is **0.45** This would result in a reduction of starting value of 20% for OB Works Duration as follows.

Works Duration 11 %

Selecting capex impact risks only the average mitigation is **0.381** This would result in a reduction of starting value of 44% for OB Capex as follows.

CAPEX 27 %

Adopting the Main OB Risk Areas, into which all the risks lie, as a check the following calculation is performed.

	PROC.	PROJ. SPECIF.	CLIENT SPECIF.	ENV.	EXT. INFL.	
	Complexity of Contract Late Contractor Inv. Design Poor Contractor Capabilities Government Guidelines Dispute & Claims Occurred Information Management Other Procurement Areas	Design Complexity Degree of Innovation Environmental Impact Other Project Specific Areas	Inadequacy of the Business Case Large Number of Stakeholders Funding Availability Project Management Team Poor Project Intelligence Other Client Specific Areas	Public Relations Site Characteristics Permits, Consents & Approvals Other Environmental Areas	Political Economic Legislation & Regulation Technology Other External Influences	
Works Duration	16	46	28	10	0	
CAPEX	24	40	17	12	7	
Average Mitigation	0.493	0.395	0.496	0.58	0.317	Works Duration
Average Mitigation	0.425	0.335	0.377	0.575	0.26	CAPEX
Modified Mitigation	8.112	27.83	14.392	4.2	0	54.5 Works Duration
Modified Mitigation	13.8	26.6	10.591	5.1	5.18	61.3 CAPEX

The OB can be estimated from the above assessment of mitigations as follows.

Works Duration 11 %  
CAPEX 27 %

Allowing a 1% increase in Capital Expenditure Optimism Bias for the cost of mitigation then we can conclude that the Optimism Bias has reduced on the project, as follows

Works Duration 11 % which equates to 3.9 months delay for a 36 month construction period  
CAPEX 28 % which equates to £ 61.5 million costs for a £220 million Capital Expenditure (excluding contingency)

It is concluded that the the Optimism Bias has been reduced by 1.1 months since reported in STAG and Preliminary Financial Case  
It is concluded that the the Optimism Bias has been reduced by £ 6.7 million costs since reported in STAG and Preliminary Financial Case



CALCULATION OF OPTIMISM BIAS

March 2004: Optimism Bias Calculation

The calculations performed below are illustrative of the range of values that can be anticipated at present (6 months on from our original OB Calculation)

Line 2 Optimism Bias

Overall average mitigation for the scheme is **0.441** This would result in a reduction of starting values of 44% and 20% for OB Capex and Works Duration as follows.

Works Duration 11 %  
CAPEX 25 %

Selecting programme impact risks only the average mitigation is **0.44** This would result in a reduction of starting value of 20% for OB Works Duration as follows.

Works Duration 11 %

Selecting capex impact risks only the average mitigation is **0.375** This would result in a reduction of starting value of 44% for OB Capex as follows.

CAPEX 28 %

Adopting the Main OB Risk Areas, into which all the risks lie, as a check the following calculation is performed.

	PROC.	PROJ. SPECIF.	CLIENT SPECIF.	ENV.	EXT. INFL.	
	Complexity of Contract Late Contractor Inv. Design Poor Contractor Capabilities Government Guidelines Dispute & Claims Occurred Information Management Other Procurement Areas	Design Complexity Degree of Innovation Environmental Impact Other Project Specific Areas	Inadequacy of the Business Case Large Number of Stakeholders Funding Availability Project Management Team Poor Project Intelligence Other Client Specific Areas	Public Relations Site Characteristics Permits, Consents & Approvals Other Environmental Areas	Political Economic Legislation & Regulation Technology Other External Influences	
Works Duration	16	46	28	10	0	
CAPEX	24	40	17	12	7	
Average Mitigation	0.493	0.395	0.496	0.583	0.4	Works Duration
Average Mitigation	0.425	0.335	0.403	0.486	0.26	CAPEX
Modified Mitigation	8.112	27.83	14.392	4.37	0	54.704 Works Duration
Modified Mitigation	13.8	26.6	10.149	6.168	5.18	61.897 CAPEX

The OB can be estimated from the above assessment of mitigations as follows.

Works Duration 11 %  
CAPEX 27 %

Allowing a 1% increase in Capital Expenditure Optimism Bias for the cost of mitigation then we can conclude that the Optimism Bias has reduced on the project, as follows

Works Duration 11 % which equates to 3.9 months delay for a 36 month construction period  
CAPEX 28 % which equates to £ 72.0 million costs for a £ 255 million Capital Expenditure (excluding contingency)

It is concluded that the the Optimism Bias has been reduced by 1.1 months since reported in STAG and Preliminary Financial Case  
It is concluded that the the Optimism Bias has been reduced by £ 7.1 million costs since reported in STAG and Preliminary Financial Case



# tie Limited

## Line 1 and 2 Tram Schemes

### Project Risk Register



## CALCULATION OF OPTIMISM BIAS

The following steps have been defined to determine the CAPEX and Works Duration with Optimism Bias affecting the Line 1 & 2 schemes.

*It is noted that there is a shared section for Line 1 and 2. The CAPEX/Works Duration for combined section should not double count the shared section if both proceed. As the financial models are being run on each line there is a clear requirement for separate Optimism Bias calculations.*

### Step 1: Determine CAPEX

MM & FM

The Capital Expenditure of the Project shall be determined by the Technical Advisors for Line 1 and 2.

The CAPEX should exclude any Contingency allowances to prevent any double counting of risk.

It is noted that the Optimism Bias compares the costs anticipated at Outline Business Case and actual out-turn costs.

### Step 2: Determine Works Duration

MM & FM

The Works Duration refers to the period between Construction Start and Works Completion i.e. the construction period, and shall be advised by the Technical Advisors for Line 1 & 2.

The Works Duration compares the period estimated at Outline Business Case and actual out-turn programme.

### Step 3: Identify Project Risks

ALL

The Project Risk Register shall be used to summarise risk exposure on the Project. The Risk Register will receive contributions from all the Project Team including advisors and shall be maintained by tie Risk Manager

Assuming that the risk register represents a complete summary of risk exposure on the Project, we can use the register to calculate Optimism Bias.

The advisors shall be asked to verify that the Risk Register comprehensively summarises all the risks that they are aware of and should be considered by tie.

The risks to be identified by the advisors shall include those created by the assumptions made by the advisors and summarised in the Assumption Register, for the scenario where the assumptions are incorrect

### Step 4: Confirm the CAPEX/Programme Impact

MM & FM

The technical advisors will be asked to confirm the financial/programme impact of each risk, according to the suggested gradings.

The suggested gradings of CAPEX and Programme impacts are included within the Definitions worksheet of this spreadsheet.

Risks that have a Major Impact (>£1m and >3 months) shall be estimated by the advisors as £2.5m, £5m, £7.5m, £10m etc or 3months, 4months, 5months, 6 months etc.

### Step 5: Determine Risk Mitigation Strategies

ALL

The Project Team including advisors shall determine the potential risk mitigation strategies for each risk.

An initial scope for mitigation of risks has been determined by the advisors and developed further by tie (RM)

### Step 6: Determine Cost of Risk Management

ALL

The cost for implementing the risk mitigation strategies shall be determined by the Technical Advisor Team for each risk.

The advisors are requested to highlight any areas of risk mitigation that they believe to be outwith their original remit for consideration by tie (PMs/PD)

The cost for implementing the risk mitigation shall be used to estimate the CAPEX including Optimism Bias

### Step 7: Review Implementation of Risk Management

tie (PD/RM)

The decision to implement proposed risk mitigation strategies shall be where the cost of mitigation presents better value for money than accepting risk.

A review of additional costs versus cost of risk shall be undertaken by the tie Projects Director and Risk Manager

### Step 8: Allocate Risks to Optimism Bias

tie (RM)

The Project Risk Register shall be reviewed relative to Risk categories.

This will allow review of the identified risks for each of the risk areas identified by Optimism Bias. This shall be carried out by the Risk Manager

### Step 9: Review Scope of Risk Register

tie (RM)



The scope of risks identified shall be reviewed to determine if further risks require to be considered.

This review shall be carried out by the Risk Manager relative to published guidance and historic project risk registers. Additional risks shall be subject to the above steps.

### Step 10: Assess Project Type

tie (RM)

A review of the 'project type' is required to allocate the scheme to a Project Type and determine starting values for risk.

Following review by Mott MacDonald of the 'project type' it is considered that the Tram Projects are a "Standard civil engineering project".

### Step 11: Determine Starting Values

tie (RM)

Table 4 within the guidance reports the following 'indicative' lower and upper bound values for optimism bias levels for 'Standard' civil engineering projects.

Optimism Bias (%)			
Works Duration		CAPEX	
Upper Bound	Lower Bound	Upper Bound	Lower Bound
20	1	44	3

Standard Civil Engineering

Table 16 within the guidance recommends that we adopt the upper bound value for optimism bias as a 'starting value', and suggests the following distribution of impacts.

	PROC.						PROJ. SPECIF.				CLIENT SPECIF.				ENV.			EXT. INFL.								
	Complexity of Contract	Late Contractor Inv. Design	Poor Contractor Capabilities	Government Guidelines	Dispute & Claims Occurred	Information Management	Other Procurement Areas	Design Complexity	Degree of innovation	Environmental Impact	Other Project Specific Areas	Inadequacy of the Business Case	Large Number of Stakeholders	Funding Availability	Project Management Team	Poor Project Intelligence	Other Client Specific Areas	Public Relations	Site Characteristics	Permits, Consents & Approvals	Other Environmental Areas	Political	Economic	Legislation & Regulation	Technology	Other External Influences
Works Duration		16						46			8		6		14			10								
CAPEX	3			21				22	18	10					7		9	3				7				

It is noted that these figures represent percentages of the Upper Bound Optimism Bias figures

### Step 12: Determine the Mitigation Factor per Risk

ALL

Determine the Mitigation Factor for each of risks identified in the Risk Register

Mitigation Factor	Description
0.0	Risks are not mitigated
0.0 to 1.0	Partial mitigation of risks
1.0	All risks are fully mitigated

The Mitigation Factor should be reported for each risk identified by the Persons Responsible for each of the organisations and groups who are responsible for mitigating each risk as 0.0, 0.2, 0.4, 0.6, 0.8 or 1.0. The greater the mitigation factor the le

### Step 13: Review of Evidence

tie (RM)

A review of the evidence to justify the advised Mitigation Factor is to be carried out to independently verify proposed reductions.

It is proposed that tie Risk Manager carries out this review with support from the tie Project Managers

### Step 14: Determine the Mitigation Factor per Risk Area

tie (RM)

The Mitigation Factor for each area contributing to Optimism Bias shall be determined by the Risk Manager for Works Duration and CAPEX.

This will be calculated as an average value of the individual Mitigation Factors for each Project Risk Area

### Step 15: Determine the Optimism Bias

tie (RM)

The above published indicative Upper Bound Figures for %Contribution of Optimism Bias shall be modified by the Mitigation Factor per Risk Area (par example)

PROC. PROJ. SPECIF. CLIENT SPECIF. ENV. EXT. INFL.



	Complexity of Contract	Late Contractor Inv. Design	Poor Contractor Capabilities	Government Guidelines	Dispute & Claims Occurred	Information Management	Other Procurement Areas	Design Complexity	Degree of innovation	Environmental Impact	Other Project Specific Areas	Inadequacy of the Business Case	Large Number of Stakeholders	Funding Availability	Project Management Team	Poor Project Intelligence	Other Client Specific Areas	Public Relations	Site Characteristics	Permits, Consents & Approvals	Other Environmental Areas	Political	Economic	Legislation & Regulation	Technology	Other External Influences
Works Duration			16							46		8		6		14			10							
Average Mitigation Factor			0.4							0.4		0.4		0.2		0.6			0.2							
Reduction in Optimism Bias			6.4							18		3.2		1.2		8.4			2							

The above mitigation factors and the following calculations are for illustrative purposes only

From the above example, it can be seen that approximately 40% (Sum of the Reduction in optimism bias) has been managed. This leaves approximately 60% of the potential upper bound optimism bias on Works Duration i.e. 12% Optimism Bias to be considered.

If the works duration was 30months, then there is an upper bound Works Duration Optimism Bias of 6 months (20%). The above example illustrates that this would reduce to just over 3.5 months (12%) after implementing risk mitigation strategies to achieve

### Step 16: Lower Bound Check

tie (RM)

A check that the CAPEX/Programme impacts have not been reduced below the lower bound values as reported above is to be carried out by the Risk Manager.

### Step 17: Final Estimated Optimism Bias with Risk Management

tie (RM)

Combine the cost of risk management and anticipated Optimism Bias on CAPEX.

### Step 18: Check CAPEX/Programme Risk Allowance

tie (RM)

A check on the anticipated risk potential from the financial and programme gradings shall be carried out as a check.

### Step 19: Decision to Proceed

tie (PD)

A review of the output shall be undertaken by the Projects Director and a decision made whether to proceed or instruct further mitigation.

### Step 20: Financial Model

GT

The CAPEX including Optimism Bias and Risk Management shall be considered in the Financial Model.

The application of OB to the Financial Model is to be reviewed relative Scottish Executive guidelines and requirements. GT to develop paper on how the Optimism Paper is to be taken forward. GT to arrange meeting with SE.



tie Limited  
Line 1 and 2 Tram Schemes  
Project Risk Register



CALCULATION OF OPTIMISM BIAS

May 2004: Optimism Bias Calculation

The calculations performed below are illustrative of the range of values that can be anticipated at present (8 months on from our original OB Calculation)

Line 1 Optimism Bias

Overall average mitigation for the scheme is **0.5** This would result in a reduction of starting values of 44% and 20% for OB Capex and Works Duration as follows.

Works Duration 10 %  
CAPEX 21 %

Selecting programme impact risks only the average mitigation is **0.5** This would result in a reduction of starting value of 20% for OB Works Duration as follows.

Works Duration 10 %

Selecting capex impact risks only the average mitigation is **0.453** This would result in a reduction of starting value of 44% for OB Capex as follows.

CAPEX 24 %

Adopting the Main OB Risk Areas, into which all the risks lie, as a check the following calculation is performed.

	PROC.	PROJ. SPECIF.	CLIENT SPECIF.	ENV.	EXT. INFL.	
	Complexity of Contract Late Contractor Inv. Design Poor Contractor Capabilities Government Guidelines Dispute & Claims Occurred Information Management Other Procurement Areas	Design Complexity Degree of Innovation Environmental Impact Other Project Specific Areas	Inadequacy of the Business Case Large Number of Stakeholders Funding Availability Project Management Team Poor Project Intelligence Other Client Specific Areas	Public Relations Site Characteristics Permits, Consents & Approvals Other Environmental Areas	Political Economic Legislation & Regulation Technology Other External Influences	
Works Duration	16	46	28	10	0	
CAPEX	24	40	17	12	7	
Average Mitigation	0.538	0.445	0.563	0.58	0.49	Works Duration
Average Mitigation	0.47	0.442	0.469	0.6	0.29	CAPEX
Modified Mitigation	7.392	25.53	12.236	4.2	0	49 Works Duration
Modified Mitigation	12.72	22.32	9.027	4.8	4.97	54 CAPEX

The OB can be estimated from the above assessment of mitigations as follows.

Works Duration 10 %  
CAPEX 24 %

Allowing a 1% increase in Capital Expenditure Optimism Bias for the cost of mitigation then we can conclude that the Optimism Bias has reduced on the project, as follows

Works Duration 10 % which equates to **3.8** months delay for a **36** month construction period  
CAPEX 25 % which equates to **£ 54.3** million costs for a **£ 220** million Capital Expenditure (excluding contingency)

It is concluded that the the Optimism Bias has been reduced by **1.5** months since reported in STAG and Preliminary Financial Case  
It is concluded that the the Optimism Bias has been reduced by **£ 13.9** million costs since reported in STAG and Preliminary Financial Case



tie Limited  
Line 1 and 2 Tram Schemes  
Project Risk Register



CALCULATION OF OPTIMISM BIAS

May 2004: Optimism Bias Calculation

The calculations performed below are illustrative of the range of values that can be anticipated at present (8 months on from our original OB Calculation)

Line 2 Optimism Bias

Overall average mitigation for the scheme is **0.52** This would result in a reduction of starting values of 44% and 20% for OB Capex and Works Duration as follows.

Works Duration 10 %  
CAPEX 21 %

Selecting programme impact risks only the average mitigation is **0.53** This would result in a reduction of starting value of 20% for OB Works Duration as follows.

Works Duration 9 %

Selecting capex impact risks only the average mitigation is **0.46** This would result in a reduction of starting value of 44% for OB Capex as follows.

CAPEX 24 %

Adopting the Main OB Risk Areas, into which all the risks lie, as a check the following calculation is performed.

	PROC.	PROJ. SPECIF.	CLIENT SPECIF.	ENV.	EXT. INFL.	
	Complexity of Contract Late Contractor Inv. Design Poor Contractor Capabilities Government Guidelines Dispute & Claims Occurred Information Management Other Procurement Areas	Design Complexity Degree of Innovation Environmental Impact Other Project Specific Areas	Inadequacy of the Business Case Large Number of Stakeholders Funding Availability Project Management Team Poor Project Intelligence Other Client Specific Areas	Public Relations Site Characteristics Permits, Consents & Approvals Other Environmental Areas	Political Economic Legislation & Regulation Technology Other External Influences	
Works Duration	16	46	28	10	0	
CAPEX	24	40	17	12	7	
Average Mitigation	0.538	0.465	0.583	0.573	0.493	Works Duration
Average Mitigation	0.47	0.446	0.504	0.557	0.29	CAPEX
Modified Mitigation	7.392	24.61	11.676	4.27	0	47.948 Works Duration
Modified Mitigation	12.72	22.16	8.432	5.316	4.97	53.598 CAPEX

The OB can be estimated from the above assessment of mitigations as follows.

Works Duration 10 %  
CAPEX 24 %

Allowing a 1% increase in Capital Expenditure Optimism Bias for the cost of mitigation then we can conclude that the Optimism Bias has reduced on the project, as follows

Works Duration 10 % which equates to **3.5** months delay for a **36** month construction period  
CAPEX 25 % which equates to **£ 62.7** million costs for a **£ 255** million Capital Expenditure (excluding contingency)

It is concluded that the Optimism Bias has been reduced by **1.6** months since reported in STAG and Preliminary Financial Case  
It is concluded that the Optimism Bias has been reduced by **£ 16.4** million costs since reported in STAG and Preliminary Financial Case



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## Line 1 and 2 Tram Schemes

### Project Risk Register



## RESPONSIBILITIES

The responsibilities for ensuring that the actions identified to mitigate the risk exposure have been identified in the risk register, and detailed as follows.

Actionee	Company/Group	Person Responsible
tie (UM)	tie Utilities Manager	<b>Tom Blackhall</b>
tie (TRO)	Traffic Regulation Order Group	<b>Ann Faulds (Dundas &amp; Wilson)</b>
tie (PRO)	Procurement Group	<b>Ian Kendall</b>
tie (PR)	PR & Communication Group	<b>Lesley Clark (Weber Shandwick)</b>
tie (PPM)	tie Project Programme Manager	<b>David Ramsay</b>
tie (PMs)	tie Project Managers	<b>Kevin Murray (Line 1) &amp; Geoff Duke (Line 2)</b>
tie (PD)	tie Projects Director	<b>Alex Macaulay</b>
tie (PAL)	Property and Land Group	<b>Matthew Edgar (Colliers CRE)</b>
tie (PAE)	Planning and Environment Group	<b>Ray McMaster (Dundas &amp; Wilson)</b>
tie (OME)	Objection Management and Evidence Group	<b>Trudi Craggs (Dundas &amp; Wilson)</b>
tie (MAD)	Modelling and Demand Group	<b>Jeff Knight</b>
tie (FD)	tie Financial Director	<b>Graeme Bissett</b>
tie (CM)	tie Cost Manager	<b>Gerry Henderson</b>
tie (CFM)	tie Corporate Finance Manager	<b>Pat Diamond</b>
tie (CEO/Chair)	tie Chief Executive/Chairman	<b>Michael Howell</b>
TET	Transdev Edinburgh Trams	<b>Jim Harries</b>
MM	Mott MacDonald	<b>Gary Turner</b>
FM	Faber Maunsell	<b>Doug Blenkey</b>
CEC	City of Edinburgh Council	<b>Ewan Kennedy</b>
DLA	DLA	<b>Andrew Fitchie</b>

For Distribution Purposes it is noted that MM/FM request the additional distribution, as follows.

*Andrew Oldfield, MM Project Manager (line 1)*  
*Gavin Murray, FM Project Manager (line2)*  
*Michael Lax, FM Project Manager (line 3)*



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## Line 1 and 2 Tram Schemes

### Project Risk Register



## DEFINITIONS

The significance of each risk will be classified by means of a 5-point AS/NZS system for combining 'impact' and 'likelihood' aspects of each risk in order to prioritise actions.

The following financial and programme tolerances are proposed.

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

The following range of likelihoods are proposed

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

The likelihood of risks and impacts can be combined in a 2-dimensional table as follows

Likelihood/ Impact	Insignificant	Minor	Moderate	Significant	Major
Remote	1	2	3	4	5
Unusual	2	4	6	8	10
Possible	3	6	9	12	15
Probable	4	8	12	16	20
Expected	5	10	15	20	25

The following significance of risk has been adopted.

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

Mitigation Factor	Description
0.0	Risks are not mitigated
0.0 to 1.0	Partial mitigation of risks
1.0	All risks are fully mitigated

Risk Type
1 Generic TIE Strategic Risk
2 Generic TIE Project Risk
3 Generic Tram Project Risk
4 Specific Tram Project Risk