

Feasibility Study for a North Edinburgh Rapid Transit Solution

July 2001

Contents

1	EXECUTIVE SUMMARY	1
	1.1 <i>Objectives of study</i>	1
	1.2 <i>Consultancy team</i>	1
	1.3 <i>Shortlisted options</i>	1
	1.4 <i>Preferred option benefits</i>	2
	1.5 <i>Next stage</i>	3
2	INTRODUCTION.....	4
3	POLICY, AIMS AND OBJECTIVES	8
	3.1 <i>Travel Choices for Scotland</i>.....	8
	3.1.1 A New Transport Policy.....	8
	3.1.2 Five Appraisal Objectives & STAG	9
	3.1.3 Planning Guidance.....	9
	3.2 <i>Regional Context</i>.....	10
	3.3 <i>Edinburgh Context</i>.....	11
	3.3.1 Local Planning context	11
	3.3.2 Local Transport Strategy 2001- 2004.....	11
	3.3.3 LTS Targets	13
	3.4 <i>Client Body</i>	14
	3.4.1 The Waterfront Masterplan	15
	3.4.2 The Steering Group's Aims	18
4	PROBLEMS IN NORTH EDINBURGH.....	21
	4.1 <i>Overview</i>	21
	4.2 <i>Economic & Population Characteristics</i>.....	21
	4.3 <i>Current Transport Links</i>	23
	4.3.1 Public Transport.....	23
	4.3.2 Roads.....	25
	4.4 <i>Current and Future need</i>	26
5	OPTION GENERATION & SIFTING.....	29
	5.1 <i>Suitability of technology/technology review</i>	29
	5.2 <i>Light Rail Transit/Guided Bus in LTS</i>.....	31
	5.3 <i>Brainstorming Options</i>	32
	5.3.1 Routes.....	32
	5.3.2 Modes – Light Rail Transit/ Guided Bus.....	34

	5.4	<i>Sifting</i>	38
	5.5	<i>Shortlist</i>	40
6		OPTION APPRAISAL	42
	6.1	<i>Introduction</i>	42
	6.2	<i>The Appraisal Process</i>	43
	6.3	<i>STAG PART 1 AST</i>	45
	6.4	<i>Demand and Revenue Forecasting</i>	57
	6.4.1	Background Travel Market	57
	6.4.2	Development Related Demand	59
	6.4.3	Summary of Results	60
	6.4.4	Commentary on Demand Forecasts	63
	6.5	<i>Approach to Option Appraisal</i>	63
	6.5.1	Environment	63
	6.5.2	Economy	65
	6.5.3	The TEE Assessment	65
	6.5.4	The EALI Assessment.....	66
	6.5.5	Safety, Accessibility and Integration	67
7		THE PREFERRED ALIGNMENT	69
	7.1	<i>Description</i>	69
	7.1.1	Route Alignment.....	69
	7.1.2	Depot Scoping Study	70
	7.1.3	Environmental Scoping Study	72
	7.1.4	Technological specifications	76
	7.1.5	Transport forecasts	77
	7.1.6	Indicative costings.....	77
8		CONSULTATION PROCESS	79
9		FINANCIAL ANALYSIS	82
	9.1	<i>Overview</i>	82
	9.2	<i>Key Assumptions</i>	82
	9.2.1	Procurement.....	82
	9.2.2	Subsidy/Dividend	83
	9.2.3	Contract Length.....	84

	9.2.4	Vehicles.....	84
	9.2.5	Depot.....	85
	9.3	Financial Costs.....	85
	9.3.1	Capital Costs.....	85
	9.3.2	Operating Revenues/Costs	86
	9.4	Developer Contributions	88
10		RISK TRANSFER	91
	10.1	Introduction	91
	10.2	Contract Price.....	91
	10.2.1	Design Risk.....	91
	10.2.2	Material Cost	92
	10.2.3	Labour Cost.....	92
	10.2.4	Utilities Diversion Costs	92
	10.2.5	Commissioning.....	92
	10.2.6	Delivery and cost of Vehicles	92
	10.2.7	Potential Railtrack/Scotrail Compensation	93
	10.2.8	Operational Cost Changes.....	93
	10.2.9	Competition	93
	10.2.10	Patronage.....	94
11		THE PROCUREMENT PROCESS	95
	11.1	Procurement Options	95
	11.1.1	Introduction	95
	11.1.2	Design Build Finance and Operate (“DBFO”)	96
	11.1.3	Design Build Operate and Maintain (“DBOM”).....	98
	11.1.4	Traditional Public Sector Procurement.....	99
	11.1.5	Concession Arrangements.....	101
12		IMPLEMENTATION.....	103
	12.1	Preparatory Measures	103
	12.2	Legal Input.....	104
	12.2.1	Drafting of the Bill.....	104

12.2.2	Parliamentary Procedure	105
12.2.3	Other Related Legal Work.....	105
12.3	<i>Environmental Assessment</i>	105
12.4	<i>Future Demand modelling and Appraisal</i>	106
12.5	<i>Technical and Design</i>	107
12.6	<i>Financial Structuring</i>	109
12.7	<i>Costs</i>	110
12.7.1	Procuring Body Internal Costs	110
12.7.2	External Advisers	110

Appendices

1. REPORTS MADE AVAILABLE
2. MAP OF PRINCIPAL ROUTE OPTIONS
3. ROUTE ALIGNMENT OPTION APPRAISAL
4. ROUTE TECHNOLOGIES OPTION APPRAISAL
5. DEPOT SCOPING STUDY
6. DEMAND FORECASTING
7. FINANCIAL MODELS
8. PARLIAMENTARY PROCESS

1 Executive Summary

1.1 Objectives of study

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

1.2 Consultancy team

The Steering Group appointed a multi-disciplinary team comprising:

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

The team has undertaken the tasks outlined above over the past six months.

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

1.3 Shortlisted options

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

Three options were considered:

- An alignment from Granton Square, through the Waterfront site and then via the disused railway line to Haymarket station;

- A continuation of the first option on-street to St Andrew's Square;
- A North Edinburgh Loop from Granton Square to Haymarket and then St Andrew's Square, Leith via Leith Walk to Ocean Terminal and then along the foreshore to Granton Square.

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

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

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

1.4 Preferred option benefits

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

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

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

1.5 Next stage

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

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

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

2 Introduction

The original purpose of this report was to examine the feasibility of a rapid public transportation link between the City Centre and Waterfront Granton. As the study progressed, the purpose of the report expanded to include the Waterfront developments at Leith and Newhaven. The objective of this report is to determine whether such linkages are feasible. The study also forms the basis for submission to the City of Edinburgh Council and The Scottish Executive to secure Public Transport Funding (“PTF”) to develop the scheme to a level where a further application can be made for funding to implement the preferred scheme.

The report has been developed in accordance with The Scottish Executive Guidance for PTF bids and the draft Scottish Transport Appraisal Guidance (“STAG”).

Waterfront Edinburgh Limited (“WEL”) which is a joint venture company between the City of Edinburgh Council (“CEC”) and Scottish Enterprise Edinburgh and Lothian formed a Steering Group of local businesses to commission this study. This group comprises:-

- Scottish Enterprise Edinburgh & Lothian
- Forth Ports PLC
- Lattice Property
- United Wire
- National Museums of Scotland
- Edinburgh’s Telford College
- Deutsche Bank
- BAE Systems
- Lothian University Hospital Trust
- Miller Ventures Limited
- Mary Erskine/Stewart’s Melville College
- St George’s School for Girls
- City of Edinburgh Council
- Lothian Buses

Representatives of these bodies, together with representatives of the two shareholders of WEL requested tenders in October 2000 to undertake a study of a route from Granton to Haymarket. A multi-disciplinary grouping led by Andersen including Mott MacDonald and Steer Davies Gleave were appointed in January 2001 to undertake this study.

The objectives of the study were:-

- To establish the economics of a comprehensive public transport solution connecting the Waterfront project site with the City Centre, considering all practicable modes of transport, and combinations of modes;
- To recommend an appropriate procurement route; and
- To develop an outline business case supporting the recommendations.

As already noted above the study was expanded to include the proposed developments at Leith and Newhaven; consequently the objectives of the original study were also applied to this additional work. It was important that the study considered the most appropriate route, the optimum technology, how best to interchange with other transport systems in the City and how the transport solution could benefit the economy of the development area as well as contribute towards effecting social inclusion, to the existing areas which would be covered by the proposed solution.

The schemes fit with overall policy, aims and objectives is contained in Chapter 3 of this report.

A number of reports were made available to the study team; these are listed in Appendix 1 to this document. A review of these reports together with an assessment of the problems to be addressed is contained in Chapter 4 of this report.

The approach to the study has comprised a series of key workstreams as follows:

- Economic impact analysis
- Traffic/patronage review
- Engineering analysis
- Option analysis
- Risk analysis
- Procurement route
- Consultation process
- Financial analysis

The process adopted has been to discuss the above issues throughout the study period with the Steering Group to ensure that the members of that group are supportive of the recommendations arising from the study. Further detail on each of these workstreams forms the main body of this document.

A key factor which has impacted on the study has been the route analysis and developments to that analysis during the study period. The initial route sought to link the Waterfront development site with Haymarket station which was seen as a key interchange point (a fact which has been confirmed by the consultation process).

Subsequent discussions with representatives of the CEC and WEL resulted in a preference to examine a route which terminated at the East end of Princes Street (St Andrew's Square) and work was commissioned to review this option. In addition Forth Ports, which some years previously had commissioned work on a light rapid transport scheme from Newhaven to Haymarket, routing up Leith Walk indicated that it was interested in seeing a solution which delivered a North Edinburgh loop. It was agreed that this option would also be analysed and that the three route options set out below would form the focus of the study.

- Granton to Haymarket ("Scenario 1")
- Granton to St Andrew's Square via Haymarket ("Scenario 2")
- Granton to Granton – The North Edinburgh Loop ("Scenario 3")

These three options were identified as the most beneficial against the evaluation criteria and a map indicating these three principal options is set out in Appendix 2. Within these options, work has been undertaken to identify potential sub-options on route alignments and these are discussed in detail in Appendix 3. The route alignments are considered within Chapter 5 of this report. At STAG Part 2 the above scenarios will require to be revisited and further work may influence the final alignment.

As part of an option sifting process consideration was given to the different technologies which could be employed. Following a long list review and a workshop with Steering Group members it was resolved to analyse in detail a Light Rail system and a Guided Bus system. The background to and outcome of this analysis is contained within Chapter 5 of this report.

The appraisal of the preferred option, in terms of route and technology, which resulted from the sifting process in Chapter 5, is detailed in Chapter 6. This analysis is underpinned with an Appraisal Summary Table.

Chapter 7 summarises the route and technology selected for the preferred option identified within Chapter 6.

A series of consultation meetings have been conducted with representatives of businesses on the likely route, potential funders, conservation groups and the local community. The outcome of these consultations has been positive support for the delivery of a quality transport scheme which integrates the North Edinburgh community with the rest of the city and its outlying areas. A summary of the consultation process is contained in Chapter 8.

As the study progressed it became clear from the demand and technical analysis that certain of these options did not deliver schemes which would achieve the overall objectives of the Waterfront Steering Group, CEC or the Scottish Executive. The financial analysis has therefore focussed on a limited number of options. The financial analysis is summarised in Chapter 9.

Chapters 10 and 11 consider the issues of risk and procurement options relating to the delivery of the preferred option. The conclusion of this work has been that the most effective procurement route would involve separate contracts for the infrastructure construction and the operation of the system. The key rationale behind this is that the

preferred option may well form part of an Edinburgh wide system at some point in the future and the suggested route offers the greatest flexibility if that were to be the case.

The analysis contained within this report has been approved by the Steering Group members. The members support a recommendation to City of Edinburgh Council that funding is sought from the Scottish Executive Public Transport Fund preparation pool to develop the preferred option identified in this report to the Part 2 STAG approval process. The report contains within Chapter 12 an analysis of the costs, both internal to CEC and external, which would be required to complete this process.

3 Policy, Aims and Objectives

3.1 Travel Choices for Scotland

3.1.1 A New Transport Policy

In July 1998, the Government published its White Paper *Travel Choices for Scotland*. The White Paper has established the new policy framework for transport in Scotland. The White Paper states that transport policies, “will work together, and with other policies, in pursuit of a higher quality of life for Scotland through our objectives of:

- a strong economy;
- a clean environment;
- an inclusive society”

(§1.1.7 Travel Choices for Scotland)

The White Paper states the development of a sustainable transport system can contribute to meeting these goals, but in doing so a number of key issues need to be addressed, namely:

- rising traffic levels, but there is a recognition that simply providing more roads is not a viable solution to congestion problems;
- key blockages on the trunk road network that have negative economic impacts;
- traffic-related local air pollution;
- the need for the transport network to counter social exclusion.

The White Paper suggests that the Government’s goals can be achieved by implementing a long-term vision in which:

- “key parts of town and city centres are free of non-essential car and other road traffic, for the benefit of people and business;
- the practical first choice for personal travel, particularly within, and to, centres of town and cities, is by foot, by cycle or by accessible, affordable, efficient, safe and environmentally-clean public transport;
- social exclusion is reduced through increased accessibility to public transport for those without a car;
- the integrated transport network is geared to the needs of the Scottish economy;
- freight movements are efficient and environmentally-clean, with a reduced dependence on road freight, particularly for longer journeys;
- traffic volumes are controlled tightly in particular locations, with optimum use made of technological innovation to reduce noise and air pollution;

- accessibility by public transport and the existing road network is a key requirement determining the pattern of development;
- an accessible, sustainable and affordable rural transport system maintains and promotes the growth of our remote and rural communities;
- the existing, and any new, strategic roads are maintained to a high standard with the emphasis on improved safety and reliability of journey times;
- the impact of roads on the countryside and the environment is reduced”;

3.1.2 **Five Appraisal Objectives & STAG**

To support the development of its integrated transport policy, Government has established five appraisal objectives – economy, environment, safety, integration and accessibility - which are to be used when authorities and agencies develop and appraise new transport proposals. To aid authorities and agencies in their proposal development and appraisal, the Scottish Executive will soon be publishing (initially in draft), the *Scottish Transport Appraisal Guidance* (“STAG”). This project has been undertaken in accordance with the intent and principles that underpin STAG, in that:

- there is a clear statement of the “planning objectives” for the proposal. Planning objectives are a statement of how the Government’s five national objectives should be applied at a local level and they take into account local needs and priorities. The advice in STAG is that promoters should develop proposals which are explicitly targeted at meeting their defined planning objectives;
- there has been an explicit consideration of the problems and issues in the North Edinburgh area. The proposals examined in this study have been designed to go towards overcoming the identified problems and issues;
- a number of options have been considered when developing the recommended solution and these have been assessed against their contribution to the planning objectives and how they would go towards addressing the identified problems;
- the recommendations have been appraised against how they achieve the defined planning objectives and contribute to the attainment of the Government’s national objectives.

On the last point, it should be noted that STAG calls for a two-part appraisal. Part 1 is an initial appraisal and broad assessment of impacts of a proposal, and is designed to be used at a pre-qualification/approval stage. It is also used to determine whether a project should proceed to Part 2. The Part 2 appraisal is a more detailed one using a mixture of quantitative and qualitative measures to assess performance against the Government’s objectives. It is intended that the Part 2 appraisal be used for making decisions on, for example, significant capital projects. Given the stage of this project’s development, it is clearly a Part 1 appraisal that is called for, although certain initial work has been undertaken which would support some Part 2 elements.

3.1.3 **Planning Guidance**

Following from the White Paper, the Scottish Executive has also developed its guidance in relation to planning and transport and this is also a relevant consideration for this study. Of particular relevance National Planning Policy Guidelines (“NPPG”) 17 on

Transport and Planning (April 1999) and the related Planning Advice Note (“PAN”)57, also called *Transport and Planning* (and also issued in April 1999).

Within NPPG17, land use planning is stated as an important tool in:

- reducing the need for travel by relating land use to transport facilities;
- enabling access to local facilities by walking and cycling;
- encouraging public transport access to developments;
- supporting essential motorised travel but relating overall to sustainable movements.

The development of brownfield land is closely dependent on adequate accessibility by sustainable modes. As stressed in NPPG17, the general hierarchy of priorities for individual travel accessibility to development should be walking, cycling, public transport and then private cars. Relating this to Waterfront, where housing will be a key land use on the site, NPPG17 states that access to jobs and facilities across the wider urban area should be a prime consideration for such uses. It is also suggested that highly accessible developments should also be constructed at a high density. In NPPG 17 it is also noted that a key objective for business and industrial development will be to reduce the need to travel, particularly by car. The guidance also states that new schools and higher education facilities should be well served by public transport and integrated into walking and cycling networks. It is clear that Government guidance suggests a mutual relationship should exist between public transport and new development (be it housing or business related) with each sustaining the other. The principles set out in NPPG 17 are echoed in the concept of Transport Development Areas (“TDAs”), namely areas of mixed-use high density development where jobs, employment and services are located in close proximity and in areas well served by public transport.

PAN 57 requires developers to produce a Transport Assessment for significant travel generating developments. It calls for developments to provide information to the planning authority to allow it to assess the suitability of an application in terms of travel demand and travel impacts. It therefore requires a consideration of person trips and freight trips and road and public transport travel.

3.2 Regional Context

The City of Edinburgh Council is a member of “SESTRAN”, the South East Scotland Transport Partnership. SESTRAN is a partnership of nine local authorities formed to identify, develop, implement and monitor matters of mutual transport interest.

The SESTRAN partnership has adopted a number of overall policy principles for application across the whole of the SESTRAN area:

- reduce dependence on the private car and minimise the need for travel especially by car for regional journeys within South East Scotland;

- maximise public transport provision and achieve public transport integration intermodality;
- promote and develop travel awareness and information; encourage walking/cycling; promoting better health and fitness; and encourage the use of public transport;
- improve safety for all road and transport users;
- reduce the environmental impacts of travel;
- enhance community life and social inclusion;
- encourage the use of the most economic, effective, environmentally friendly and efficient modes for freight transport.

3.3 Edinburgh Context

3.3.1 *Local Planning context*

The statutory development plan for Edinburgh is comprised of the Lothian Structure Plan (1994) and the local plans. The City of Edinburgh Council, West Lothian, Midlothian and East Lothian Councils are currently working together to prepare a new Structure Plan, and published a major issues paper for consultation. The key issues identified within the paper are housing pressures, jobs and the economy, transport and commuting. Within Edinburgh itself, the Granton Waterfront area is identified as having potential for brownfield residential development, as well as land for office and business space, provided transport and other infrastructure is adequate. High density brownfield development at the Waterfront area is included within a potential sustainable “compact city” development scenario, in accordance with government policy.

The CEC has also prepared a draft Edinburgh Local Plan and will publish this document for public consultation later this year. The draft Local Plan includes a chapter on the Granton Waterfront area and when approved will form the statutory guidance for the area. The Leith and Newhaven areas of the Waterfront development are already covered by the North East Edinburgh Local Plan.

3.3.2 *Local Transport Strategy 2001- 2004*

The Local Transport Strategy (“LTS”) recently produced by the City of Edinburgh Council sets the key framework for the City’s transport strategy over the next two decades. Within the context of the strategy, the Council has set out its policies and programmes, and has highlighted key issues and trends.

The Council has concerns over car use and car ownership in Edinburgh, both of which are growing. The growth in car use is a consequence of rising ownership levels and of changing land-use patterns such as more out-of-town destinations, the decline of older industries in central parts of the City, as well as changes in expectations for personal mobility. In particular, traffic levels outside the city centre and in off-peak hours have grown. However, it is believed that at peak periods traffic into the City Centre has experienced little growth in recent years. Walking and public transport still make up significant proportions of travel, walking being especially important for short trips. Rail is an important mode for medium and long distance travel.

Lack of access to facilities and services are significant contributors to high levels of social exclusion experienced in the City. Particularly affected are the elderly, disabled as well as those with low incomes, children, women and parents with young children. To reduce social exclusion, the Council has identified good public transport, less traffic and lower speeds, better land use planning and transport integration, and accessible services as required elements of its transport strategy.

The Council views congestion as affecting the economy in the city centre, but it is also seen to be affecting the outskirts of the city. The LTS stresses that all major centres of activity need to be accessible by public transport, foot and cycle. Future major travel generating development should be steered to areas that are well served by public transport, and local centres need to be supported by planning policies. The Council wishes Edinburgh's economic success to be shared by all citizens.

Overall, the Council's aspirations can be summarised by this extract from the LTS:

“Edinburgh aspires to be a city with a transport system that is accessible to all and serves all. Edinburgh's transport system should contribute to better health, safety and quality of life, with particular consideration for vulnerable people such as children, and elderly and disabled people; it should be a true Citizen's Network. The transport system should support a strong sustainable local economy.

The Council will seek to maximise people's ability to meet their day to day needs within short distances that can easily be undertaken without the need to use a car. The city should develop and grow in a form that reduces the need to travel longer distances, especially by car. Choice should be available for all journeys within the city.

The City of Edinburgh Council's Local Transport Strategy has 6 “aims”, which in the context of STAG, are the policy objectives for the LTS. These are:

- to improve safety for all road users and transport users;
- to reduce the environmental impacts of travel;
- to support the local economy;
- to promote better health and fitness;
- to reduce social exclusion (to enhance social inclusion);
- to maximise the role of streets as the focal point of our local communities where people can meet, shop, and, in appropriate circumstances, where children can play.

For a transport proposal to be successfully promoted in the City, it must be shown to contribute to meeting the six planning objectives outlined above.

To help meet their “aims”, the Council has adopted a number of what are called “objectives”. These “objectives” actually define the sorts of measures and general policies which the Council believes will help facilitate the attainment of their planning objectives. They are:

- to make it easier to live without the car, or use the car less;
- to reduce the amount of car use;
- to encourage and facilitate walking, cycling and public transport use;
- to reduce the adverse impacts of travel including road accidents and environmental damage, particularly for those worst affected by these impacts;
- to enhance streets as 'civic spaces', where priority is given to people rather than cars;
- to improve the ability of people with low incomes or mobility impairments to use the transport system, especially by public transport, as pedestrians or by bicycle;
- to maintain the road network, and any other facilities for the movement of pedestrian, cyclists and bus users, to a standard suitable for safe and comfortable movement.

The Local Transport Strategy focuses on reducing the need for car use by providing attractive alternatives and by other measures including integration with planning policy. A key element of the LTS is to develop a congestion charging scheme; it is recognised, however, that such a scheme cannot be introduced without CEC and Scottish Executive approval and significant improvements being implemented in advance. The LTS envisages a Light Rail network as a major part of the future transport infrastructure of the City. The North Edinburgh scheme which forms part of this study could form the initial element of a larger city-wide network.

3.3.3 **LTS Targets**

The City of Edinburgh LTS contains a number of targets, all of which, to a degree, are relevant to the proposed redevelopment of Waterfront and the rapid transit scheme. Those of particular relevance for this study are:

- Making it easier to live without the car – increasing accessibility to key facilities by sustainable modes;
- Reducing the amount of car use – stabilising at 1996 levels by 2005 for the whole of the city, with a 10% reduction by 2010; reducing city centre traffic by 10% by 2005 compared to 1996 levels, and 30% by 2010;
- Encouraging walking, cycling and public transport journeys – increasing modal shift to sustainable modes for several categories of trips.
- Draft LTS targets for public transport modal split by Edinburgh residents for all trips are 23% by 2010, and 39% for all work trips. This compares with an actual modal split of 18.3% for all trips in 1999 and 34% for work trips by Edinburgh residents in 1991;
- For cycling, LTS targets for all trips by 2010 is 6%, with 10% for work trips (compares to 1.5% for all trips in 1999);
- For walking, targets for all trips by 2010 are 26%, and 18% for work, 32% for shopping (compares to 23.4% for all trips in 1999);

- Reducing adverse impacts – reducing air pollution;
- Reducing adverse impacts – reducing noise pollution;
- Transport and social inclusion – access to opportunity will be the one measurable aspect.

The redevelopment in the Granton and Leith Waterfront areas will be affected by wider Council policies, such as the LTS targets for use of public transport. The relevant targets are those stated above. The targets for public transport should be viewed in the context of those contained within the City's LTS document, which indicated that the share of all trips made by public transport should increase from 34% to 39% by 2010.

If the targets for public transport are met, the development will generate substantial public transport demand. In order to meet the targets set, the Council has identified as necessary an attractive and effective public transport choice for those both living in the Granton and Leith areas and those travelling to and from them. To meet the City's objectives, any public transport link would have to be combined with adequate controls over parking supply, and other initiatives to influence travel behaviour, such as the adoption of Green Commuter Plans/Travel Plans by significant employers in the area. A rapid transit scheme could clearly contribute to the above targets in a number of ways:

- Providing public transport links to a major site of new development and redevelopment, reducing the need for the car and promoting modal shift to more sustainable modes;
- It would be an environmentally friendly form of transport, contributing towards the reduction of air pollution;
- One of the most attractive features of light rail (in particular) is its comparatively low noise levels, which has contributed to its acceptability in close proximity to significant pedestrian activity in city centre areas in European cities;
- Improving wider access to employment opportunities for the communities on the transit route, providing public transport links to the growth areas in the west of the city, to the city centre, and to the rest of the city through interchange and links to the wider public transport network;
- Improving access to facilities as well as employment will contribute towards the reduction of social exclusion.

3.4 Client Body

3.4.1 The Waterfront Masterplan



The Waterfront development shown above comprises a £1 billion development scheme involving the regeneration of 140 hectares of brownfield site within the North Edinburgh area to convert it from what is predominantly polluted wasteland to a total redeveloped area of up to 340,000m² of business space and up to 27,000 m² of general industrial units. It is expected the net additional jobs created by this proposed development are estimated at 9,000 with up to 15,000 jobs in total being located on the site. Total dwelling numbers are not expected to exceed 6,500. Brief details of the proposed developments within the development area for both Waterfront Edinburgh and Lattice Property are highlighted below.

Waterfront Edinburgh has applied for outline planning consent for a mixed use development over a substantial area in the centre of the site, known as the 'Central Development Area'. This application comprises the following elements:

- **Residential** - including provision for approximately 1000 units, of which some 900 will be located on the site fronting the sea to be known as "The Strand";
- **Business space** – uses will include offices which will be housed on 300,000m², with an additional 30,000m² set aside for general industrial users. This area is also likely to include the Edinburgh World Trade Centre, for which a license has been secured;
- **Leisure/cultural/visitor attractions** - including a major physical expansion and change of role for the existing research centre and collections store for National Museum of Scotland which will extend to 23,500m². NMS will surrender by NMS of some land to the west of its site, in return for the transfer of Waterfront Edinburgh land to the east and north of the site;

- **Educational** – it is proposed that Edinburgh’s Telford College will relocate to between ten and twelve acres of the site, in a scheme requiring between 30,000 – 40,000 m² of space.

Planning consent is expected towards the end of 2001, with work commencing on the infrastructure required in early 2002.

Lattice Property received outline planning consent in February 2001 for a mixed use development on the former Granton Gasworks site subject to reserved matters. This mixed use development will comprise of the following elements:

- **Retail** including a local centre with a variety of commercial and community uses with commercial floor space of up to 8,900m² gross floor area, comprising a mixture of food and non food retail financial/ professional services and restaurant / food and drink uses. An anchor foodstore would use up to 6000m² gross floor area;
- **Residential** with provision of up to 2000 dwellings;
- **Business** uses to include offices, research and development and possibly light industrial uses of up to 75,000 m²;
- **Leisure/Assembly/Hotel** unspecified scale at this stage;
- **Educational** – various uses including a site for a primary;
- **Open Space** of up to 8 hectares in area.

In addition to the development plans for the Waterfront area highlighted above **Forth Ports** have also submitted an outline planning permission application for a mixed use development covering both Granton Harbour and the Western Harbour at Leith Docks.

Details of the Granton Harbour development include;

- **Retail/Public Buildings/Leisure** covering 23,000m², which is expected to include a 120 bedroom hotel;
- **Residential** with the provision of 3,113 units which will incorporate 48 serviced apartments;
- **Business** uses to include 26,800m² of office space
- **Marina Berthing** for 381 spaces in the West Harbour, 49 spaces in the Inner harbour and 200 spaces in the East Harbour.

Ocean Terminal and the surrounding areas are currently being developed and include plans for the following;

- **Retail/Public Buildings/Leisure** covering 21,366 m² which is expected to include a 7000m² department store and a 5000m² cinema and 57 smaller retail units;
- **Residential** development will take place at the Western Harbour area with upto 3000 houses planned in the mixed development;

- **Business** there are expected to be three large “stor” areas, one of which will be a foodstore totalling 3,617m² in terms of gross floor area. Additional Class 2 use has been estimated at 652m²;
- **Leisure** use which will include the Britannia Complex will total 3,081m². A cinema is also planned covering 2,500m². Approximately 5,535m² has been set aside for Class 3 use.

There is also expected to be further development on Edinburgh’s Telford College sites at Crewe Toll. It is clear that the demand by students will be transferred from Crewe Toll to the Waterfront area, however any new development on the Telford sites will be net additional demand. The College sites extend to approximately 25 acres and are likely to be predominantly used for residential purposes. Crewe Toll is also likely to see additional demand from expansion of the Deutsche Bank facility and BAE Systems.

It is a concern of WEL and the Steering Group that, in order to achieve the scale of development envisaged above and to meet the overall objectives of the scheme significant improvements will be required to the public transport system linking the development area to the City Centre, other parts of the City and its environs. As has been noted the Edinburgh LTS includes an expectation that major new developments in the City will be well served by public transport. Currently the public transport provision is bus based and suffers from congestion at many pinch points into the City Centre. Car access is similarly constrained. Likely planning restrictions on the number of parking spaces means that there will be a limit as to what can be provided for motorists in the development and effective alternatives need to be provided to meet the anticipated demand.

Accordingly, the Steering Group wish to deliver a transportation scheme fit for the 21st Century which will provide the Waterfront development with an effective and attractive scheme to link the area to the City Centre. The preferred option should offer good interchange facilities with other principal transport modes to facilitate integrated public transport access to the area.

The City Centre is one of the Nation’s most important transport interchanges with heavy rail and bus services to the major population centres in the North, South and West. Additionally, intra-city links to Leith, the South-East wedge, the new Royal Infirmary site and Edinburgh Park all meet there. This area has historically attracted Edinburgh residents and visitors through its array of commercial and cultural attractions.

The public transport links between the Waterfront area and the City Centre will therefore play an integral part in the achievement of the development plan, whilst being aligned to CEC’s local transport strategy of increasing rates of public transport usage.

The Llewelyn-Davies Masterplan for the area envisages a strategic city link which joins the centre of the development area and the City Centre. The Masterplan envisages that the link would follow the alignment of disused railway track (currently a cycle path) and the Southern Access Road.

The Masterplan identified the strategic city centre link being supplemented by bus routes operating from an East-West core spine with the aim of ensuring that most households are within a 200m walk of a bus stop, which will be positioned at 400m intervals along routes. Bus priority measures will be introduced and commercial and professional

development will be clustered around bus stops. The interchanges between the bus system and strategic city centre link will be efficient and easy to allow full access to the largest possible proportion of the population.

3.4.2 **The Steering Group's Aims**

In developing this study the consultants were asked to consider certain key areas.

- sustainability;
- social inclusion;
- economic development.

Sustainability

The Steering Group identified that in order to be sustainable, the deliverable service will be required to meet the following sustainable development principles:

- Encourage energy efficiency;
- Minimise pollution;
- Reduce consumption of non-renewable resources and encourage and develop the use of renewable resources;
- Conserve and enhance bio-diversity;
- Restore, conserve and enhance local environmental quality and contribute to better environmental equity.

It is the Steering Group's view that the strain placed upon the Green Belt will be reduced through more efficient use of brownfield sites within the Waterfront area. On a strategic level, the scale and mix of the development will be balanced in order to minimise the need to travel and balance inward and outward circulation flows and also exploit the need for a strategic public transport link from the Waterfront to the city centre.

As the level of public transport utilisation increases, traffic calming measures will be introduced on West Granton Road to reduce the incentive for travelling by car and encourage pedestrian travel e.g. narrowing roads and widening pavements.

To achieve the optimum solution the proposed link will require to be capable of connection to a wider integrated transportation network for Edinburgh and its environs. This would include interchanges at Haymarket, St Andrew's Square and possibly Waverley with the heavy rail and bus networks. A linkage at Haymarket will offer access to Aberdeen, Glasgow, the Gyle and Edinburgh Park, as well as connections to the Airport. If the South Suburban line were to be re-opened to passenger traffic either through a heavy or light rail solution the access to the South of the city would be enhanced. Haymarket also offers access to the East through Crossrail. St Andrew's Square offers the opportunity for linkages with the national bus network and Waverley to the East Coast main line and local services. The solution should remain flexible enough to allow for future extensions to the route and the system.

The access to the area needs to be efficient, equitable and flexible, responding directly to the proposed patterns of development and activity.

The transport infrastructure should offer the widest possible choice of routes and transport modes for all those living, working or visiting the Waterfront and the surrounding areas.

The public transport infrastructure proposed in the Masterplan creates multiple entry and exit routes from the South, East and West, and a permeable urban layout within the development area which will link communities and assist in achieving the *Moving Forward* targets for public transport utilisation. The routes put into place must be flexible to allow operators to contemplate new routes in the medium to long term or amended routes in the short term in order to match the development of the area.

Social inclusion

Social inclusion is a key driver for the development proposals and local government transport strategy as a whole and a number of the issues affecting the area and its surroundings are set out in Section 4.2. The Masterplan aims to provide the greatest possible mix of employment, housing and social services for the Muirhouse, Drylaw, Royston, Granton, Wardie and Trinity areas which will be accessible to both local residents and visitors to the area by the broadest mix of transport modes possible. This should also have a beneficial knock-on effect to the area to the South of the Waterfront. The social and economic benefits that this scheme will bring is highlighted throughout this document and is borne out by the results of the consultations with local community groups including the Greater Pilton Community Alliance.

Economic development

Key to the development plans are two local centres which will lie within an 800 metre walking catchment area of the majority of the area's residents, with one positioned on Granton Square and the other at the site of the old British Gas gasworks. Two new health centres and primary schools are required in addition to a community treatment centre (to reduce the number of visits to the new Royal Infirmary) and a new further education institute.

A public transportation system would improve the current business plans of both the companies currently located in the Waterfront area and the new companies, which will look to, locate there in the future. The system would give residents in the area easier access to the city centre, and in the future to the wider city job market.

Reports examining the development plans indicate that around 9,000 net new additional jobs will be created making an approximate total of 15,000 jobs being sustained in the Waterfront area. Centrica currently employs 1,100 in the area, and have stated that they will be supporting the development plan by ensuring that these jobs stay within the Waterfront area.

The implementation of a rapid transit network would create temporary construction jobs in addition to permanent jobs necessary for the operation and maintenance of the system.

Without a sustainable transport system, it is a concern that the development as detailed in the Masterplan would not be possible as the land values, which are critical to the cost / benefit analysis of cleaning up the site, would not be attained. This in turn may reduce

economic growth and fail to generate or even retain the current jobs in the area, thereby having a significant social cost.

Employers currently located in the area are seeking to expand their activities and are constrained in their ability to do so by the lack of an effective link to the rest of the city and its environs. Without taking into account the future plans for the Waterfront development, current expansion plans may not be achievable without the development of the transport system in the area. There are similar issues for the development of greater tourist activity in the area. The potential of the foreshore is currently not being maximised and a link would facilitate this.

SUMMARY

The hierarchy of policies and programmes, which are generally supportive of the promotion of the new transport modes include;

- **The July 1998 White Paper “Travel Choices for Scotland”;**
- **Policy and principles adopted by SESTRAN which include the reduction of car dependence and the maximisation of public transport;**
- **The adopted Local Transport Strategy which has six objectives. A range of solutions to these objectives were examined by CEC and this demonstrated that a rapid transit option including light rail would be most effective at meeting its transportation objectives**
- **The Masterplan for the Waterfront site, which is predicated on the provision of a high quality public transport system has been approved by CEC.**

4 Problems in North Edinburgh

4.1 Overview

In this Chapter, problems that a public transportation link is designed to contribute to overcoming are described. A significant body of research is available into the transport, economic and social problems in North Edinburgh. This Chapter draws from the available research, as well as the findings of the consultation exercise undertaken as part of this study. Documents consulted include:

- Review of the Economic & Social Profile of the NEAR Area, Final Report. (Halcrow Fox, 1999);
- North Edinburgh Public Transport Strategy, Final Report. (Oscar Faber, 2000);
- North Edinburgh Public Transport Strategy: A Review, Final Report. (Colin Buchanan & Partners, 2000).

4.2 Economic & Population Characteristics

The areas covered by the Waterfront development, the surrounding neighbourhoods and North Edinburgh as a whole have a history of social deprivation and exclusion. The North Edinburgh area has been the subject of a policy initiative, which seeks to address social deprivation issues. As such, there is a rich stream of data that illustrates the area's social deprivation compared with the rest of the City and Edinburgh. However, whilst the available research is quoted extensively below, it is important to note that social needs are not limited to the neighbourhoods covered by the data. Social deprivation spreads across much of the north of the City, including Leith, where notwithstanding recent regeneration social issues remain. The situation in the North Edinburgh Area Renewal ("NEAR") area should be seen as typical of the many parts of the north of the city.

The redevelopment of the Waterfront area is intended to contribute to the regeneration of Granton and the surrounding areas. Granton, and its neighbouring areas of West Pilton, Muirhouse, Drylaw and Royston/Wardieburn suffer from significant levels of social deprivation. A recent study by Halcrow produced an updated Economic and Social Profile of the NEAR area, covering these five areas.

The study highlighted some general social and economic characteristics of the NEAR area:

- North Edinburgh has larger household sizes than the city and national averages. There are also high proportions of large households with children, and elderly households in the area.
- The area had a younger population than Edinburgh as whole.
- 53% of respondents in the NEAR area rented housing from the local authority. Owner-occupied levels were low, at 28% of households in the area. The Halcrow report noted the difficulties in developing a private housing market in the area, with market

values of properties low. The proportion of respondents with housing from the Housing Association and Co-operative Sector is double the proportion in Edinburgh as a whole (at 11%, compared to 5% in Edinburgh). This reflects the growing significance of this sector in housing in the area.

- Access to a car varied amongst the areas surveyed. Overall, 66% did not have access to a car. This compares to 46% of Edinburgh residents with no access to a car, and 35% in Scotland overall. Therefore, the North Edinburgh area has significant proportions of people with no access to private vehicular transport.
- Across Scotland, 12% of households do not have a bank or Building Society account. In the NEAR area, this proportion was 23%, suggesting a high level of exclusion with regard to financial services.
- Overall 22% had a net income of less than £300 per month, with females faring worse than males – 29% of women in lowest income bracket, compared to 13% of men.
- The levels of qualifications in North Edinburgh were poor compared to the national average. Those with no qualifications were double the national average. In the NEAR area, 46% left school with no qualifications. Overall, only 22% had undertaken post school education.

In relation to employment, the following figures show the nature of employment patterns and modes of travel in the area:

- In the NEAR area 42% of adults in surveyed households were employed full-time, 12% part-time, with 22% unemployed and 13% retired. Unemployment figures for Edinburgh for 1997 suggested 4.5% unemployed in the city overall.
- The proportion of respondents employed part-time is lower than the Edinburgh average. Overall, differences between genders reflect wider trends, with 51% of males in full-time employment, compared to only 26% of females. More females are unemployed than males. However, females working part-time is much more significant at 16% compared to 2% of male respondents.
- Compared to Edinburgh as a whole, the NEAR area has a low proportion of adults working in managerial, administrator and professional sectors. The majority of respondents were employed in the service and skilled trade sectors, with some variations across neighbourhoods.
- There are significant levels of long-term unemployment: 80% of the unemployed respondents had been so for longer than a year, higher than the official statistics of 24% (explained by unregistered unemployed in this survey) and 48% had been unemployed for longer than 5 years. Long-term unemployment was particularly prevalent in older age groups, especially between 45-54 years old.
- Overall in the NEAR area, most respondents worked in the City Centre (29%), followed closely by the NEAR area (28%).
- When asked about mode of travel to work, overall the largest single proportion (36%) travelled by bus. This is a significant proportion, estimated to be three times the Scottish average. This was followed by 31% travelling by their own car, with 14%

walking. Muirhouse respondents revealed themselves to be most dependent on the bus for work. Travelling to work by bus was the second most popular response for West Granton respondents, at 26%, although this was below the average overall figure, with the largest proportion travelling by their own car, at 38%. Interestingly, out of all the areas covered, West Granton showed the largest proportion of people cycling to work, at 11%, compared to an overall average of 4%. Slightly more West Granton respondents walked to work than the overall average, at 15% compared to 14% in total.

- When asked about barriers to their ideal job, 21% stated access, the second highest obstacle after lack of experience. The cost of travel was a very low factor (only 1% overall).
- As a consequence of the research into modes of travel to work, the study concluded that employment patterns were shown to reflect public transport links. It also suggested that work patterns will continue to be affected by accessibility by bus and foot. The main growth areas were viewed to be service sector employment, in the City Centre and at The Gyle and Edinburgh Park. The report stressed that better public transport links to the latter two locations in particular were required to enable access to opportunities, with relatively good public transport access currently to the City Centre.

A study carried out by Oscar Faber examining public transport option in North Edinburgh, reinforced Halcrow's findings. It stressed these communities' reliance on public transport and the inadequacy of current connections to areas of employment in Leith and the west of the city.

The recent studies that have examined the socio-economic characteristics have identified that the North Edinburgh area – defined as Muirhouse, West Pilton, West Granton, Royston/Wardieburn and Drylaw – is characterised by social deprivation and economic need. While there is an acceptance that improved transport provision will not address all of the needs of the area, there is also a recognition that in concert with other initiatives promoting housing, employment and urban regeneration, it can make a contribution to improving the well being of the north of the city. It is also important to note that while the available studies have concentrated on a sub-area of North Edinburgh, the socio-economic deprivation is not limited to the area covered by the NEAR study. Needs spread further afield, including into Leith where, notwithstanding the regeneration that has occurred there, areas of social deprivation remain.

4.3 Current Transport Links

4.3.1 Public Transport

A recent report carried out by Oscar Faber (2000) into a public transport strategy for North Edinburgh reviewed existing services and recommended a strategy, with particular reference to the two main developments in the area, Leith and Granton Waterfronts.

Current bus services are mostly operated by Lothian Buses, with some run by First Edinburgh in the Leith Area. Existing services run predominantly from the north, through the City Centre to the south. There is a strong grid pattern to the existing routes. Routes go to the City Centre along three main corridors – Crewe Road South, Inverleith Road,

Great Junction Street/Leith Walk. There was found to be limited services on Sundays. Low-floor access was found to be limited on the Lothian Buses services.

Key interchange opportunities are in the City Centre, along Princes Street and at St. Andrew's Square. Informal interchange also occurs between the two circular routes and radial routes into the centre, at their points of intersection.

The report highlighted amongst the findings that there were significant gaps in delivering the current public transport services in the area. As many services cross the City Centre, there are problems of congestion affecting routes and regularity, as well as the network constraints in the City Centre which affect services.

It was reported that concerns over the capacity of the current road network were expressed by Lothian Buses, who indicated that there were particular pinch points in the central area through which services ran to and from the North of Edinburgh. It was argued that these points impair their ability to deliver effective service provision to the area in question. These areas are:

- Lothian Road/Princes Street/Charlotte Square;
- Picardy Place and London Road/Leith Walk roundabouts;
- George IV Bridge/The Mound/Lawnmarket.

Other areas along the routes were identified as causing problems for the running of services, mainly by lack of capacity and on-street parking. However, planned traffic management in the City Centre should contribute to improving reliability, as could the development of Quality Bus partnerships and Corridors throughout the city, adding to the existing Greenways strategy.

In the same study, representatives of the Public Transport section of the City of Edinburgh Council commented on the lack of integration of bus services in the area, with ad-hoc provision being made by operators for new developers and expressed the general view that the North of Edinburgh is the only part of the city to suffer from a lack of high quality service. The comment was also made that the current road network in North Edinburgh hindered the development of a high quality bus service.

The study mapped accessibility to destinations by direct services for Granton, Muirhouse, Newhaven and Leith. The mapping exercise clearly showed the lack of direct services to destinations in the West of the city, notably the Gyle, Edinburgh Park, Sighthill and Hermiston Gait, as well as the Airport. This limited accessibility to the west is a recurring theme in several studies carried out on transport in the North Edinburgh area, and has implications for access to employment and social inclusion as discussed above. This could be significantly improved through an interchange at Haymarket.

The report on the North Edinburgh public transport strategy recommended new and improved bus services to and from North Edinburgh, as well as within the North Edinburgh area, in the short to medium term. A segregated guided bus system in the long-term was recommended between Granton and the City Centre along the "Roseburn Link", utilising the Southern Access Road and the disused railway line via Haymarket. A quality bus service was recommended from Newhaven and Leith to the City Centre.

Light Rail was not considered cost-effective from Granton to Haymarket. However, the report did not rule this out for possible implementation in the future.

In a review of the North Edinburgh Public Transport Strategy, Colin Buchanan and Partners suggested that new direct public transport services from Granton to the Gyle, Edinburgh Park and the airport should be considered, as the strategy produced by Oscar Faber appeared to focus mainly on improved links to and from the City Centre, and on east-west corridors. The same review emphasised certain issues in connection with the North Edinburgh Public Transport Strategy, such as the need to meet an incremental build-up of demand for public transport as a result of the development in North Edinburgh, by phasing additional capacity. The review agreed that a segregated public transport corridor would be required in the long-term.

Regarding the consideration of the light rail option between Granton and Haymarket via Roseburn in the North Edinburgh Public Transport Strategy, the review highlights specific issues it believes require further consideration. These include the potential for single track sections at bridge crossings, which was deemed unacceptable in the Oscar Faber strategy. Practical issues involved in running light rail to Haymarket station are highlighted, as are issues surrounding the integration of light rail into the public transport network as a whole.

The review recommended more work in certain areas, such as investigating the optimum route and service frequency for a link between Granton and Edinburgh Park, and assessment of the impact of a segregated public transport corridor on existing bus routes.

4.3.2 Roads

As well as the problems that have been identified with North Edinburgh's public transport network there are also a number of existing and anticipated problems with its road network. Between Leith Walk and Queensferry Road, the crossings of the Water of Leith act as pinch points to north-south traffic. In addition, north-south traffic has to cross or use in part a number of heavily trafficked east-west routes, including Ferry Road. Principal routes in North Edinburgh – Leith Walk, Ferry Road and Queensferry Road all experience significant peak hour congestion.

Traffic in North Edinburgh is characterised by conflicting north-south and east-west movements and traffic routing is strongly influenced by a number of pinch points in the network. The area experiences significant rat running, with there being many alternative routes along roads often unsuitable for heavy volumes of traffic.

As part of the North Edinburgh Public Transport Study, Oscar Faber identified a number of junctions where they forecast capacity would be exceeded by 2011. Their assumptions considered the impact of high economic growth and some public transport network development, but did not consider any shift away from road that a North Edinburgh Rapid Transit solution could bring. Their analysis included an assessment of the contribution of the new Southern Access Road.

The following junctions were identified by Oscar Faber as being over capacity in 2011:

- Ferry Road/East Fettes Avenue
- Ferry Road/Granton Road

- Ferry Road/North Junction Street
- Bonnington Road/Great Junction Street
- Leith Walk/Pilrig Street
- Crewe Toll
- Ferry Road/Craighall Road
- Queensferry Road/Quality Street
- Ferry Road/Inverleith Row
- Trinity Road/Trinity Crescent
- Lindsay Road/Commercial Street
- Great Junction Street/Leith Walk
- Granton Square

In addition, other junctions would be close to their operational capacity.

4.4 Current and Future need

There are currently 2,070 bus journeys between the Waterfront area and the City Centre during morning peak time. Oscar Faber estimate that 9 additional buses per hour will be required between the City Centre and Newhaven harbour at morning peak time before 2003, but Colin Buchanan and Partners estimate that 11 are required due to allowance for layover time at each route end and allowing 30 minutes for each trip.

Additional Peak Hour capacity required between Newhaven Harbour and City Centre	2000-2002		2003-2015	
	OF	CB&P	OF	CB&P
Supply	2,500	2,500	3,000	3,000
Demand	2,100	2,100	2,800	2,800
Additional vehicles required per hour	9	11	9	11

Due to the phasing of development, the predicted increase in demand between Granton and the City Centre is staggered into 3 phases. The Oscar Faber report suggests that a segregated corridor would be the best solution on this route. However, the Colin Buchanan and Partners report suggests that the construction lead time would not make this available until 2003 and demand would not increase sufficiently until 2007 due to the phasing of development work, the best solution would be to transfer demand from road-based transport to the new transport system.

Additional Peak Hour capacity required between Granton and City Centre	2000-2002		2003-2006		2007-2010		2011-2015	
	OF	CB&P	OF	CB&P	OF	CB&P	OF	CB&P
Supply	1,100	1,500	3,000	2,000	3,000	2,500	3,000	4,500
Demand	n/a	1,200	3,000	1,800	3,000	2,600	3,000	3,800
Additional vehicles required per hour		11		11		17		17

The Oscar Faber North Edinburgh Public Transport Study (“NEPTS”) final report prepared the following estimate showing how the anticipated market share for public transport will be increased through the use of a light rail network as opposed to bus use on the routes to and from Granton. The forecast demand for peak morning travel trips is 8,000.

	Quality Bus	Guided Bus	Light Rail
Trips to City Centre			
Car Trips	1,580	1,430	1,320
Public Transport	1,170	1,320	1,430
Public Transport share	43%	48%	52%
All Trips			
Car Trips	4,730	4,580	4,460
Public Transport	3,210	3,360	3,480
Public Transport share	40%	42%	44%

The predictions within both the Oscar Faber reports and the Colin Buchanan review would suggest that there would be around 45 vehicles running the same route every hour, which demonstrates the need for infrastructure improvements in order to cope with the increased demand.

Lattice predictions are that the number of people living outside ‘walking thresholds’ of work, shopping, educational centres and public transport stops (400m-1,600m) will increase by 2015, thus showing the need to carefully plan the position of new amenities and public transport stops.

The Lattice car trip generation figures fall midway between those predicted by the Colin Buchanan and Oscar Faber reports, but does not predict the same rises as the other

reports do for bus usage. This is attributed to the greater number of internal journeys conducted within the Waterfront area:

Waterfront trip generations	Morning peak		Evening peak	
	Car	Bus	Car	Bus
Colin Buchanan	2,680	2,850	2,740	2,290
Lattice Property	3,418	1,962	3,348	1,559
Oscar Faber	4,748	5,016	4,095	4,355

In Edinburgh, the rate of change of public transport usage from 1989 to 1999 showed a decrease of 2.8%, which was the greatest decrease registered by the European Local Transport Information Service (“ELTIS”). This is partially explained by the high cost of usage in Edinburgh which was 43 Euros per month in 1999, which compares to 34 Euros in Strathclyde and 26 Euros in Genoa.

SUMMARY

- North Edinburgh has demonstrable social deprivation and in economic terms, performs below average when compared with the rest of the City.
- Unemployment is higher than the City average while skills and qualifications are below average.
- There is a high dependency on public transport, yet poor accessibility is highlighted as one of the key obstacles to residents gaining employment opportunities.
- Studies of North Edinburgh have highlighted the apparent incoherence and the degree to which congestion affects journey times, punctuality and regularity of the public transport network.
- Transport linkages to other parts of the city and its environs are poor.
- North Edinburgh’s road network already experiences peak hour congestion and has a significant rat-running problem.
- Without a step-change shift to public transport, general economic and local regeneration is forecast to place increasing pressure on the road network.
- The Waterfront Masterplan is predicated on the provision of high quality public transport.
- Studies that have preceded this one have already highlighted that additional capacity will be required to that available at present and, moreover, as well as additional capacity the development related public transport element will only occur if there is a step-change in the quality of public transport.

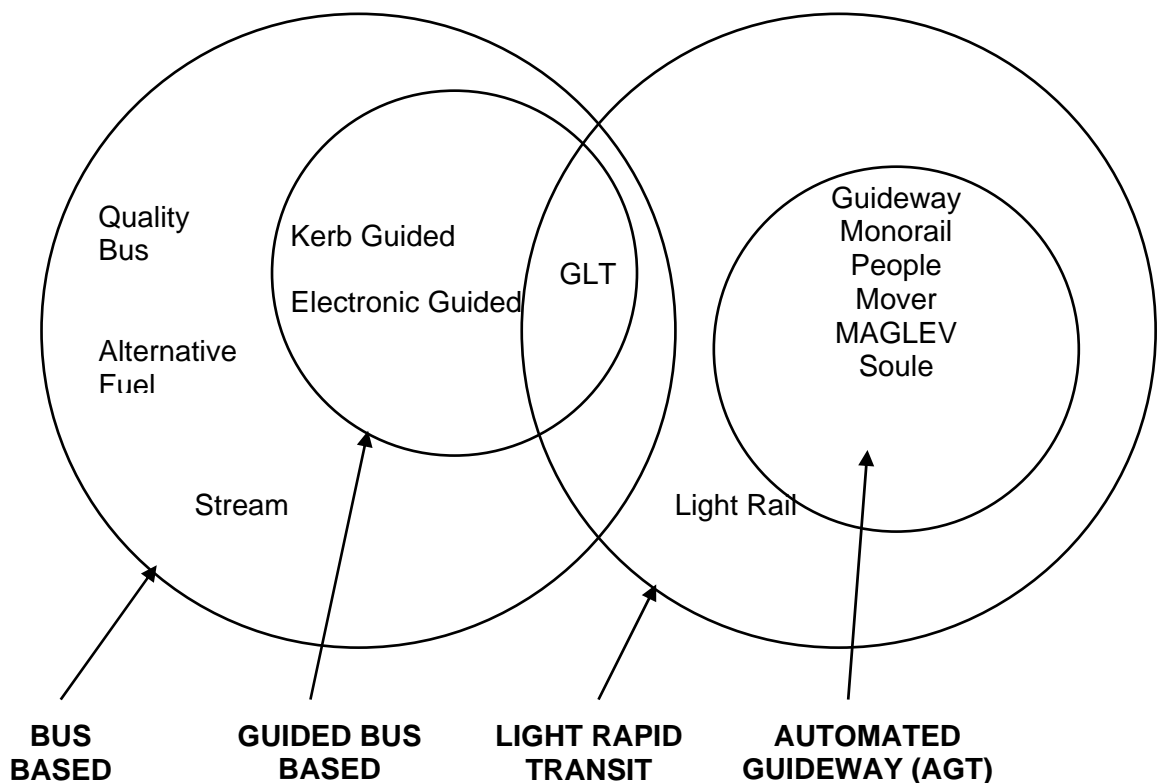
5 Option Generation & Sifting

5.1 Suitability of technology/technology review

As part of the option generation and sifting process it was necessary to undertake a review of the available Rapid Transit System (“RTS”) technologies. The technologies that exist are diverse and range from conventional and quality buses, through guided bus, to light rapid transit solutions to name the more standard technologies employed.

This review resulted in the preparation of the ‘Route Technology Options Appraisal’ report, which is included in full as Appendix 4 to this report. The report discusses the available technologies, and relates them to the key issues and objectives for the provision of a ‘high quality public transport solution’ in Edinburgh. The report first gives an overview of potential technologies, which is followed by initial and detailed assessments to reduce the number of appropriate technologies before the conclusions of the study are presented.

The figure below details the technologies considered and the relationship to each other, which highlights the overlap between the systems.



The option selection process for the scheme is focused on providing a robust transport solution, which fits within the broader local and national policy framework. Consequently the key issues considered in the assessment included, timing of solution, capacity, sustainability, flexibility, image, track record of performance and the ability to maximise opportunities.

The initial assessment provides a review of the Strengths, Weaknesses, Opportunities and Risks/Threats associated with each technology. As part of this appraisal the following questions were developed to assist the assessment process.

- Will the technology work within the available corridor?
- Does it achieve the overall quality desired of the system?
- Does the technology match with the scale and form of network proposed, including future development?
- Will the technology attract the anticipated patronage or have adequate capacity?

The qualitative results of this assessment were used to discount those technologies that were considered inappropriate for the rapid transit link. Following this assessment it was concluded that the following technologies are inappropriate.

- Traditional Bus;
- Monorail;
- Guideways;
- Magnetic Levitation (MAGLEV); and
- Peplemovers.

The principle reasons for the rejection of these technologies are summarised below.

Traditional Bus

Unlikely to meet the aims and objectives of the Steering Group, in particular a desire for a dedicated, high quality, fast, reliable and visually strong link between Granton and the city centre or Leith via the city centre. Existing capacity constraints on the road network also weight against this option. Benefits include flexibility, the ability to use existing maintenance depots and no requirement to interface with HMRI, while image, capacity and emissions are the main disbenefits.

Monorail

Network expansion beyond Granton or Haymarket would be limited because of the physical intrusion of such a system, particularly along the 'on street' routes from Haymarket to Princes Street and along Leith Walk. Generally, these systems do not fit well within an historic urban environment (i.e. Princes Street) as well as other fixed systems such as light rail.

The technology could potentially be used for a single line from Haymarket to Granton, but does not have the flexibility of other modes (bus based systems) to expand by operating within the surrounding highway network. It therefore does not meet with the Steering Groups aim of "a robust transport solution which fits within the broader local and national policy framework".

Despite having been around for a number of years, such systems have failed to prove acceptable within the United Kingdom.

Guideways

Similar reasons apply to guideways as was discussed for monorail. The restriction of vehicles to guideways limits the use of these systems in an urban street environment, particularly ones such as West Maitland Street and Shandwick Place where space is limited. A system could operate from Granton to Haymarket through the segregated disused railway corridor, but expansion of the network would be restricted. Guideways do not have the flexibility of 'guided bus' modes to operate beyond their guide system.

Magnetic Levitation (MAGLEV)

As with monorail and guideways, magnetic levitation systems are restricted to a fixed route and segregated corridor, and are not suitable for an urban street environment. The advanced technology is arguably beyond that required for an urban transit system where the high-speed benefits would not be fully utilised, particularly with stops 500m to 1000m apart. In addition, this technology is subject to high maintenance costs.

Peplemovers

These would not provide sufficient capacity for the size of the proposed network.

It was also recommended, at this time, not to consider alternative light rail technology such as the LR55 system proposed by the New Edinburgh Tram Company (NETCo) in 1996 as this is not currently a proven technology.

Of the various guidance systems being developed for guided bus networks, it was decided to concentrate on the tried and tested technology provided by kerb guidance, as it is essential that the technology can be delivered on time. Other systems such as electronic and central guidance have failed to perform in practice and could pose an unacceptable risk to the overall project. This position on alternative guidance systems should however be reviewed as the project develops.

The remaining technologies, quality bus, guided bus and light rail were then subject to the detailed assessment, taking into account the extent of the final network, based on three different route scenarios and the rate and sequence in which the network develops.

The findings of this assessment were presented to the Steering Group, before it was agreed with the Steering Group that both light rail and kerb guided bus technologies should be considered further. In addition, it was suggested that quality bus technology be considered as a possible interim measure to meet short-term transport demands, prior to the long-term solution being implemented. This element does not form any further part of this study.

5.2 Light Rail Transit/Guided Bus in LTS

Sections 3.2 and 3.3 outlined the local transport strategy 2001-2004 and also detailed the LTS targets which are relevant to the proposed redevelopment of the Waterfront and a public transportation link. These objectives and targets are at a high level, compatible with the LTS for the rapid transit and guided bus technologies.

5.3 Brainstorming Options

5.3.1 Routes

While taking cognisance of previous public transportation studies undertaken for the North Edinburgh area, it was decided to establish as broad a range of optional alignments as possible. This decision was vindicated at an early stage in the study, when the Scottish Executive made it clear, that the study should analyse the potential options and demonstrate the rationale behind the preferred option.

In response to this, a comprehensive brainstorming session was conducted by Mott MacDonald, which led to an extensive number of optional alignments being identified. A sifting process was initiated which reduced the options to 3 basic alignments. Details of the long list are included in Appendix 3. This study for the rapid transit link therefore, considers the following three scenarios for the scheme's development:

- Scenario 1 - Granton to Haymarket;
- Scenario 2 - Granton to St Andrew's Square via Haymarket; and
- Scenario 3 - The North Edinburgh Loop (Granton to Granton).

The majority of the optional route alignments identified, are alternatives to using the disused Granton to Haymarket railway corridor for Scenario 1. This is due to the fact that the continuation of the route from Haymarket, Scenarios 2 and 3, is largely based on the New Edinburgh Tram Company ("NETCo") proposals developed in 1996. Although the NETCo proposals were developed to a Parliamentary Submission, these proposals were never submitted to Parliament. As the route alignment on which the Parliamentary Submission had been based was agreed in principal with the City of Edinburgh Council, this route was adopted with few optional alignments considered.

These optional route alignments were presented to the Steering Group outlining the advantages and disadvantages of each alignment and are illustrated in Drg.No. 61664/EDN/0001 and listed in Chapter 3 of the 'Route Alignment Options Appraisal' report which is included in full as Appendix 3 to this report. For ease of reference, these tables have been replicated below.

Table 5.3.1: Long List of Optional Alignments (Scenario 1)

Option	Description	Dependents*
1	Lower Granton Road (at Eastern Breakwater) – West Harbour Road – WEL Development Roads – Southern Approach Road – Disused Granton to Haymarket Railway Solum – Railway Solum (adjacent to Balbirnie Place) – Public Transportation Reservation – Haymarket Terrace.	N/A
2	Disused Granton to Haymarket Railway Solum (at Roseburn) – Railway Solum (adjacent to Balbirnie Place) – Public Transportation Reservation – Haymarket Station	1
3	Disused Granton to Haymarket Railway Solum (at Roseburn) – Roseburn Terrace – West Coates – Haymarket Terrace	1
4	WEL Development Road – West Granton Road – Pennywell Road – Ferry Road – Disused Granton to Haymarket Railway Solum (at Crewe Toll)	1
5	WEL Development Road – Lattice Site – Marine Drive – Pennywell Road	1 & 4
6	WEL Development Road – West Granton Road – Crewe Road North – Crewe Road South – Orchard Brae – Dean Path – Bells Brae – Queensferry Street – Princes Street	1 & 17
7	Orchard Brae – Queensferry Road – Queensferry Street	1, 6 & 17
8	Crewe Road North – Ferry Road – East Fettes Avenue – Comely Bank Avenue – Dean Path Crescent – Queensferry Road	1, 6, 7 & 17
9	Southern Approach Road – Ferry Road – Crewe Road South	1, 6 & 17 **
10	Crewe Road North – Telford Road – Groathill Avenue – South Groathill Avenue – Disused Granton to Haymarket Railway Solum (at Craigleith)	1 & 6
11	Telford Road – Disused Granton to Haymarket Railway Solum (at Craigleith)	1, 6 & 10
12	Disused Granton to Haymarket Railway Solum (at Craigleith) – Queensferry Road – Queensferry Terrace – Belford Road – Queensferry Street	1, 6 & 17 **
13	Belford Road – Douglas Gardens – Palmerston Place – West Maitland Street	1, 12 & 17
14	Pennywell Road – Ferry Road – Groathill Road North – Telford Road – Groathill Road South – Disused Granton to Haymarket Railway Solum (at Craigleith)	1 & 4 **
15	Groathill Road North – Telford Road – Strachan Road – Ravelston Dykes Road – Murrayfield Road – Corstorphine Road – Roseburn Terrace	1, 4 & 14 **
16	Disused Granton to Haymarket Railway Solum (at Telford Road) or Telford Road – Telford Road	1 & 15/10 & 15

* Dependent alignments are generally only part of a particular alignment.

** Other optional route alignment combinations exist.

Table 5.3.2: Long List of Optional Alignments (Scenario 2)

Option	Description	Dependents*
17	Haymarket Terrace – West Maitland Street – Shandwick Place – Princes Street – St.Davids Street – St.Andrew’s Square – St.Andrew’s Street – Princes Street (to form turnback facility)	1 **
18	Shandwick Place – Hope Street – Glenfinlas Street – Charlotte Square – George Street – St.Davids Street – St.Andrew’s Square – St.Andrew’s Street – St.Andrew’s Square – St.Davids Street – George Street – Charlotte Square – Hope Street – Shandwick Place	1 & 17 **

* Dependent alignments are generally only part of a particular alignment.

** Other optional route alignment combinations exist.

Table 5.3.3: Long List of Optional Alignments (The Loop)

Option	Description	Dependents*
19	St.Andrew’s Square – St.Andrew’s Street – York Place – Picardy Place – Leith Walk – Constitution Street – Ocean Drive – Victoria Quay – Ocean Drive – Lindsay Road – Pier Place – Starbank Road – Trinity Crescent – Lower Granton Road (at Eastern Breakwater)	1 & 17 **
20	Ocean Drive – Albert Dock – Imperial Quay – Albert Dock Basin – Ocean Drive	1, 17 & 19 **
21	Constitution Street – Bernard Street – Commercial Street – Lindsay Road – Pier Place	1, 17 & 19 **
22	Leith Walk – Great Junction Street – North Junction Street – Lindsay Road	1,17,19 & 21**
23	Leith Walk – Operational Railway Solum to Broughton Waste Disposal Facility – Disused Waverley to Leith Docks Railway Solum – North Junction Street	1, 17, 19, 21 & 22 **
24	Leith Walk – Operational Railway Solum to Broughton Waste Disposal Facility – Disused Waverley to Granton Railway Solum – Lower Granton Road (at Eastern Breakwater)	1, 17 & 19 **

* Dependent alignments are generally only part of a particular alignment.

** Other optional route alignment combinations exist.

For further details of the route alignment options review, reference should be made to the ‘Route Alignment Options Appraisal’ report, which is contained in Appendix 3 to this report.

5.3.2 Modes – Light Rail Transit/ Guided Bus

The two remaining technologies, guided bus and light rail, were subject to a detailed assessment taking cognisance of the likely phasing of the three different route scenarios considered.

Scenario 1 (Granton – Haymarket)

If Scenario 1 were progressed as a standalone option, with no further extension to the network, then kerb guided bus technology would be considered appropriate. The kerb guided system could provide a quality system with the required capacity (depending on vehicle choice), and would cost significantly less than a light rail system for the same route. It is therefore considered unlikely that a light rail system would prove economically viable over this comparatively short length. The extent of the route that would be kerb guided would be dictated by detailed alignment design. For example, the short section in Haymarket Terrace would not be guided with the vehicle operating as a normal bus, most probably within the existing ‘Greenway’ system. It is however, recognised that the current difficulties facing the CERT scheme could present potential problems for another kerb guided bus scheme.

Also of significance is the ability to construct a depot facility that could serve Scenario 1. Whereas a bus based system could operate out of facilities away from the main corridor which may already exist, light rail systems require dedicated depot infrastructure in close proximity to the preferred route. The depot study report that identifies possible sites is summarised in Section 7.1.2 and is included in full as Appendix 5.

Purely on the basis of an assessment of this technology the most appropriate solution for a Scenario 1 route alignment on a standalone basis would be kerb guided bus. However, should Scenario 1 be the first step towards the wider network then the choice of technology would differ.

Scenario 2 (Granton – St Andrew’s Square)

Scenario 2 is similar to Scenario 1 but with the network extended to St Andrew’s Square. The extended corridor operates either on street with other traffic or segregated in dedicated lanes of the highway.

If the extended network is limited to Scenario 2, then the technology choice is likely to be similar to that for Scenario 1. This would mean the kerb guided bus technology used in the segregated corridor could transfer to operate as a quality bus, using the existing ‘Greenway’ priority lanes linking Haymarket and Princes Street. This would allow the network to be extended quickly and at minimum cost.

Alternatively, a light rail system could be considered for Scenario 2. However, the cost effectiveness of adopting light rail technology requires further consideration if it is to operate as a standalone line. The connection of Scenario 2 into the heart of Edinburgh should influence cost benefit in a positive manner towards light rail. Reference should be made to the following sections of this report which consider demand forecasting, patronage and revenue. The implementation of light rail along the route between Haymarket to St Andrew’s Square will require more modification of the existing highway and streetscape than other technologies. Consequently, the time to implement would be longer and require significant work in combining the system with any development proposal for the city centre such as the CEC “Managing traffic in Central Edinburgh” proposals. The main advantages and disadvantages of guided bus and LRT technologies are given in the table overleaf. The shaded areas in the table indicate the technology that is considered to provide the greatest benefits for that particular criterion.

Table 5.3.4: Matrix of Advantages & Disadvantages for Guided versus LRT

Criterion	Guided Bus	Light Rail Transit
Alignment	If segregated similar issues to LRT, otherwise easier to design	Dedicated alignment design required whether segregated or not
Public Utility Impacts	If segregated similar issues to LRT, otherwise no relocation required	All longitudinal services beneath swept path must be relocated
Traffic Impacts	Will need to contend with existing bus services on street	Greater priority afforded thus reducing impacts if properly policed
Modal Interchange	No major benefit over existing bus services	Benefit of incorporating new mode of transport at interchange
Journey Time	Guided bus will not receive any greater priority than normal buses if unsegregated	Greater priority afforded to LRT on unsegregated sections thus reducing journey times
Patronage	Not perceived as significantly different from a conventional bus thus reduced patronage	Reduced journey times, improved reliability and comfort will result in increased patronage
Carrying Capacity	Would require approx. 18 additional vehicles for the same peak capacity	Increased carrying capacity with peak capacity 2500 persons/hour
Vehicle Fleet	Requires 20no. articulated buses	Requires 10no. LRVs
Depot Site	No dedicated infrastructure required	Dedicated infrastructure required
Capital Cost	Reduced capital costs	Increased capital costs
Operating Cost	Comparable to LRT but increased life cycle replacement costs	Comparable to guided bus but fewer life cycle replacement costs
Revenue	Less revenue	More revenue
Construction Programme	Programme contracted due to works extent being significantly reduced	Programme lengthened due to works extent being significantly increased
Accessibility	More difficult access for disabled persons, push chairs etc.	Greater accessibility for all including disabled persons with level access
Comfort / Ride Quality	Inferior comfort levels due to irregularity of road surface	Superior comfort levels with LRVs fitted with resilient wheels and high spec. suspension on rails
Frequency / Reliability	More frequent but not as reliable due to reduced priority traffic impacts	Improved frequency / reliability mainly due to given priority
Image	Perceived by public as normal bus	Improved public image over buses
Safety	Reactionary operation therefore path not as easily perceived	Improved safety due to fixed path easily perceived (pedestrian/drivers)
Air Quality/Noise Impacts	Increased air quality and noise impacts due to the bus vehicles generally being diesel powered. These impacts can be reduced by adopting dual powered buses named 'duo-buses'	Reduced impacts as LRVs being electrically powered do not discharge noxious emissions and equipped with resilient wheels and skirting, as well as, using continuously welded rail, means that noise is minimised

Excepting cost and programme a number of significant advantages extracted from the above table exist in respect of LRT technology when compared to a bus based system. These advantages include:

- improved reliability in terms of capacity, frequency, speed and journey time;
- improved safety due to the LRVs operating on a fixed path easily perceived by pedestrian and other vehicles alike, particularly prevalent at key junctions;
- superior comfort levels with LRVs fitted with resilient wheels and high specification suspension operating on continuously-welded rails;
- greater accessibility for all including Disabled Persons with level access at conveniently situated stops;
- reduced environmental impacts as LRVs being electrically powered do not discharge any noxious emissions. In addition to being powered electrically, with the LRVs equipped with resilient wheels and skirting, as well as using continuously welded rail, noise impacts are minimised.

Although these additional benefits add weight to the LRT argument on the basis of the technology assessment, utilising the kerb guided bus technology from Scenario 1 and Scenario 2 and operating this as a quality bus using “Greenways” for the non-segregated sections would appear to be the logical choice. However, should light rail technology prove to be more economically robust following detailed transport and financial modelling and cost benefit analysis, then we would conclude on this issue at STAG stage 2. It should be noted that the ability to secure a maintenance depot site is fundamental to the success of light rail technology for any of the route scenarios. Therefore, reference should be made to Section 7.1.2, which includes a summary of the ‘Depot Scoping Study’ report that is included in full as Appendix 5 to this report.

In addition, on the assumption that Scenario 1 was to be the first stage of a developing network then the technology would need to be consistent throughout and suitable for the future network. On this basis, the requirement for a depot site for Scenario 1 still remains, as this would be the first line constructed irrespective of whether the entire network extends to Scenario 2 or the Loop. This facility would preferably also be of a sufficient size to accommodate future needs. However, additional sites could be developed at a later date to provide for the wider network.

Scenario 3 (The North Edinburgh Loop)

The Loop provides a circuitous route linking the City Centre with Leith, Newhaven and back to Granton. As such it creates a transport network for the city rather than a single link, and therefore can be developed as a mass transport corridor using technologies appropriate for such a system.

Rail based systems are generally considered the most appropriate to facilitate mass transit. With large sections of the network operating on street the only form of rail system appropriate for this is light rail (more commonly referred to as trams). Kerb guided bus systems would operate as a quality bus and as such would be perceived as a normal bus and would not receive any greater priority than existing services unless segregated. It is not possible to segregate the guided bus option, as it is not credible to effectively employ kerb guidance within existing streetscapes. This is due to problems associated with the

kerb guides obstructing other vehicles that require to cross the guided bus alignment. At each crossing the kerb guides would need to be discontinued making the segregation effectively unworkable over such short lengths.

Advanced guided bus technology could arguably provide a similar service to light rail over the Loop. However, to be efficient they would have to adopt the same route design principles as light rail, incorporating segregated running where possible. If this does not occur, then the average journey times will increase making the system less desirable. As with Scenarios 1 and 2, the use of advanced guided bus technology would be a high risk at present because they remain unproven in service, but this position should be reviewed as the project develops.

Therefore, we would recommend that the most appropriate solution for the Loop route alignment is light rail. However, developments in advanced guided bus technology should be monitored continually and consideration should be given to implementing a quality bus system as an interim measure to meet transport requirements as the preferred solution is developed.

In summary, the following conclusions were drawn following the detailed assessment.

- Quality bus technology should be considered as a possible interim measure to meet short-term transport demands, prior to the long-term solution being implemented;
- Adopt kerb guided bus for Scenario 1;
- For Scenario 2, extend kerb guided bus technology from Scenario 1, operating as a normal bus utilising Greenways;
- Alternatively for Scenario 2, adopt light rail technology if more economically robust when compared to the guided bus system; and
- Adopt light rail for the Loop but monitor developments in advanced guided bus technology.

For further details of the technology review, reference should be made to the 'Route Technology Options Appraisal' report, which is contained in Appendix 4 to this report.

5.4 Sifting

The sifting of options is reported in full in Chapter 4 of the "Route Alignment Options Appraisal" report, which is contained in Appendix 3 to this report.

Owing to the large number of optional alignments, it was decided to undertake an initial option appraisal to sift out the majority of these options. This initial appraisal was based on a qualitative assessment which allowed certain alignments to be discounted, allowing a more detailed appraisal to be carried out on the remaining options.

The options that were discounted at this stage include Options 3, 6 to 16, 18 and 20 to 24. The reasons for discounting these optional alignments, illustrated on Drg.No. 61664/EDN/0001, are discussed in Section 4.5 of Appendix 3 to this report. For ease of

reference, the salient points used to justify discounting the above alignments are summarised below.

Option 3

Operationally undesirable, significant traffic impacts, increased journey times and high capital costs.

Option 6

Lost Haymarket modal interchange opportunity, major traffic impacts at the Crewe Toll roundabout, limited ability to provide tram priority, increased journey times and high capital costs.

Option 7

Option 7 is entirely dependent on Option 6 and those concerns expressed in relation to Option 6.

Option 8

Horizontal and vertical alignments are geometrically infeasible.

Option 9

Option 9 is dependent on Options 6 and 8 and those concerns expressed in relation to Options 6 and 8.

Option 10

Unsure of the geometrical feasibility of Telford Road/Groathill Avenue junction, operationally undesirable and major traffic impacts at the Crewe Toll roundabout and Telford Road.

Option 11

Option 11 is dependent on Options 10 and 16 and those concerns expressed in relation to Options 10 and 16.

Option 12

Lost Haymarket modal interchange opportunity, difficult alignment geometry, increased journey time, poor patronage / revenue and higher operating costs.

Option 13

Option 13 is entirely dependent on Option 12 and those concerns expressed in relation to Option 12.

Option 14

Complex alignment geometry, significant traffic impacts, increased journey times, operationally undesirable, major impacts in terms of private property and public and possible land/property acquisition.

Option 15

Complex alignment geometry, significant traffic impacts, operationally undesirable, increased journey times and high capital and operating costs.

Option 16

Option 16 is entirely dependent on Option 15 and those concerns expressed in relation to Option 15.

Option 18

The “Managing traffic in Central Edinburgh” proposals developed by CEC assume all current bus services operating in George Street are relocated to either Princes Street or Queen Street. Therefore, to integrate an LRT system into George Street would be contradictory to those proposals.

Option 20

Vertical alignment concerns regarding long span crossing of the navigable channel leading into the Albert Dock Basin. In addition, increased route length, journey time and capital cost.

Option 21

Lost opportunity to penetrate the redeveloped Western Harbour area of the Leith Docks including the Ocean Terminal retail and leisure centre and the Britannia visitor attraction. Reduced opportunity for segregated alignment and therefore increased journey times.

Option 22

As Option 21.

Option 23

Lost opportunity to penetrate Leith and the redeveloped Western Harbour area of the Leith Docks including the Ocean Terminal retail and leisure centre and the Britannia visitor attraction. Consequential reduction in patronage.

Option 24

Lost opportunity to penetrate Leith, Newhaven and the redeveloped Western Harbour area of the Leith Docks including the Ocean Terminal retail and leisure centre and the Britannia visitor attraction. Consequential reduction in patronage.

5.5 Shortlist

Following the sifting of optional alignments, the remaining optional alignments included Options 1, 2, 4, 5, 17 and 19. Of these alignments, Options 1, 17 and 19 are critical to Scenarios 1, 2 and 3 respectively. Option 2 although feasible, was discounted as it only serves a standalone Scenario 1 alignment. In relation to Option 4, although technically feasible, it was decided not to consider this optional alignment further as the additional route length added significant increase in capital cost, journey times and operating costs. As Option 5 is critically dependent on Option 4, this optional alignment was also discounted.

In summary, this left a shortlist of Options 1, 17 and 19 (effectively comprising the Loop) which was subject to a more detailed assessment to confirm the decision to proceed with these three alignments as the preferred route. For details of the preferred route reference should be made to Section 7.1.1.

SUMMARY

The preferred technology choice depends on the findings of the transportation and financial modelling reported later in this submission. Solely based on technical grounds, the following technologies are proposed for the respective route scenarios:

- Scenario 1 - Adopt kerb guided bus (16 buses required);
- Scenario 2 - Extend kerb guided bus technology from Scenario 1, operating as a normal bus utilising Greenways (20 buses required);
- Scenario 2 - Alternatively, adopt light rail technology if more economically robust when compared to the guided bus system (10 LRVs required); and
- Scenario 3 - Adopt light rail for the Loop but monitor developments in advanced guided bus technology (16 LRVs required).

In addition, quality bus technology should be considered as a possible interim measure to meet short-term transport demands, prior to the long-term solution being implemented;

Depending on the chosen technology following transportation and financial modelling, it may be necessary to provide dedicated infrastructure for the storage and maintenance of vehicles. This is especially prevalent if LRT technology is adopted, as a depot facility is a fundamental requirement. Consequently, a depot scoping study was undertaken which concluded that, in the next stage of design development, any further investigations are concentrated on Sites 8, 18 and 19 as detailed below.

Site 8 - Fire Hazard Training Ground (Fire Board), off Ferry Road;

Site 18 - Lorry Park (CEC), Port of Leith; and

Site 19 - Forth Ports Storage Area (Forth Ports), Port of Leith.

For further details of the technology review, route option appraisal and depot scoping report reference should be made to the 'Route Technology Options Appraisal', 'Route Alignment Options Appraisal' and 'Depot Scoping Study' reports, which are respectively contained in Appendices 2, 3 and 5 to this report.

Following the option generation, sifting and detailed appraisal, it was considered that the route made up of optional alignments 1, 17 and 19 should be adopted as the preferred alignment for further development. These optional alignments allow each of the three route Scenarios to be implemented as shown below.

- Scenario 1 - Optional Alignment 1 (6.75 km);
- Scenario 2 - Optional Alignments 1 and 17 (9.05 km); and
- Scenario 3 - Optional Alignments 1, 17 and 19 (15.70 km).

6 Option Appraisal

6.1 Introduction

In this Chapter the appraisal of the preferred option for the North Edinburgh rapid transportation link is described and in the next Chapter a detailed description of the preferred option is provided. In subsequent Chapters further detail is given on the methodology and findings of the key work streams that have informed the development and selection of the preferred option from the three shortlisted scenarios described in the previous Chapter.

To recap, the three scenarios that were identified in Chapter 5 are:

- Scenario 1, a guided bus option linking the Waterfront site to Waverley via the Roseburn link;
- Scenario 2, an extension of Scenario 1 from Waverley to Haymarket utilising either guided bus or light rail technology;
- Scenario 3, (the preferred alignment) a loop extended from Scenario 2 to Leith and then Granton, utilising light rail technology. Although subject to modelling and highlevel financial assessment, the guided bus options for Scenario 3 was rejected on technical grounds.

The transport and financial analysis of Option 1 showed that a light rail option would not recover its on-going operating costs from revenue, thus supporting the engineering-based assessment that guided bus is the preferred technology for Scenario 1. The transport and financial analysis also showed that guided bus options for Scenarios 1 and 2, and the light rail option for Scenario 2, whilst recovering operating costs from revenue would not generate sufficient revenue to make them attractive to a private sector operator. In addition to the operating costs there would also be significant mid life refit for the light rail option and lifecycle replacement for the guided bus vehicles which would also increase the running costs of these options. This financial consideration removed the light rail option for Scenario 2 from consideration. The financial consideration, combined with the risk assessment of the implementability of guided bus options led to the rejection of the guided bus options for scenarios 1 and 2.

The preferred North Edinburgh Public Transport Link option is:

- A light rail system operating on a segregated alignment from Granton Square through the Waterfront development area and then (again segregated) along the alignment of the disused Roseburn railway line to Haymarket. It would then run on-street, but with priority over other traffic, from Haymarket to St Andrew's Square via Waverley and then onto Leith via Leith Walk. A segregated alignment would be provided through Leith Port and then a mixture of street-running and segregated alignment to Granton Square.

6.2 The Appraisal Process

The process of appraisal allows a fuller examination of impacts with three key outcomes:

- It will demonstrate whether a proposal is deliverable in all senses: technically and financially feasible and acceptable to key stakeholders;
- It will reveal to planners the extent to which a proposal fulfils the *planning objectives* set (being the objectives which will have driven the entire design process);
- It will show to external stakeholders (notably the Scottish Executive) the full set of likely impacts of the proposal against its five objectives of environment, safety, economy, integration and accessibility together with the distribution of these impacts across important groups.

The appraisal of North Edinburgh Rapid Transit is being conducted in accordance with the principles laid down in the forthcoming consultation draft of the *Scottish Transport Appraisal Guidance* or *STAG*. This guidance leads on directly from the policy objectives set out in the Scottish Transport White Paper *Travel Choices for Scotland* and develops further the planning and appraisal methodology first set out during the Strategic Trunk Roads Review. Most notably for the purposes of this report, STAG specifies a two-stage appraisal process:

- The first stage is intended as a scoping exercise, aimed largely at fulfilling the first two of the three appraisal outcomes listed above;
- The second stage is intended to include a more thorough examination of impacts, focussed on the five Scottish transport policy objectives.

The two-stage appraisal process is intended to minimise wasted effort by testing early on whether a proposal meets certain key criteria before detailed analysis of its impacts is commenced. The North Edinburgh Rapid Transit Scheme is at the stage where a Part 1 appraisal is appropriate given the needs:

- To demonstrate the scheme's validity in meeting the objectives of the promoter;
- To establish "in principle" support from the Scottish Executive, a key stakeholder.

The Part 1 appraisal concentrates on the following areas:

- The proposal's likely impact against the planning objectives;
- The rationale for the proposal, including an explanation of what alternatives were considered and why they were discarded;
- An initial check of the proposal's fit with relevant established transport, land-use planning and other relevant policy;
- An investigation of the proposal's feasibility, affordability and likely public acceptability.

In addition, an early view is taken on the impacts of the proposal against the five objectives set out in the Part 2 appraisal.

In the next Section, the Part 1 Appraisal Summary Table (“AST”) is presented. By definition the AST is a summary of the appraisal. The AST is therefore followed by supporting text summarising some key aspects of the appraisal. Subsequent chapters provide more detail on some key workstreams that have informed the development of the preferred option and the appraisal *per se*.



6.3 STAG PART 1 AST

Proposal details			
Proposal name	Waterfront Light Rail Loop	Promoter name	Waterfront Edinburgh Limited in association with 14 other organisations in both public and private sectors along the preferred route.
Proposal description	A light rail service creating high-speed reliable public transport links between the Granton regeneration area, central Edinburgh and central Leith and multiple intermediate points. See Appendix 2 for route.	Estimated costs <ul style="list-style-type: none"> • Capital (undiscounted) • Annual 	Estimated costs <ul style="list-style-type: none"> • £191 million • £5.43 million
Funding sought from (if applicable)	Not applicable	Amount of application (if applicable)	Not applicable

Proposal background	
<p>Planning objectives</p>	<p>This appraisal is based on the fact that the Masterplan for the Waterfront regeneration area has been approved by the City of Edinburgh. Hence, the planning context is the question of identifying the best transport structure to support the achievement of the Masterplan in keeping with the transport priorities for the City as a whole.</p> <p>Hence, the planning objectives which have informed the process leading to this appraisal are the six aims set out in the Local Transport Strategy for Edinburgh¹:</p> <ul style="list-style-type: none"> • to improve safety for all road and transport users; • to reduce the environmental impacts of travel; • to support the local economy; • to promote better health and fitness; • to enhance social inclusion; • to maximise the role of streets as the focal point of our local communities, where people can meet, shop, and, in appropriate circumstances, children can play. <p>Supported by the principal aim of the Waterfront Granton Masterplan²:</p> <ul style="list-style-type: none"> • To create a place which involves and benefits the existing communities of Granton and which attracts investment in a full range of employment uses, housing opportunities, leisure, cultural and community development. (<i>The Vision, Waterfront Masterplan, page 1</i>)
<p>Performance against planning objectives</p>	<p>A scheme very similar to this one (“North Edinburgh Light Rail”) was appraised as part of a study carried out for SESTRAN to develop a strategy for travel to and within Edinburgh³. The appraisal was carried out against a set of criteria extremely close in spirit and content to the LTS aims cited above. Of 80 schemes (across the Edinburgh area) considered, it performed fourth best. It was the strongest contender amongst those schemes which would facilitate accessibility for the Granton site as well as Leith and Newhaven. In effect, the technology favoured (light rapid transit) has a further strength given that the best performing measure from the 80 is also a light rapid transit scheme (Edinburgh Light Rapid Transit).</p> <p>Given the above and the fact that the pool against which the option was compared was so large, it is fair to say that the favoured scheme is a strong contender when considered against the planning objectives set out above.</p>

¹ City of Edinburgh Council Local Transport Strategy 2001-2004, p15

² Three volumes, published by City of Edinburgh Council, Scottish Enterprise Edinburgh and Lothian, Scottish Homes, December 2000 (Llewelyn-Davies et al)

³ Appraisal of Strategies for Travel to and within Edinburgh, WS Atkins, September 2000

<p>Alternatives to proposal considered</p>	<p>This study has considered alternative technologies and routes for a rapid transit in North Edinburgh. A review of available technologies indicated that either light rail or kerb guided bus were possible candidates: other technologies were discounted. A large number of route options were considered before three routes were identified as suitable for detailed consideration. These were:</p> <ul style="list-style-type: none"> • Scenario 1 – Granton to Haymarket via the Roseburn link • Scenario 2 – Granton to St Andrew’s Square, via Haymarket, Princes Street and Waverley • Scenario 3 – a loop linking Granton to St Andrew’s Square as per option 2 before continuing to Leith via Leith Walk and then along the waterfront to Granton Square. <p>In the earlier SESTRAN study, alternative means of facilitating good links to the Waterfront/Granton development considered were⁴:</p> <ul style="list-style-type: none"> • North Suburban Rail Link • North Edinburgh CERT • Upgrades to bus services (frequencies and start/finish times) and priorities (lanes, selective vehicle detection) • Improvements to cycle access and parking <p>It should be noted that these options are not mutually exclusive (cycle accessibility improvements being very probably compatible with a light rapid transit scheme); for the purposes of this exercise, however, each of these would be considered as the principal element of a strategy to provide Granton, Leith and Newhaven with good links.</p>
--	--

⁴ The density of development proposed for the site is such that predominantly car-based access would be unworkable (regardless of its relative acceptability in wider policy terms). The set of alternatives from which the favoured option has been drawn therefore reflects the assumption that “good links” implies good public transport access.

Comment on performance of alternatives

Demand forecasting and financial appraisal undertaken as part of this study showed that for light rail:

- Scenario 1 would not cover its operating costs from revenue
- Scenario 2 would cover its operating costs from revenue, but the case was marginal. The financial case for the scheme is highly dependent upon the outturn development at Granton and elsewhere in North Edinburgh
- The Loop had a strong financial case, which is strengthened by additional demand from developments planned for Granton, Leith and elsewhere.

Notwithstanding other benefits that a light rail for scenarios 1 and 2 would bring, the financial analysis indicated that only the Loop should be taken forward.

Guided bus options were also considered for the three routes. The analysis showed that the financial case was not strong. While covering operating costs from revenue they would not be attractive to private sector operators as the potential return was low. Moreover, it was identified that there was an implimentability issue associated with the institutional problems of establishing a concession. Engineering investigation showed other than along the Roseburn link and around Leith port, the guided bus would actually be operating on-street in the Greenways with other buses: it would not offer a step change improvement for much of its route. Light rail was identified as bringing much greater benefits and was therefore the preferred technology.

Similar findings were identified from earlier work. The appraisal exercise undertaken for SESTRAN produced the following rankings for the schemes mentioned above:

Scheme	Rank
• North Suburban Rail Link	49
• North Edinburgh CERT	11
• Upgrades to bus services	18, 40 46, etc ⁵
• Improvements to cycle access and parking	13

North Edinburgh CERT, the favoured option's nearest equivalent amongst the alternative schemes, visibly does not perform as well. This reflects a poorer showing under the headings of accessibility and integration.

The various bus improvements could be seen as the obvious "low cost" option for access to Waterfront/Granton. The relatively poorer ranking of its components indicates that it would do less well in meeting the key aims set by Edinburgh.

The North Suburban Rail Link would not serve Waterfront/Granton directly as it would terminate in Leith so its value must be judged in the context of the requirement for bus feeders to make it a viable transport connection for the site. Given that it performs poorly in relative terms even without this consideration, it can be seen to be a very weak competitor.

⁵ The bus improvements were separated into a number of service and infrastructure initiatives

Rationale for selection of proposal	<p>The light rail loop option:</p> <ul style="list-style-type: none"> • Has a strong financial case • Brings economic benefits to a wide area • Goes towards meeting the planning objectives of the Edinburgh LTS • Will help contribute to the regeneration of Leith and Granton waterfronts <p>The other two light rail options examined would not be financially viable. Guided bus alternatives have a poor financial case, have difficulties associated with their implementation and bring benefits which are at a much smaller scale to those that light rail will achieve.</p> <p>This study's findings are supported by the earlier SESTRANs work, which concluded that light rail is the best technology for meeting the planning objectives set out for Edinburgh.</p>
Spatial and social information	
Area context: general	<p>The Loop serves a large area within Edinburgh, salient within which is the Waterfront/Granton regeneration area (described below). Central Edinburgh is an increasingly vibrant business and leisure/tourism centre for which congestion charging is being taken forward by the City Council. Leith, until recently itself an area of significant deprivation, has seen considerable improvement of late but still has some regeneration needs of its own.</p>
Economic performance	<p>Parts of Edinburgh are enjoying considerable prosperity and can be expected to continue to do so. Meanwhile, areas within the City suffer significant deprivation: Granton, Pilton and Muirhouse make up the North Edinburgh Social Inclusion Partnership Area and have demonstrable economic deprivation. Recent regeneration in Leith has improved the situation there, but there are still significant areas of economic need there too. Granton Waterfront has been independently identified as a regeneration area.</p>
Deprivation/social exclusion	<p>North Edinburgh has larger household sizes than Edinburgh on average though 24% of households in Granton are single-parent households. Owner occupied homes represent only 12% of the dwellings. Access to a car is relatively low: 66% across NEAR (North Edinburgh Renewal Area). 62% of a sample surveyed in West Granton had left school without qualifications. The fulfillment of the Waterfront/Granton Masterplan would be expected to have considerable positive effects on the economic and social situations of local people.</p>
Planning and environment	<p>Edinburgh is for the most part highly urbanised with large sections of prized built heritage. There are significant conservation areas across Edinburgh (the centre being a World Heritage Site) which the further design of this scheme will clearly have to respect. The planned alignment on the Roseburn railway bed is protected and is currently used as a cycle path and de facto linear park. Granton Waterfront is an area designated for redevelopment and is subject to a Masterplan which has been adopted by the City Council.</p>
Spatial level of appraisal	<p>Impacts on the whole of Edinburgh are considered as the primary level of appraisal. In addition, the particular issue of access to and from Waterfront/Granton is considered separately – here the regeneration area is the sector of concern. The <i>net</i> wider economic impacts are analysed at a Scotland level.</p>

Implementability appraisal

Transport land-use integration

This statement is based on examination of:

- Major Issues Paper (preparation for replacement of the Lothian Structure Plan 1994)
- West Edinburgh Local Plan (consultation draft as at 27/3/01)

The favoured scheme appears entirely in keeping with the principles voiced in the Major Issues Report. It describes a “development direction” within Edinburgh along the lines of a “compact city” and speaks of the scope for further development intensification in two locations in particular, one of these being Waterfront. The possible benefits of reusing brown-field land and providing job opportunities for local people are contrasted with the danger of town cramming.

The draft Local Plan actively embraces the Masterplan for Granton Waterfront and states that “the regeneration of this area is a priority objective of the Council”⁶. The draft local plan also contains nothing with which the scheme would obviously conflict. Its underlying objectives are those set out in *Changing Edinburgh for the Better*⁷. There are four themes to the objectives in the Local Plan. They are:

- Sustainable Development
- Regeneration and Equality
- Quality
- Diversity and Identity

The first two are of most relevance to the Waterfront project. They include the objective to reduce car dependency and the need to travel, and to promote more sustainable travel choices: the greater use of public transport, walking and cycling. In addition, with regard to regeneration and equality, the objectives include opening up opportunity and developing stable and balanced communities in identified priority areas.

In the Transport chapter, the following is said: “the Council also considers that a ... high quality, public transport link should be provided to access the Granton Waterfront area, to enable this to achieve its full economic and employment potential” (8.25). The following objectives are also presented in the chapter:

⁶ Executive Summary
⁷ City of Edinburgh Council, March 2000

	<ul style="list-style-type: none"> • To facilitate development and activity in locations which promote accessibility, minimise car use and the need to travel and favour more sustainable means of transport – walking, cycling and public transport. • To minimise the incentive to use the car, particularly in areas where the direct adverse impacts of this are most severe. • To minimise the transport and parking impacts of new developments on neighbouring areas/people and the environment. • To ensure that development takes account of user and community safety, having regard in particular to vulnerable groups such as children and cyclists <p>The scheme would clearly contribute directly to the achievement of the first two of these and it, in combination with the realisation of the Masterplan, would contribute to the achievement of the third and fourth.</p>
Policy integration	<p>The development of a light rail loop in North Edinburgh would fit well with the policy direction outlined in the Government’s 1998 White Paper. It would also fit well with regional transport policy as established by SESTRANS. The scheme is fully in accord with the Edinburgh Local Transport Strategy.</p> <p>At a local level the scheme would contribute to the achievement of the strategy of the Social Inclusion Partnership (SIP) of NEAR in the following key ways:</p> <ul style="list-style-type: none"> • By providing excellent transport links to new job opportunities in the Waterfront area and in central Edinburgh, the scheme would open up significant potential for the residents of the area; • The scheme would link residents to the substantial amenities planned for the Waterfront as well as those already existing in Edinburgh at large. <p>When looked at in combination with the Waterfront Masterplan for land-use, the principles of community involvement and strategic planning inherent in the latter are clearly in keeping with the SIP’s strategy.</p> <p>The preferred scheme would support and complement the Waterfront Masterplan.</p>
Distribution impacts	<p>The accessibility impacts of this scheme will be felt particularly strongly amongst the poorer communities served by the stops Drylaw, South Pilton, West Pilton and Caroline Park amongst whom car availability is generally low. Relatively large numbers of these people are unemployed. The expectation is that a substantial number of the jobs created at the Waterfront site will be in-scope for this community given its skills levels but a clearer picture of the likely numbers will become apparent on further analysis.</p>
Technical feasibility	<p>A technology review has demonstrated that the preferred light rail solution is both proven, with many applications world-wide and is feasible for the options put forward. The review showed that the only feasible alternative technology in this context was kerb guided bus, an option that has been ruled out for reasons other than technological feasibility.</p>

Operational feasibility	<p>The issues are:</p> <ul style="list-style-type: none"> • Maintaining patronage – lack of flexibility with light rail; need to develop alignment, at considerable cost, if patronage changes. • Choice of vehicle – if vehicle becomes outdated, obsolete, or servicing arrangements are not maintained by manufacturer then the system’s fleet could be at risk. Risk typically occurs where technology choice is bespoke and from one manufacturer only. Generally, light rail is flexible enough to mitigate this risk due to the extensive vehicle market.
Technical risks	<ul style="list-style-type: none"> • Operation of a light rail system through the city centre, specifically Princes Street, St Andrew’s Square and Leith Walk, which will need reconfiguration to produce an efficient LRT operation without unduly affecting other transport proposals such as CEC’s ‘Managing Traffic in Central Edinburgh’. Finding agreement with interested parties for these areas, particularly Princes Street, which is a World Heritage Site. • Depending on chosen alignment there is potential for additional costs associated with immunisation of Railtrack signalling cables at Haymarket, depending on the proximity of the nearest LRT & heavy rail running rails. These costs cannot easily be quantified for the Outline Business Case (“OBC”) as this requires detailed alignment design before definitive consultations can be had with Railtrack; these consultations will be incorporated in the next phase of design development. • Fitting the alignment within Starbank Road knowing that current parking provision would be removed and parking outlawed, especially in light of the distance from residences to alternative parking sites. • Influence upon “Greenways” and conflict with existing bus operations. • Impact of service diversions – accurate cost estimates not possible for OBC. • Impact upon ESW Stormwater Outfall facility at Trinity Crescent and its associated operations – precise details unknown for OBC.
Other risks	<ul style="list-style-type: none"> • Danger that the necessary political will to drive implementation of requisite priorities will not come about. • Possibility that the Waterfront/Granton Masterplan fails to deliver all that is promised of it and expected patronage and social benefits do not materialise. • Demand fails to transfer elsewhere on the route for other reasons (e.g. change of travel patterns, changes in wider transport policy).
Affordability	<p>It is expected that the capital costs of this project will be met from a number of sources, including some form of developer contributions and grant-funding from the Public Transport Fund. A condition of the scheme’s more detailed design is a robust case for the capital costs to be covered from established sources supported by a properly argued explanation of the capital cost estimates.</p>
Financial sustainability	<p>One key reason for the selection of the Loop alignment for rapid transit is the strong indication that revenue will cover operating costs., Forecasting and appraisal work to date indicates that the preferred option will not require ongoing revenue funding.</p>
Public acceptability	<p>Preliminary consultation has been carried out with a range of representative bodies (such as the NEAR Group, the Pilton Partnership, the Greater Pilton Community Alliance) in North Edinburgh to gauge the attitude of stakeholders to the proposed scheme. The response to date has been almost wholly positive.</p>

Objective	Assessment	Supporting information
<p>Transport: what are the transport impacts of the proposal</p>	<p>Those transferring to the system from bus and car are forecast to enjoy significant benefits in terms of travel time savings, quality improvements and gains in travel time reliability.</p> <p>There will in addition be decongestion benefits for continuing users of the road network.</p>	<p>Patronage has been forecast on the basis of current and projected demand and forecasts of development related demand. The network used was drawn from the established model for transport in Central Scotland (“CSTM3”) which includes a detailed representation of the highway and public transport network in Edinburgh. A mode choice model was developed that explicitly allowed the consideration of attributes of alternative modes.</p> <p>An initial cost benefit analysis has demonstrated that the preferred option has an economic Net Present Value of £275m, a Benefit Cost Ratio of 2.65:1 and an Internal Rate of Return of 10.1%.</p>
<p>The local economy: what will be the impacts in terms of employment</p>	<p>Preliminary analysis suggests that were the scheme not built, developments at Waterfront Granton might be delayed and may come about at a smaller scale.</p> <p>A “mid-case” projection of impact indicates that 6,700 additional new jobs would arise as a result of the scheme in the regeneration area. Between 500 and 1,000 of these new jobs would result from displacement and would therefore be additional at the Scotland level.</p>	<p>These numbers are provisional and the fuller ramifications of the scheme in distributional terms will only be understood once the type and scale of development has been more closely analysed.</p>

Objective	Assessment	Supporting information
<p>Environment: what will be the impacts on the environment</p>	<p>The principal environmental impact of this scheme will lie in its effect on the built heritage of Edinburgh and, in particular, the section of Princes Street which is a World Heritage Site. Overhead power supply is likely to bring visual intrusion which may excite resistance but its careful management could mitigate the degree of perceived damage.</p> <p>The aggregate noise and vibration impacts will depend on associated bus operations but the scheme can be expected to have at worst a neutral impact and at best a positive effect.</p> <p>The effect on air quality should be positive because of decongestion effects on general traffic and the likely reduction in bus numbers and their associated pollution. Efficiencies in power production should lead to an overall reduction in greenhouse gas emission.</p> <p>Impacts on water quality, drainage and flood defence are likely to be negligible.</p> <p>There will be an impact along the Roseburn corridor, which is used as a cycleway and footpath.</p>	<p>An environmental scoping study was undertaken to support the Part 1 environmental assessment.</p>

Objective	Assessment	Supporting information
<p>Safety: what will be the effects of the proposal on road and pedestrian safety</p>	<p>There should be some accident savings resulting from the general reduction of traffic but there is a danger that these would be partially offset by accidents involving pedestrians and light rail vehicles given their novelty in Edinburgh, however this is likely to be a short term impact only. The groups benefiting most from the gains would be pedestrians and cyclists.</p> <p>There may also be gains in sense of personal security if, as envisaged, the scheme results in a more bustling, continental street atmosphere. In general, greater reliability will support the feeling of security and will bring larger passenger flows which themselves increase the comfort of passengers, particularly women and the elderly.</p>	
<p>Accessibility: what will be the impacts on accessibility</p>	<p>Given low car ownership in certain key areas served by the scheme, change in base accessibility can be expected to be for the better particularly as the Loop alignment will provide good links between points in Edinburgh which are poorly connected by public transport at present.</p> <p>Change in severance should also be for the better as the scheme creates a strong connection between the Waterfront area and points surrounding it. It should be possible to cross the alignment at any point along its length provided sufficient care is taken.</p>	<p>The change of severance impact in fact relates to walk trips the majority of which would not normally take place at present given the state of the regeneration site, but which can be expected in light of the jobs, housing and amenities which are to be located there.</p>

Objective	Assessment	Supporting information
<p>Transport integration: what will be the impacts in integrating transport modes and services</p>	<p>The scheme will bring good links with mainline rail at Haymarket and Waverley. Good interchange facilities with provision of a new bus station at St Andrew's Square. There will clearly be considerable interchange opportunities at this site for trips within and outside Edinburgh. In all these cases, the "turn up and go" frequencies of the scheme will mean that travellers will not need to worry about scheduling of interchanging services.</p> <p>The expectation is that bicycles will not be accommodated on the vehicles but the provision of good parking facilities at stops should ensure strong perceived links between the two modes on the part of users.</p> <p>The nature of ticketing remains to be established but this too could aid the integration of transport options within the SESTRAN region.</p>	

6.4 Demand and Revenue Forecasting

A central part of the appraisal of alternative options for transit links in North Edinburgh has been the development of forecasts of demand and revenue for a number of scenarios.

There are two primary sources of demand and hence revenue for a rapid transit system in North Edinburgh. These are the:

- “background” travel market, that is the demand for travel currently experienced in Edinburgh combined with the forecast growth that is anticipated in that market over the next few years;
- “development” related market. This is demand associated with particular land use developments proposed for North Edinburgh, namely at Granton Waterfront, Leith Port and Crewe Toll.

The approach that has been adopted examines each segment separately yet in a consistent way. The overall approach is summarised below and further details are presented in Appendix 6.

6.4.1 **Background Travel Market**

The background travel market is the existing and forecast demand in North Edinburgh in the absence of any additional demand from development sites. Conventionally, in the absence of development, the background travel market would provide the source of the case (or otherwise) for a rapid transit system in terms of:

- user revenue;
- user benefits;
- non-user benefits;
- other unquantifiable or non-monetised benefits.

The Central Scotland Transport Model 3 (“CSTM3”) was used for the source of data on existing and forecast background demand in Edinburgh. CSTM3 is a multi-stage demand forecasting model covering all of the Central Belt. The model was developed for the Scottish Executive and uses as its source local models of *inter alia* the Edinburgh road and public transport networks. The geographic area covered by CSTM3 and the range of interactions included within the model are far greater than is required for the assessment of rapid transit in North Edinburgh. Therefore, the approach that was adopted was to extract from the full CSTM3 model cordoned networks and matrices covering the Edinburgh area. The cordoning process has reduced the scale of the model and has resulted in a much more manageable model being applied.

The cordoned model includes all of Edinburgh and extends beyond the Ring Road to include Musselburgh to the East and the Forth Bridge approaches to the West. The model includes all major roads and junctions within the City as well as public transport services provided by bus and rail companies.

A logit mode choice model was developed between car and public transport and the model was calibrated to reproduce the mode shares within the base year CSTM3 model. Weightings for the construction of generalised cost were adopted directly from CSTM3. A single public transport network including bus and rail in the base year and with the addition of rapid transit for forecast years was adopted. This combined network ensured that interchange between modes was allowed within the model. Within the set of available public transport modes, the choice of mode is determined by the assignment model.

For the background travel market, the model forecast year is 2006. For car travel the CSTM3 2006 (cordoned) trip matrices were adopted. However, the CSTM3 2006 public transport matrices showed a decline in travel in Edinburgh from the (1997) base year. Such a decline does not accord with the experience of the last two to three years in Edinburgh where both the City Council and public transport operators are of the view that, at worst, public transport patronage has been static or perhaps even increasing. Consequently, it was felt that the 2006 CSTM3 matrix was not representative of recent trends and the 1997 base year matrix was adopted for the forecast year.

A do-nothing scenario was adopted in which there were no changes to the road and public transport networks from their 1997 definition. In the 2006 do-nothing scenario, morning peak car trips in the modelled area increase by around 17% from the 1997 levels, equivalent to 1.7% per annum. Public transport demand increase by about 5% in the same period, this is not due to any further improvement in public transport beyond those currently implemented, rather it is the effect of increased congestion making car less attractive. However, as car trips are increasing at a faster rate than bus trips, there is a forecast decline in public transport mode share. Similar effects are forecast in the off-peak period too.

A do-minimum scenario has also been developed. The input matrices into the do-minimum scenario are the same as those used in the do-nothing. The do-minimum road network was extracted directly from the CSTM3 do-minimum. The do-minimum public transport network includes the impact of bus priorities that are anticipated to be introduced in North Edinburgh associated with the planned development on the Waterfront site.

The impact of the proposed bus priorities is a very modest increase in peak hour bus trips and virtually no change to forecast off-peak figures. There is no impact on mode split in the modelled area. This is not to say, however, that the proposed do-minimum measures are not worthwhile; they are likely to lead to benefits to existing bus users in terms of journey times and bus service reliability.

For the do-something options a range of scenarios were examined. These were:

- Granton Square – Haymarket via the Waterfront site and Roseburn alignment;
- Granton Square – Waverley via the Waterfront site, Roseburn alignment and Princes Street;
- a loop from Granton Square to Haymarket, Waverley and then onto Leith via Leith Walk and back to Granton Square via Lower Granton Road.

Each alignment option was modelled as being served by light rail and guided bus. It is important to note that the modelling work was undertaken in parallel to the engineering work reported elsewhere. Consequently it was necessary to make a number of assumptions about each option. In particular:

- each option would be shown to be feasible in engineering terms;
- that for street running light rail would be offered priority over all other road traffic at every junction it passes through;
- that similar (but not equivalent) priority would be offered to a guided bus option travelling in un-guided mode on street.

For forecasting light rail and guided bus demand it was also assumed that each mode represented a step change in the quality of service offered existing public transport modes and this step change could be quantified through a (negative) mode specific constant added to the generalised cost of travelling by light rail and guided bus. In the absence of any local information on the likely value of the mode specific constant typical values have been adopted that reflect experience from similar studies in the United Kingdom.

6.4.2 Development Related Demand

There are proposals for significant land use developments in North Edinburgh. In addition to the proposals for Granton Waterfront and Leith, described in Chapter 3 of this report, there are also developments at Crewe Toll involving Deutsche Bank, BAE Systems and the redevelopment of Edinburgh's Telford College Site. The new developments are a potential source of significant demand for a North Edinburgh transit system.

Schedules of development at each of the three central locations were provided by Waterfront Edinburgh Ltd, Forth Ports and Lattice for the Waterfront site, by Forth Ports for their proposed development at Leith and by BAE Systems for their proposals for Crewe Toll. The number of morning and off-peak trips to and from the developments has been projected using the TRICS database. The distribution of trips to and from the development sites was determined by reference to the trip distribution to and from locations in Edinburgh with a similar land use pattern to that proposed for the developments. Assumptions were also made on the number of people who would live and work within a particular development area (e.g. the number of people who would live on the Waterfront site and also work on a Waterfront – associated development).

The same mode choice model was adopted for assessing transfer from car trips to and from development sites as was used for looking at the mode choice of the background demand. Generalised costs for use in the development related mode choice model were extracted from the 2006 peak and off-peak network models. All mode choice model parameters were the same as those used to assess background demand.

The development at Waterfront, Leith and Crewe Toll is anticipated to take place over a number of years and not all the development will be in place for the 2006 forecast year used to assess background demand. Consequently development related forecasts were produced for 2006, 2011 and 2016, with each year reflecting the development anticipated to be completed by the date in question.

6.4.3 Summary of Results

The table below summarises the demand and revenue forecasts for the preferred option. Figures 6.1 and 6.2 present modelled flows for the morning peak and off-peak hours for the 2006 forecast year. The figures also show the impact of additional development on line flows that is projected to take place until 2016. However, the 2016 figures do not include any growth in the background travel market from 2006 to 2016 and are therefore a conservative view on future patronage patterns. The figures in the table do not represent the total trip making to and from the new developments, only that which will use the North Edinburgh Rapid Transit.

Table 6.1: Preferred Option: Demand

Demand Source	Annual Demand (trips)
Background Demand (2006)	14.591m
Development Demand (2006)	3.947m
Development Demand (2011)	5.448m
Development Demand (2016)	5.588m

Figure 6.1

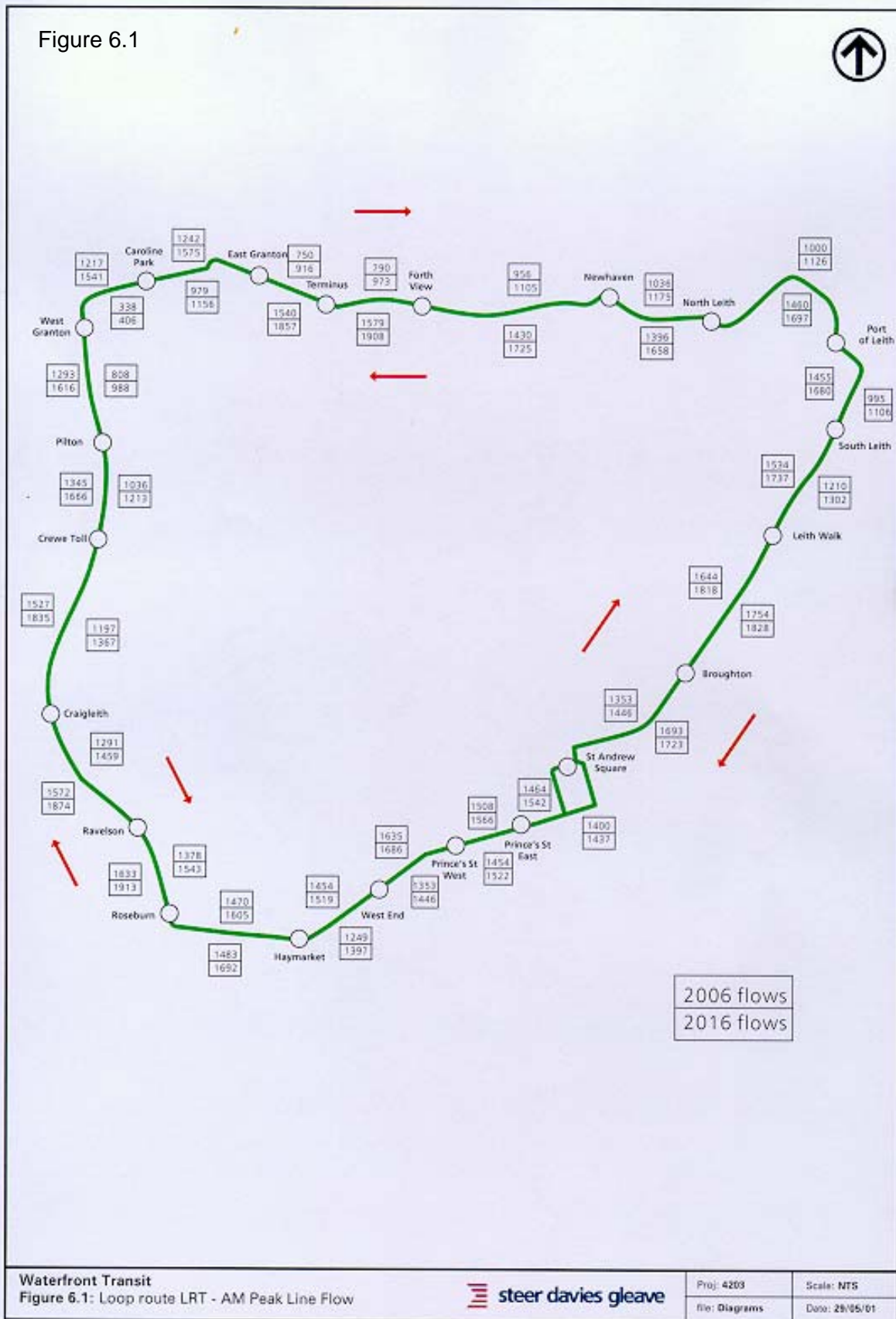
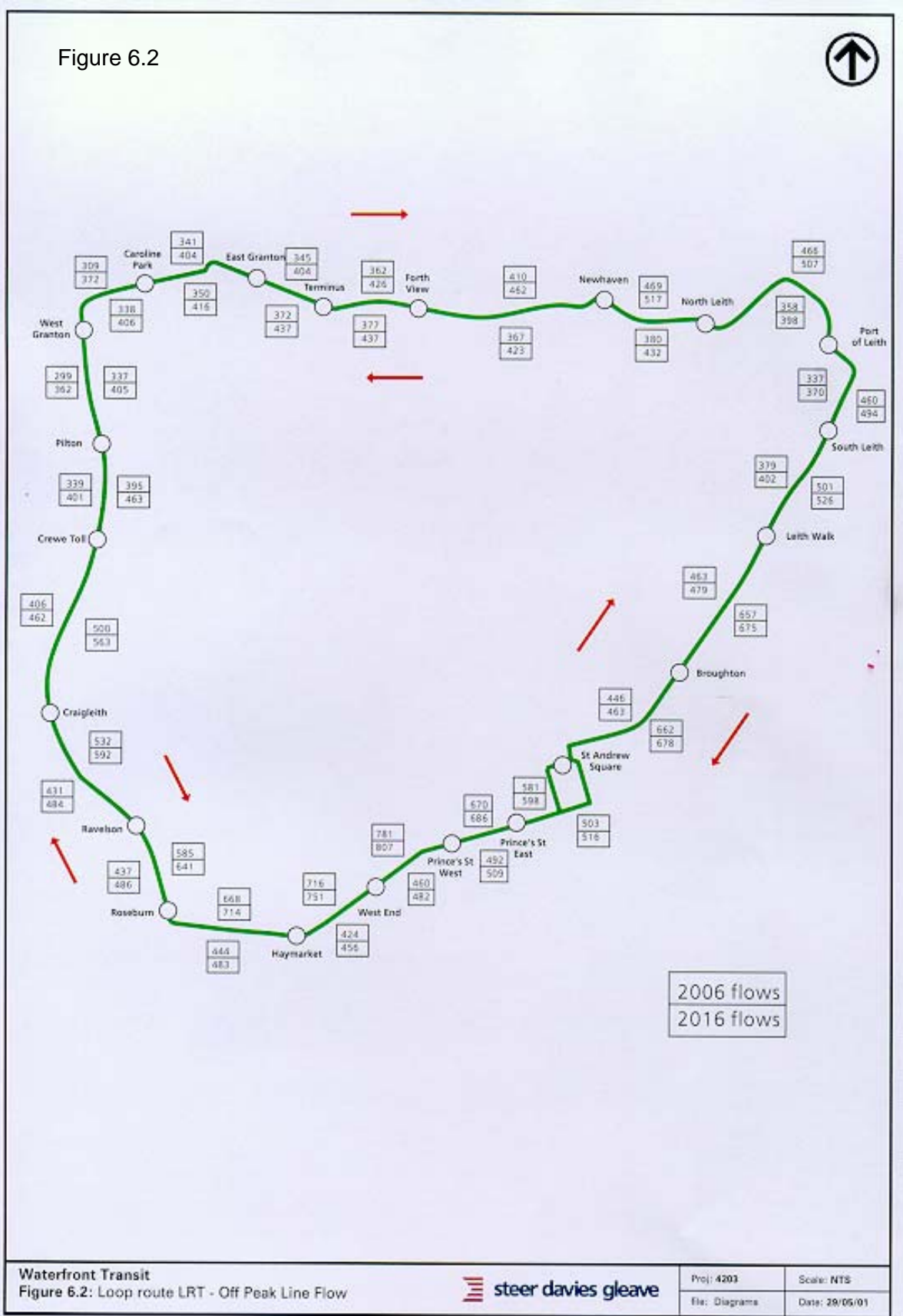


Figure 6.2



6.4.4 **Commentary on Demand Forecasts**

The demand and revenue forecasting exercise has made best use of existing models and data to produce forecasts for a number of potential North Edinburgh rapid transit options. The detail of the work is greater than any previous studies have undertaken and provides a sound basis to make a decision on whether to proceed to the next stage of the project's development. Part of the next stage will be further model development (probably supported by data collection) and forecasting work.

There are a number of points that should be borne in mind when considering the outputs of the modelling exercise:

- there is an explicit assumption that the CSTM3 networks and matrices are a robust source from which to develop demand forecasts;
- the model demand and revenue is based on, and is sensitive to, reasonable assumptions on the degree of priority that will be provided and the relative attractiveness of rapid transit modes compared to the established bus network;
- the demand associated with developments is sensitive to the assumptions made on the number of trips associated with each development and their distribution. There is also a degree of uncertainty on the timing and scale of each development;
- the impact of any road user charging scheme on demand has not been considered.

6.5 **Approach to Option Appraisal**

6.5.1 **Environment**

Specialist environmental consultant ERM was retained to undertake a desktop environmental scoping exercise of the likely impacts of a light rail loop.

The scoping exercise comprised a high level qualitative assessment to identify the possible adverse and beneficial effects of the North Edinburgh Rapid Transit Study. The following environmental sub-objectives were addressed, in accordance with the Scottish Transport Appraisal Guidelines. Included under each objective below is a summary of potential environmental impacts identified by ERM.

- Noise and vibration

Traffic will reduce in the surrounding area as a result of the scheme albeit not to an extent sufficient to bring about significant reductions in noise. However, depending on technology choice significant improvements can be achieved if an LRT system were adopted owing to it being electrically powered on continuously welded rail while equipped with noise suppressing resilient wheels and skirting. Any improvements in traffic generated noise and vibration throughout the route is welcomed but especially along the World Heritage site of Princes Street.

- Air quality

Traffic will reduce in the surrounding area as a result of the scheme albeit not to an extent sufficient to bring about significant improvements in air quality. Once again, being electrically powered, the operation of an LRT system is likely to have less impact on the

air quality when compared to a diesel bus or duo-powered (diesel/electric) bus. In fact, the introduction of an LRT system may result in overall improvements in the air quality throughout the route, but especially in the city centre, where there is a high frequency of bus services operating.

- Water resources

There are two sites at which the proposed route crosses the Water of Leith. Extra sedimentation and run-off may occur during construction activities, thus affecting the water quality. However, no adverse effects during operation of the scheme are expected to occur.

- Geological features and ground contamination risk

During excavation of the land, contaminated spoil may be encountered along the proposed route. This contaminated land should be appropriately dealt with according to relevant legislation.

- Ecology and biodiversity;

A number of SSSIs are located near the proposed route, however, these will not be directly impacted upon. A number of non-statutory designated sites (urban wildlife sites) located within sections of the disused railway line between Craighleith and Roseburn will be impacted upon. Inevitably, there will be temporary loss of habitat during the construction phase, however, it is hoped that these areas can be ameliorated to avoid permanent loss of habitat.

- Landscape quality and visual amenity

A number of conservation areas are intersected by the proposed route, which may be impacted upon and therefore, require consideration during construction. Visual impacts would occur at residential properties and land uses located near the route, in particular at Princes Street (a World Heritage Site), in the city centre. There are a number of mitigation measures which could be utilised to ensure any impact would be minimal.

- Cultural heritage and archaeology

A Scheduled Ancient Monument of national importance may be impacted upon during construction.

The following information sources were used by ERM:

- The North Edinburgh Railway Path Network: Wildlife Management Plan, Scottish Environmental Consultants, December 1989;
- The North Edinburgh Railway Path Network: Additional Sections, Sudheer Carroll, January 1996;
- The Waterfront Granton Master Plan, The City of Edinburgh Council, December 2000;
- North East Edinburgh Local Plans, City of Edinburgh District Council, April 1998;
- Central Edinburgh Local Plans, City of Edinburgh District Council, May 1997;

- North West Edinburgh Local Plan, the City of Edinburgh District Council, January 1992;
- Scottish Transport Appraisal Guidance prepared by Steer Davies Gleave in association with SIAS and WS Atkins, January 2001;
- The Edinburgh Diversity Action Plan, Edinburgh City Council, March 2000; and
- The Scottish Environment Protection Agency (SEPA), River Classification Scheme, 2000.

6.5.2 **Economy**

The economic impacts of the preferred light rail option are considered in one of two categories in a STAG appraisal. The first considers the impact on economic welfare through an examination of transport costs and benefits resultant from the scheme. This is called the Transport Economic Efficiency (“TEE”) appraisal. The second is an assessment of the Economic Activity and Location Impacts (“EALIs”) of the scheme. These assessments are summarised in the following sections.

6.5.3 **The TEE Assessment**

The TEE assessment, through an economic cost benefit analysis, is a requirement for a Part 2 STAG Appraisal. However, given the potential significance of the North Edinburgh Rapid Transit system it was identified as beneficial for the study for an initial economic cost benefit appraisal of the preferred option to be undertaken.

For the cost benefit appraisal, the following assumptions were made:

- The scheme opening date is 1 January 2009;
- The appraisal period is 30 years;
- All costs and benefits are discounted to 1998;
- The discount rate is 6%.

Key cost assumptions were:

- The scheme’s capital cost is £191.9m of which £28.8m is for light rail vehicles;
- The scheme’s annual operating cost is £5.43m.

Capital costs were phased over a three year construction period and 80% of operating costs were incurred during a commissioning period the year before opening.

For demand and hence revenue, the residual market was forecast to grow at 1% per annum from the 2006 forecast year. Growth in revenue from the development related market was assumed to grow between 2006 and 2011 and 2011 and 2016 at the growth rates implied by the demand figures set out in Table 6.1. After 2016, no growth in the development related market was assumed.

For benefits, public transport user benefits were calculated on a matrix basis following the standard methodology. For non-user benefits the (then) DETR’s standard rate of 40p

per pcu km removed from the network was applied⁸. Values of time and growth in benefits over time followed the assumptions set⁸ out in the Transport Economic Note.

The economic appraisal indicated that, the preferred option for a North Edinburgh rapid Transit, has:

- An economic NPV of £275m;
- A Benefit Cost Ratio of 2.65:1;
- An internal rate of return of 10.1%.

6.5.4 *The EALI Assessment*

The economic activity impacts of the project are expected to arise from a combination of two factors:

- the development proposals for some sites may be delayed if the North Edinburgh Rapid Transit does not proceed, and
- the scale of some or all developments is likely to be smaller than if the project goes ahead.

The additionality of the project therefore comprises a mix of scale effects (and possibly also quality effects) and temporal additionality – the project will help to bring forward developments.

Based on projected types and sizes of development, it is possible to indicate for the “with project” scenario the potential gross numbers of jobs which would be enabled within the overall site (here taken to include all of the land within the general catchment of the project). This represents the central projection.

In order to compare this with the “without project” scenario, at this stage alternative assumptions have been developed to encapsulate possible temporal and scale impacts. Given the complex nature of this assessment, these will need to be developed and tested further in the next stage of the projects development, where individual forecasts for specific sites can be incorporated.

Table 6.2 below shows the outputs of the appraisal model using jobs as the outcome indicator. A number of points regarding this are set out following the table. In particular it should be noted that the impacts modelled are “place” impacts and not people or distributional impacts, as required by STAG. At this time, for the Part 1 appraisal, a positive statement is required to indicate that target social groups in the Waterfront regeneration area will indeed benefit from the developments taking place. In the subsequent development stage, for the Part 2 appraisal links to other programmes need to be made explicit.

Table 6.2 also shows an initial assessment of possible Scotland level impacts: these are highly dependent on attracting genuinely mobile investment projects to the area – ones

⁸ The analysis presented in this report was completed prior to the publication of revised guidance by DTLR at the end of June on the appraisal of major public transport schemes. In common with the approach adopted for schemes in England and Wales that will be the subject of funding submissions this summer, the appraisal has not been updated to reflect the revised guidance, a position agreed with DTLR. The benefit rate of 40 p/km is within the range of benefit rates put forward as part of the latest guidance.

which otherwise might not come to Scotland. As the Scottish Executive is particularly interested in this aspect, when making a funding application for the construction (as opposed to development) of the scheme, more robust (additional) evidence/arguments will be required for a Part 2 appraisal.

Table 6.2: initial ranges of potential employment impacts

	local/regeneration area based estimate	Scotland
With project	11,200	500 - 1,000
without – best case	5,750	200
without – middle case	4,500	0
without- worst case	3,300	0
additional impact – low	5,450	300 – 800
additional impact – mid	6,700	500 – 1,000
additional impact – high	7,900	500 – 1,000

Notes to Table 6.2

1. Preliminary estimates based on potential sizes of developments by category and by indicated/expected year of completion.
2. All developments shown as completed in 2003 or earlier have been ignored as the project is expected to have no effect on these.
3. Projections undertaken over 30 years and “jobs” treated as 10 person years of employment.
4. “Without project” scenarios are each based on 4 year delay in completions and alternative levels of development: -
 - low = 40 % of “with” scenario
 - mid = 55% of “with” scenario
 - high = 70 % of “with” scenario
5. Local level impacts assessed solely on area basis: no account has been taken of social groups affected by the developments: this is likely to reduce the “regeneration” impacts, possibly significantly.
6. The local level impact model can incorporate alternative assumptions for jobs per unit area, completion dates and scale of development.

6.5.5 Safety, Accessibility and Integration

The assessment of the impacts of the North Edinburgh Rapid Transit under the safety, accessibility and integration headings has been a qualitative one. In the case of safety, the appraisal has been informed by the output of the transport model and an understanding of the impact on safety and security of light rail schemes promoted elsewhere. The assessment against the accessibility and integration criteria have been informed by extant documentation and studies relevant to the area.

SUMMARY

- **LRT system on Loop is the preferred option and offers greatest benefits;**
- **Economic NPV of £275 million;**
- **Benefit Cost Ratio of 2.65:1;**
- **Internal Rate of Return of 10.1%;**
- **Fit with LTS and Steering Group objectives.**

7 The Preferred Alignment

7.1 Description

7.1.1 Route Alignment

Following the option generation and sifting a short list of alignments was prepared for detailed appraisal. Subsequently, it was considered that the route made up of optional alignments 1, 17 and 19 should be adopted as the preferred alignment for further development. Reference should be made to Chapters 5 and 6 of Appendix 3 for further details of the detailed appraisal and preferred alignment. This route of the preferred alignment, indicating stop locations, is detailed in the table below.

Table 7.1.1: Preferred Alignment

Route Description	Length (m)	Chainage (km)	Stop No.	Stop Location	Chainage (km)
Lower Granton Road (at Eastern Breakwater)	380	0.00	-	-	-
West Harbour Road	370	0.38	1	East Granton	0.45
WEL Development Roads	1210	0.75	2	Caroline Park	1.16
	-	-	3	West Granton	1.81
Southern Approach Road	1000	1.96	-	-	-
Disused Granton to Haymarket Railway Solum	3720	2.96	4	Crewe Toll	3.05
	-	-	5	Craighleith	4.18
	-	-	6	Ravelston	5.08
	-	-	7	Haymarket	6.59
Haymarket Terrace	290	6.68	-	-	-
West Maitland Street	220	6.97	-	-	-
Shandwick Place	480	7.19	8	West End	7.33
Princes Street	930	7.67	9	Princes Street West	7.85
	-	-	10	Princes Street East	8.31
S.St.Davids St./St.Andrew's Sq./N.St.Davids St.	340	8.60	11	St.Andrew's Square	8.75
Queen Street	110	8.94	-	-	-
York Place	350	9.05	-	-	-
Picardy Place	140	9.40	12	Broughton	9.45
Leith Walk	1710	9.54	13	Leith Walk South	10.22
	-	-	14	Leith Walk North	10.99
Constitution Street	650	11.25	15	South Leith	11.74
Ocean Drive	720	11.90	16	Port of Leith	12.42
Ocean Drive (Victoria Dock)	230	12.62	-	-	-
Ocean Drive	1200	12.85	17	North Leith	13.17
	-	-	18	Newhaven	13.90
Pier Place	370	14.05	-	-	-
Starbank Road	390	14.42	-	-	-
Trinity Crescent	190	14.81	-	-	-
Lower Granton Road (at Eastern Breakwater)	715	15.00	19	Forth View	15.06
	-	15.71	-	-	-

Following the identification of the preferred route, we were able to investigate potential maintenance depot sites and assess the likely environmental impacts. These investigations led to the “Depot Scoping Study” report, which is included in full as Appendix 5 to this report and the “Environmental Scoping Study” which is detailed in Chapter 8 of the “Route Alignment Options Appraisal” report which is included in full as Appendix 3 to this report. For ease of reference, summaries of the depot and environmental scoping studies are provided in Sections 7.1.2 and 7.1.3 respectively.

7.1.2 Depot Scoping Study

A maintenance depot is a fundamental requirement in the success of any light rail proposal. This facility allows routine maintenance to be carried out while providing safe stabling when the system is not in operation.

Consequently, it was necessary to undertake a preliminary assessment of depot requirements and potential locations. From the broad qualitative assessment of 23 potential sites we were able to provide comment on those sites which are considered inappropriate and identify those sites that are worthy of further consideration.

To service the Scenario 3 Loop route will require 16 Light Rail Vehicles (LRVs) which allows two spare LRVs to cover breakdowns and facilitate maintenance. To accommodate this vehicle fleet it was estimated that a minimum site area of 1.4 hectares (3.5 acres) would be required. This required area is dependent on the configuration of the site, with a rectangular site whose length and breadth are in a ratio of 2:1 to each other being the preferred configuration. It is also preferable if the site can be accessed from both ends of its length, thus avoiding any space inefficient turnback loops or operationally undesirable reversing manoeuvres.

Due to the high capital costs associated with providing a depot site, the site should preferably, be oversized to allow for expansion of the vehicle fleet on a single site to achieve benefit of scale economies. Expansion of fleet sizes can be required should future demand exceed predicted capacity and frequency. More common, however, is the need to accommodate additional LRVs which are required to service extensions to the original route.

It was agreed in meetings with CEC Planning & Policy representatives not to consider either Princes Street Gardens or any site beyond the green belt. In addition, CEC added that no site within the confines of the Waterfront Granton masterplan area would be viewed as being consistent with Masterplan. It was therefore agreed not to investigate any sites within the Waterfront Granton area.

Those sites that were considered within this scoping study are illustrated on Drg. No. 61664/EDN/0003 and detailed in the table overleaf.

Table 7.1.2: Long List of Optional Sites

Site	Description	Area (ha) *
1	NEI / Vtec Site & Former Parsons Peebles Site, Near Pilton Avenue & Drive	4.5
2	Wimpey Site Between Former Railway Solum & Ferry Road (Wimpey plc)	1.1
3	Site Between Former Railway Solum & Ferry Road Adjacent to Site 2	0.5
4	Car Park Area Adjacent to Morrison Street & Dalry Road	1.6
5	Industrial Site Bounded by Haymarket Railway Lines, Western Approach Road & MacLeod Street	2.8
6	Former Railway Goods Yard (CEC), Roseburn Terrace	0.6
7	Drylaw Recreation Ground (CEC)	1.6
8	Fire Hazard Training Ground (Fire Board), off Ferry Road	1.4
9	Telford College, Crewe Road North Sites (Telford College)	8.2
10	Craigroyston School Playing Field (CEC)	3.6
11	Wimpey Site Bounded by West Granton Road & Pennywell Road (Wimpey plc), West Pilton	6.9
12	Granton Park Recreation Ground (Lattice)	5.0
13	Wardie Recreation Ground	5.2
14	Area of Land, off Lindsay Road, Newhaven	1.9
15	Area Adjacent to Hawthornvale on Former Railway Solum, Newhaven	1.9
16	Area Adjacent to Former 'Five Ways' Railway Junction & Solums, Trinity	1.6
17	Various Industrial Units (Smarts Developers), off Constitution Street	0.6
18	Lorry Park (CEC), Port of Leith	0.7
19	Forth Ports Storage Area (Forth Ports), Port of Leith	2.3
20	Dalton Piling & Demolition Contractors Site (DP & DC)	1.2
21	Former Edinburgh Tram Depot Site, Foot of Leith Walk	1.8
22	Enclosed Triangular Site Between Waverley, Granton & Musselburgh Railways	1.9
23	Former Lothian Bus Depot (LRT), Leith Walk	2.3

* Areas expressed in hectares (1.0 hectare = 2.5 acres approx.)

From this broad qualitative assessment we were able to provide comment on those sites which were considered inappropriate and identify those sites we believe are worthy of further consideration.

The sites that we believe are not appropriate are outlined below along with a brief justification for those decisions.

- Sites 2, 11 and 15 can be discounted due to them not being available as they are already under development;

- Sites 1, 7, 9, 10, 13 and 16 can be discounted due to them not being available due to opposition from CEC Planners;
- Sites 3, 6, 17 and 20 can be discounted due to them not being of a sufficient size to accommodate a depot for 16 LRVs;
- Sites 12 and 14 can be discounted due to the sites having received planning approval for compatible development proposals; and
- Sites 22 and 23 can be discounted due to the technical and operational difficulties that would be encountered or need to be resolved in respect of these sites.

The remaining sites include Sites 4, 5, 8, 18, 19 and 21. Due to the location of Site 4 and the engineering difficulties in respect of gaining access to Sites 4, 5 and 21 we would advise that these sites are not discounted but are viewed as alternatives to the other sites. We would therefore advise, in the next stage of design development, that any further investigations are concentrated on Sites 8, 18 and 19 unless other suitable sites are identified between now and those investigations.

7.1.3 Environmental Scoping Study

This scoping study comprises a high level qualitative assessment to identify the possible adverse and beneficial effects of the proposed North Edinburgh Rapid Transit System (for both guided bus and LRT technologies and based on the Scenario 3 route alignment), aiming at the co-ordinated development of public transport within the area.

This report appraises the performance of the scheme in respect of the Government's New Approach to Appraisal ("NATA") environment objective, in accordance with STAG. The following environmental sub-objectives are addressed, as required by STAG:

- noise and vibration;
- air quality;
- water resources;
- geological features and ground contamination risk;
- ecology and biodiversity;
- landscape quality and visual amenity; and
- cultural heritage and archaeology.

A summary of the scoping assessment for each of the above sub-objectives is provided below.

Noise and Vibration

Impacts in terms of noise will mainly arise during construction of the scheme. Sources of potentially significant noise impacts would include the following:

- road breaking;

- earth moving;
- diversion of services;
- construction of the track form;
- track laying;
- resurfacing of roads; and
- the movement of vehicles to and from construction sites.

Vibration impacts may occur from possible driven piling or other heavy works that may be necessary at specific locations along the route. Sensitive receptors include the residential areas in close proximity to the route and a number of schools along the route may also be affected by noise during construction of the scheme. Princes Street will also be sensitive to any noise and vibration impacts generated during the implementation of the scheme.

Details of the levels of noise generated by the guided bus or LRT system are not known at this stage of design development, although they are not expected to give rise to significant noise impacts. Noise levels will in fact reduce with a modal shift from car use. These issues will be addressed in greater detail in the next stage of design development and will be included in the resulting environmental statement. In addition, detailed design will take account of the noise and vibrational effects resulting from the operation of a guided bus or LRT system. In relation to LRT systems, the LRVs can be equipped with resilient wheels and skirting and by adopting continuously welded rail all contribute to minimising noise and vibration.

Air Quality

Significant air quality impacts are not expected to occur as a result of the scheme, although a level of dust may be generated during construction activities. Air quality may improve with a modal transfer from cars to public transport. Traffic reduction will in turn reduce the emissions of CO₂ arising from road vehicles (a contributor to global warming), although it is uncertain to what level this will be achieved in relation to this development.

As required by the Environment Act 1995, City of Edinburgh Council has reviewed and assessed the local air quality to determine whether or not the objectives set out in the Air Quality (Scotland) Regulations 2000 are met. The Council has finished the First, Second and Third Stages of this review and have concluded that the local air quality objectives for benzene, 1,3-butadiene, carbon monoxide, lead, sulphur dioxide and particulate matter will be met.

Following a more detailed investigation into nitrogen dioxide (NO₂) levels in Edinburgh it has been found that the long term objectives are unlikely to be met in eight areas in the City Centre. These are located around George Street, Leith Walk, Princes Street, Roseburn Terrace, Gorgie Road, North Bridge, Queen Street and West Maitland Street. Vehicular traffic is the principal source of the NO₂ emissions at these locations. The proposed scheme has the potential for reducing some of these emissions through the modal transfer it aims to achieve.

Once again, being electrically powered, the operation of an LRT system is likely to have less impact on the air quality when compared to a diesel bus or duo-powered (diesel/electric) bus. In fact, the introduction of an LRT system may result in overall improvements in the air quality throughout the route, but especially in the city centre, where there is a high frequency of bus services operating.

Water Resources

The main water courses that may be affected by the construction and operational activities associated with the Rapid Transit System route, include the Water of Leith and the Firth of Forth coastal zone, where sensitive protected species and habitats within the adjacent SSSIs, may be adversely affected.

The Scottish Environment Protection Agency ("SEPA") has confirmed that there are no source protection zones designated within this area. The area in general, is underlain by strata of the Calciferous Sandstone Measures, which are classed as moderately permeable on the Groundwater Vulnerability Map of Scotland. The superficial deposits near the coast consist mainly of raised beach deposits, with boulder clay further inland. There is also alluvium associated with the Water of Leith.

It is important that construction activities will not increase sediment loadings and adversely impact upon water quality and drainage.

Geological and Ground Contamination Risk

It is expected that the geological impacts will be neutral, as it is assumed that the scheme will be designed and constructed appropriately, so that geological features will not be impacted upon.

As the majority of the route passes through an urban area, it is possible that contaminated land may be encountered during excavation, particularly along the coastline, around Granton, Newhaven and North Leith, which have been historically, and to a certain extent still are, dominated by industrial and commercial sites. Due to time constraints, it has not been possible to specifically identify the relevant land uses that may result in contamination. Further investigation is therefore necessary, and mitigation measures adopted, so that any contamination is identified and appropriately dealt with in agreement with the SEPA.

Ecology and Biodiversity

There are two statutory designated sites located near the proposed route. These include the Firth of Forth coastline ("SSSI") in north east Edinburgh and Arthur's Seat Volcano SSSI in central Edinburgh (not affected by the scheme). These areas have been identified by Scottish Natural Heritage as requiring special protection due to their flora, fauna, geological or physiological features, under the Wildlife and Countryside Act 1981 and amendments.

The Firth of Forth coastal habitat is an area where off-shore waters and intertidal mudflats support a variety of protected species, including internationally important wildfowl and waders such as Goldeneye, Eider Duck, Common and Velvet Scoters, Oystercatchers and Curlew.

A number of non-statutory designated sites in the form of urban wildlife sites, lie within 100 m of the proposed route. Local designated sites are valuable, as they represent the local biodiversity resource and often have amenity or educational value. These are found

mainly along sections of the disused railway line, passing through Cragleith, Ravelston and Roseburn.

Railway corridors are usually important for their wildlife value. Mature woodland and scrub have been found along the disused railway corridor between Cragleith and Roseburn. Disused railway corridors are often habitats in an urban environment. As linear habitats, they may be wildlife corridors that facilitate the passage of plants and animals through urban areas and between larger areas of habitat. The development of the proposed scheme has the potential for causing loss of habitats along this corridor. The railway corridor also has a significant amenity value as it used as a footpath and cycle path.

Landscape and Visual Amenity

The introduction of new infrastructure can cause permanent impacts in an area, which could either be positive or negative. Consideration would need to be given therefore, to a number of Conservation Areas that are located in close proximity to the proposed route. Conservation Areas are designated under the Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997 as being of special architectural or historic interest, the character of which, therefore, is desirable to preserve and enhance.

The scheme would potentially create impacts to people and land uses in terms of visual intrusion, particularly during construction. Areas most sensitive to these impacts include Princes Street which, in addition to being an important shopping area, has a number of historic features and listed buildings, making it an important tourist attraction, with a high scenic quality. In terms of visual impacts, the scheme with the guided bus may be slightly less visually intrusive due to the absence of overhead line electrification ("OHLE") infrastructure which is required for the LRT system. However, careful design of the OHLE will minimise any visual intrusion.

Other sensitive receptors include those properties where views of the transport scheme are highly visible. The majority of residential areas are located in north west Edinburgh, around Pilton, Cragleith, Ravelston, and Roseburn. Appropriate mitigation measures should therefore be implemented to reduce the visual impacts of the scheme.

Cultural Heritage and Archaeology

The centre of Leith has been identified as an area of archaeological importance within the Local Plans for north east Edinburgh. As the route intersects this area, it may be necessary for a full archaeological investigation to be undertaken here. Of particular importance is the fact that within 40 m of the proposed route, a Scheduled Ancient Monument ("SAM") of national importance is located at Victoria Bridge, within Leith Docks. Any construction works in the vicinity of this SAM will need to be carefully planned and implemented, to ensure that any impacts are minimised.

In addition, the centre of Edinburgh is classified as a World Heritage Site and the city centre, Princes Street and Princes Street Gardens are significant resources for local recreation and tourism. The alignment passes through Princes Street with a number of listed buildings and conservation areas located in close proximity to the route, which may be affected during construction.

Construction activities may cause temporary disruption to traffic and pedestrians. These activities may also affect the setting of any conservation areas and listed or historic buildings that are located adjacent to the site. These may also be impacted upon in

terms of vibration during operation of the scheme. Designs would be required to be sensitive to the surrounding areas.

LRT Versus Guided Bus

The main differences between guided bus and LRT technologies are detailed in Section 5.3.2. In terms of environmental impacts, however, LRVs being electrically powered do not discharge any noxious emissions, unlike guided buses, which are invariably diesel powered. To minimise the air quality impacts of guided buses, 'duobuses' could be employed. Duobuses are buses with dual power systems, normally diesel and electric motors, which automatically switch depending on vehicle speed to maximise power whilst minimising emissions, particularly if zero to low emission diesel engine technology is used.

In addition to being powered electrically, LRVs are generally equipped with resilient wheels and skirting which, as well as operating on continuously welded rail, results in noise impacts being minimised. Therefore, in summary, a guided bus scheme, depending on the type of guided bus, will have more air quality impacts than an LRT based system in terms of direct emissions from engines and from the re-suspension of surface dust.

In terms of landtake through the disused railway corridor, the extent of land required for a guided bus system would be slightly greater to accommodate the guideway kerbs, albeit with a slightly narrower vehicle. Both technologies have associated elements that are visually intrusive. In terms of the LRT system, these impacts are mainly due to the OHLE infrastructure, whereas the guideway kerbs are the principal concern in respect of guided bus systems. However, through careful design, these impacts can be minimised.

Summary

Overall, with appropriate mitigation, the effects of the scheme are expected to be benign, as there are no statutory designated areas that will be significantly affected by the scheme.

7.1.4 Technological specifications

For the purposes of this study, the LRV's were assumed to have similar characteristics as the Duetto Siemens (Sheffield Supertram) vehicle. This particular LRV has been chosen for LRT planning to ensure flexibility in the choice of vehicle which could be procured, should the scheme be implemented, as it has relatively standard design characteristics in terms of minimum turning radii, maximum gradient and width. The Guided Bus ("GB") was based on a standard single deck fixed chassis vehicle with articulated single deck bus figures shown bracketed in the table below. The characteristics given for guided buses are based on standard figures following research into two of the principal manufacturers, Scania and Volvo. The assumed characteristics of both vehicles are detailed in the table below.

Table 7.1.4: Vehicle Characteristics

Characteristic	Light Rapid Transit	Guided Bus
Minimum Horizontal Turning Radius (m)	25.0	13.0 (12.0)
Minimum Vertical Curve Radius (m)	750	>750
Maximum Gradient (%)	8.0	>8.0
Length (m)	34.750	12.000 (18.000)
Width (m)	2.650	2.550 (2.550)
Height (m)	3.645	3.300 (3.300)
Seated Capacity	100	50 (65)
Overall Capacity	250 (@ 4 pass / m ²)	65 (95)
Power System	750V d.c. OHLE system	Diesel Engine (Diesel Engine)
Cost (£ / unit)	1,800,000 (approx.)	140,000 approx. (200,000)

To illustrate the vehicles and technologies being appraised the following photographs show the Sheffield Supertram approaching a stop on a segregated section of the track and the Adelaide O-Bahn GB system.



Figure 1: Sheffield Supertram



Figure 2: Adelaide O-Bahn Guided Bus

It was assumed the number of assumed that for Scenarios 1, 2 and the Loop the number of LRVs required was 8, 10 and 16 respectively, with the number of GBs being 16, 20 and 32 respectively. To facilitate maintenance and in case of breakdown, two spare LRVs and GB are allowed for in the above totals for each Scenario.

7.1.5 Transport forecasts

Detailed analysis of the transport forecasts for the preferred option are detailed in Chapter 6 of this report.

7.1.6 Indicative costings

For details of the capital costings reference should be made to Section 9.3.1.

SUMMARY

- **The preferred alignment cover the loop form Lower Granton Road via Haymarket and St Andrew’s Square back to Lower Granton Road;**
- **A depot will be required and the shortlisted sites of the Fire Hazard Training Ground, the Lorry Park and the Forth Ports storage area will require further investigation;**
- **The environmental analysis highlighted that the LRT scheme is likely to be the most beneficial in the longer term;**

8 Consultation Process

The brief for the commission instructed the consultant team to carry out a consultation exercise. The original list to be consulted was:

- The Pilton Partnership Board
- The NEAR Group
- The Greater Pilton Community Alliance
- The Edinburgh Chamber of Commerce
- The Cockburn Association

This was revised to include the following additional stakeholders:

- Edinburgh's Telford College
- Lothian University Hospital Trust
- Lothian Buses
- The Bank of Scotland
- The Royal Bank of Scotland
- Scottish Homes
- The City of Edinburgh Council, Planning Department
- The Edinburgh and Lothian Tourist Board
- Scottish Gas
- BAE Systems
- SPOKES

In addition, Councillor Hinds (Councillor of Muirhouse Ward) was also interviewed on a personal basis.

It was decided that the best way to proceed was to hold two workshops for the Pilton Partnership Board and the NEAR Group, the first to appraise them of the remit of the study and to establish the local concerns and issues, and the second to inform them of the proposed preferred option to establish their specific views with respect to the possible route and type of vehicle. In this way the local community and business representatives could have a focussed and particular opportunity to engage fully in the process.

In addition, a series of one-to-one interviews were undertaken with the other stakeholders. These interviews followed the same procedure as the two workshops. The second round initially comprising a telephone conversation to appraise the

interviewee of the preferred proposal and offering the opportunity for a formal, second one-to-one interview if desired. Preparatory notes were prepared and distributed before the first round of interviews and workshop.

The key outcomes of the consultation process can be summarised as follows:

- 100% support for an enhanced transport link to the City Centre. Needs to be operational as soon as possible;
- There is a clear perception that the current access is poor and that the area is in need of regeneration. There is a belief that there is considerable potential in the area to achieve economic growth;
- There is the potential to generate a significant base level of patronage from attracting certain key organisations to the location;
- A good, high quality link is seen as crucial to the success of the development of the area. The local community particularly felt that a rail-based solution would make them feel more connected to the City centre and would engender a greater confidence because of its permanence;
- A link to Leith was seen generally as a key element of the scheme; if the scheme were to stop at Granton this would not deliver the full benefit to the local community;
- Ideally the system should be the first part of a city-wide network and should offer good interchange facilities to other transport modes. Haymarket was identified by many respondents as the key interchange facility particularly as this offered links to the east and west through the rail network as well as a number of important bus routes. Crewe Toll was also seen as an important interchange and an area where there is to be significant development and increase in employment. Other points of importance mentioned were Craighleith, the Western General/Telford Road, Princes Street and the Waterfront itself;
- The transit link needs to integrate with the local bus services and cycling/walking networks;
- There was clear preference also from the business community for a rail based system; bus provision was not regarded as an acceptable solution;
- Any transport solution must serve the requirements of both the business user and local communities. The community must "own" the facility;
- Operating hours need to be as long as possible; at least 6am to 12pm. Concern was expressed that current provision is not good later in the evening;
- Community representatives were particularly concerned about improving access to the City Centre and healthcare facilities such as the Sick Children's Hospital and the New Royal Infirmary. Non-car users currently have considerable difficulty in accessing these areas. The scheme would need to be able to offer good connections with other transport modes to facilitate cross-city journeys;

- Quality of the system needs to be high, particularly with regard to stops and information;
- Security will be a key issue;
- The local community needs to have access to the employment, social and leisure activities which will be generated by the Waterfront development and any transit system needs to address this. It was felt that the solution should offer a mixture of express and local services;
- Ticketing needs to be integrated and accessible. The cost of travel is an issue for the local community;
- There was general appreciation from consultees at being involved and it was noted that at the appropriate time other affected communities would also need to be consulted in the same way.

The results of the first stage of the consultation process were relayed to the Steering Group and the points noted. It should be noted that the first round of consultation was undertaken prior to the extension of the study including the completed North Edinburgh Loop. A key point to emerge from the consultation is the agreement on the key issues and concerns from both the communities and business.

SUMMARY

- **Cross-sectoral support for the link;**
- **Strong perception that a link would deliver economic and social benefits;**
- **Integration to the wider Edinburgh transport network is crucial.**

9 Financial Analysis

9.1 Overview

In order to assess the preferred route and technology in financial terms it was necessary to adopt a number of base assumptions, in terms of procurement, finance and the operation of the system. It is possible at the next stage that these assumptions may change when further work has been carried out on the procurement options, however the base assumptions as detailed in the next section are considered to be the most likely outcome at this stage. The model assumptions relating to capital cost and the traffic forecast are detailed in Section 9.3 of this report. Full financial models for the two options which have been examined in detail are set out in Appendix 7.

The previous Chapters of this report have analysed the various routes and potential technologies which have been considered for the scheme. Demand and cost forecasts have been prepared for the shortlisted routes and technologies. The resulting analysis has highlighted the preferred option as a Light Rail Transit system providing a service on the Loop. The purpose of this Chapter is to consider the financial outcome of the preferred technology for both the Loop and Scenario 2. This financial analysis will take account of the outputs of the transportation forecasts in estimating operating costs and revenues and the indicative capital costs from the technical analysis of the preferred technology and the associated requirements.

The financial model has been constructed to assess the net present costs to the public purse of providing a Light Rail Transit system to serve the Loop. In order to compare and contrast an alternative option we have also modelled Scenario 2. We have not included in this Chapter detailed financial modelling on a Guided Bus option for the Loop. For the reasons outlined previously a Guided Bus is not regarded as offering a solution which meets the objectives set for this study. From a financial perspective it is clear that a Guided Bus solution, were it to follow the procurement option identified for the Light Rail solution, would require an ongoing subsidy to March 2030, in order for an operator to generate an acceptable return. The reasons for this are set out in more detail below.

As indicated above the transportation and technical analysis highlighted the fact that an Light Rail Transit system under Scenario 1 would not cover its operating costs and therefore no financial analysis has been performed on this option. The transport and technical forecasts also highlighted that an LRT system operating on Scenario 2 would only marginally cover its operating costs, however this option would have a lower initial capital cost which would partially offset the reduced revenue forecasts.

9.2 Key Assumptions

9.2.1 Procurement

There are a number of procurement options which could be applied to this project and these are discussed further in Chapter 11 below. At this stage it would be difficult to select one "final" procurement route as there are a number of factors which would require further analysis at the next stage. However, in order to perform the financial analysis on the scheme the key assumptions of the financial model are detailed below.

- The upfront capital costs of the scheme would be fully funded by CEC, as the procuring body, through an allocation of funds from the Scottish Executive;
- The CEC would enter into a contract with a contractor who would be responsible for building the infrastructure and also procuring the rolling stock;
- On completion of the infrastructure contract the CEC would select an operator to operate and maintain the system for a certain period;
- No upfront fee would be paid to the CEC by the operator. For the preferred option it is anticipated that operators would bid to run the system paying CEC either a capital sum or share of revenues;
- The operator would be responsible for the significant refit expenditure expected on the LRT rolling stock;
- The operator would be responsible for the operating costs prior to opening. These costs would relate to the commissioning stage and would include training costs. It has been assumed the operator would fund these costs from both bank funding (approximately 90%) and equity and sub debt funding (approximately 10%);
- We have reviewed recent deals in the market for LRT schemes to assess the typical rate of return an operator would expect on a similar scheme. The return we have estimated would be dependent on a number of factors including which party will take the demand risk. There are a number of legal issues and accounting issues which will need to be investigated prior to this issue being agreed and the proposed operator would also undertake their own due diligence exercise on the transport demand in Edinburgh.

9.2.2 **Subsidy/Dividend**

As part of the financial analysis, a shadow private sector model has been developed. This model takes into account the operating costs and revenues that a private sector would generate and assumes a project return of approximately 15% over the project life. This return is based on funding being provided by the operator to undertake the commissioning phase, repay borrowings, meet the standard banking covenants, provide for mid life refit and generate a profit which will be paid to the shareholders by way of dividends and the holders of the subordinated debt with a coupon of 11%.

The Loop

For the Loop option there is no subsidy required after the initial construction of the infrastructure. The return paid to CEC under this option fluctuates during the lifecycle provisioning period, to retain banking ratios, however the payment in 2010 is approximately £2.2 million and does not fall below this figure throughout the contract period. In the last year of the contract (year end 31 March 2039) the nominal sum paid back to the Council would be £16.2 million.

The passenger demand is made up of two components as described in section 6.4, namely background demand and development demand. Details of the assumed growth rates for the different types of demand are highlighted in section 9.3.2.

Fare prices are assumed to remain static in real terms and are therefore inflated annually at 2.5%. Therefore any growth over and above the rate of inflation is assumed to be generated by increased patronage.

Scenario 2

The profile of revenues and costs fluctuates from year to year (especially due to the provisioning for mid life refit), for Scenario 2 the cash generated in any specific year may not be sufficient to meet the funders requirements in terms of cover ratios or debt service/maintenance reserves. However there are other years after the mid life refit when the returns to the operator are substantially greater than 15%. To ensure the project would be acceptable to a funder we have assumed that a subsidy would be paid by CEC to the operator to achieve the minimum ratios that would be required. Conversely in years when the returns made by the operator are greater than 15% the operator would pay money to CEC. The model indicates that a subsidy from CEC would be required until March 2025. The subsidy varies over this period but averages in nominal terms £600,000 per annum. From March 2025 onwards the operator would pay a revenue stream to CEC to the end of the contract at an average annual rate of £1.25 million per annum. As consistent with the Loop, fare prices are assumed to be constant in real terms and increased revenue is assumed to be generated by increased patronage.

The above profile of the subsidy is reasonably simplistic and in practice there is likely to be a fixed period over which the Council would receive a subsidy from the operator. The level of subsidy would have a lower limit which would be paid by the operator regardless of the revenue generated and a revenue sharing agreement if the returns were regarded excessive.

This area will require to be thoroughly reviewed at the next stage in line with the procurement process. Financial models will require to analyse the subsidy options available and perform “what if” analysis on the results to ensure that CEC attains the best solution. This work should allow the public sector a degree of flexibility to ensure the scheme can be funded in line with the money available from the Public Transport Fund.

9.2.3 Contract Length

The contract length of the operating contract is assumed for modelling purposes to be 30 years. While the Croydon concession was for 99 years, it is thought this length of contract is unlikely to be repeated. In reality it is likely that a number of concessions will be let for periods of between 7 and 10 years. This would allow the flexibility to integrate this scheme with other transportation schemes in and around the Edinburgh area over the longer term and reduce the risk of CEC having to “buy out” the operator for substantial sums of money, as has been the case in other similar schemes including the Manchester Metrolink.

9.2.4 Vehicles

It has been assumed the vehicles will form part of the infrastructure and will be funded by the public sector. Any refurbishment will be the responsibility of the operator; this will also include the significant refit expected at year 15 of the contract. Based on the length of the scheme, run times and required spares a total of 16 vehicles (Duewag Siemens as used at Sheffield) have been assumed for the loop and 10 similar vehicles for Scenario 2. The assumed cost of each vehicle is £1,800,000.

9.2.5 Depot

A separate paper has been included in Appendix 5 on the possible locations for the depot. A provisional sum has been assumed in the financial model for the acquisition of land which the depot will require.

9.3 Financial Costs

9.3.1 Capital Costs

As part of the detailed appraisal, capital costs have been estimated in respect of the preferred alignment for Scenario 2 and the Loop. It should be noted that at this stage of design development it is not possible to estimate capital costs to a high degree of accuracy, and the costs provided are considered accurate to $\pm 25\%$.

In preparing these costs certain assumptions have been made which will require to be reviewed in the next phase of design development. The cost estimates for each Scenario are provided in the following table (based on current costs).

Description	LRT(loop)	LRT (2)
Civil	54,851,350	37,514,555
Electrical	19,334,700	11,716,700
Stops	6,870,000	4,310,000
Depot	13,075,000	13,075,000
Track	43,942,000	24,237,000
Vehicles	28,800,000	18,000,000
Contingencies (15%)	25,030,957	16,327,988
Grand Total	191,904,007	125,181,243
Route Cost (£M / km)	12.22	13.83

For further details of the preferred alignment capital cost estimates, reference should be made to Section 6 of Appendix 3.

As expected the capital cost for the Loop using the LRT system is the most expensive at approximately £192 million. Scenario 2 has an estimated cost of £125 million. The costs have been estimated by Mott MacDonald and include provision of a depot and the rolling stock. The Loop is approximately 15.7km which equates to a cost of £12.2 million per kilometre. Scenario 2 extends for 9.05 km at a cost of £13.8 million per kilometre. The Loop has a lower cost per metre as it absorbs the one off costs over a greater distance.

Under the LRT system there would be a major refit of the rolling stock required in year 15 of the contract. The cost of the refit has been assumed as one third of the original cost of the rolling stock and has been spread over a four year period. These costs would be capitalised and amortised over the remaining life of the contract.

9.3.2 Operating Revenues/Costs

	LRT (loop)	LRT (scenario 2)
Operating Revenues		
Background (2006)	7,265,439	2,216,399
Development (2006)	2,994,635	444,375
Total	10,260,074	2,660,774
Operating Costs (2006)	5,430,000	2,550,000
Gross Margin	<u>4,830,074</u>	<u>110,774</u>

The table above indicates the nominal annual forecast revenues and costs for year 2006. The traffic forecasts have been based on 2006, however for the financial model, financial close has been assumed to be in March 2006. The operational date for each option is based on the length of the construction period. For the purposes of the financial model the revenue forecasts have been inflated at 2.5% from 2006 to the commencement of operations.

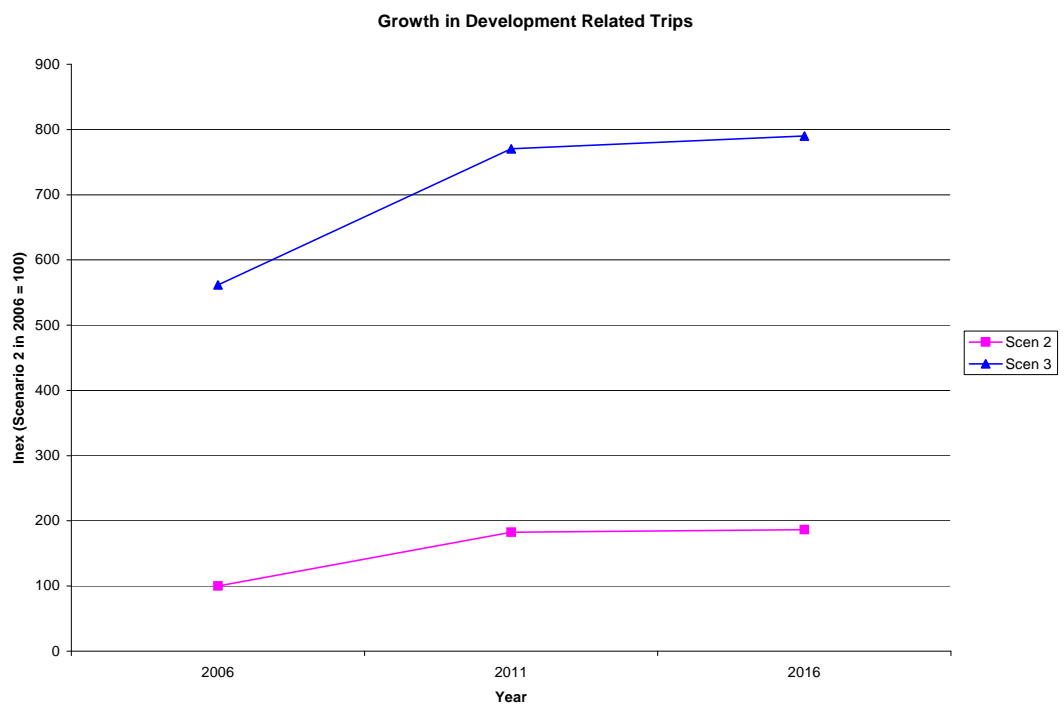
The loop generates approximately £4.7 million more gross income in the year than Scenario 2. This additional income can be utilised to provide for the mid life refit without any additional subsidy being required. This income can also be utilised to pay the CEC an annual dividend as has been modelled, or alternatively operators could be asked to bid a lump sum for the right to operate the franchise which would be retendered at regular intervals, either 7 or 10 years.

As highlighted above operating revenues for the two options are broken down into both the revenues based on existing demand and revenues generated by the developments expected to take place in Edinburgh over the next 15 years. The forecast growth of the revenues for the two options are graphically detailed below:

LRT (loop)	2006	2011	2016
Background	1%	1%	1%
Development	5.5%	0.4%	NIL

LRT (scenario 2)	2006	2011	2016
Background	1%	1%	1%
Development	12.8%	0.43%	NIL

This can be graphically shown as:



As highlighted above the development growth for Scenario 2 is greater than that assumed for the Loop. This is caused by four key factors:

- The type of development will take place e.g. offices, residential etc;
- The phasing of the developments that are scheduled to take place;
- Where the people within the developments will travel to and from;
- How the proposed scheme will service the development.

Analysing the information that has been made available on the proposed developments the results are that there is a higher growth rate from Scenario 2.

Operating costs are not expected to increase in real terms over the period of the contract, despite the growth in passenger numbers as the service headways are not expected to change. The operating costs are also assumed to cover lifecycle expenditure (other than the mid life refit).

Both revenues and costs are assumed to increase at the rate of inflation which is assumed to be 2.5% throughout the period.

Guided Bus

We have not performed a detailed financial analysis on the Guided Bus option for the three route options as this has been discounted for technical reasons and also lack of fit with objectives. However as part of the option appraisal process we performed a high level financial review of the guided bus option for the loop.

The preliminary analysis estimated that the capital costs for this option would be considerably lower than the LRT scheme and were estimated at £28.6 million based on current costs. This cost excludes the vehicles, as it is likely the private sector would be required to procure the guided bus vehicles under this option. The lower cost of this option would be expected as there is significantly less infrastructure to be put in place and the required depot would be less expensive.

A guided bus vehicle is expected to cost approximately £140,000 and the Loop is expected to require 32 vehicles, based on a 6 minute headway giving a total cost of £4.5 million. The vehicles are expected to be replaced on a rolling program every eight years. The vehicles being replaced would have limited residual value.

A guided bus system would be expected to generate a total of £4.4 million revenue (2006 figures) based on the transport forecasting work which has been undertaken. The operating costs are estimated to be £4 million (2006 figures) giving a gross annual margin of approximately £400,000. As detailed the provisioning of new vehicles based on an eight year program would require a provision of approximately £560,000 per annum. Therefore after accounting for vehicle replacement the guided bus system would generate an annual operating deficit. This analysis does not take account of any return which the operator would require to generate and therefore an annual ongoing operating subsidy would require to be paid by the CEC for this scheme until March 2030. It is unlikely that a transport scheme would be subsidised if it fails to cover its operating costs.

9.4 Developer Contributions

It is well known that land around transport facilities gains added value due to the improved level of access that the facilities bring. This has been recognised in the Key Sites document published recently by The Scottish Executive particularly the potential for a higher density of travel generating development which would maximise the opportunity afforded by a quality public transport solution. These benefits have been seen in many places throughout the world and in some instances it has been used to help finance transport facilities. At the next stage detailed work would be undertaken by the advisers to assess areas along the route, typically at or near stations where additional developer contributions could be achieved.

Increased land values have taken place on a number of schemes including around the Washington DC metro, the London underground and heavy rail stations and the TGV in France. This added value is usually associated with fixed track systems for the obvious reason that the permanent nature of the infrastructure gives confidence to the development market.

In addition to the increased land values noted above there has also been examples of contributions being used to assist in the funding of transport systems include the extension of the Portland, Oregon Metro to the airport which was wholly funded by Bechtel on the back of a business park. The cost of the Metro was of the order of £30million. Secondly, the Orestad Project in Copenhagen has funded the extension of the Copenhagen Metro on the back of increased land values associated with a new area of development near the airport.

This uplift in land value of course comes from the presence of a high quality transport link and the securing of planning permission. On the second point, it is more likely that planning permission can be secured around transit stations, since this is Government policy, thereby improving road conditions through relieving congestion and helping the on-going profitability of the transit line by increasing patronage. Density can also be increased as well. It is often the case that land that is either land-locked or blighted by the fact that a railway/tramway is disused can be released thereby unlocking value to the land owner/developer. It has been shown that because of this fact a win/win situation can be created whereby funding can be raised for transport links and acceptable returns can also be generated for the land owner/ developer.

These projects have shown that developer contributions can be secured to assist in the funding of transport infrastructure improvements because of the enhancements provided by a quality transport system. However, it is assumed that in his instance the scale of contribution will be moderate and will arise from opportunities outwith the Waterfront and Leith development areas. These areas require significant investment to bring existing brownfield land to a developable standard. In addition, the developments are subject to Section 75 agreements for affordable housing, infrastructure and education provision. Accordingly examination needs to be made of alternative opportunities on the alignment, particularly on the former railway line and at key locations in the city centre where benefit can be gained.

At this stage we have not assumed any developer contributions to the scheme, however at the next stage we would require to explore this issue further with a view to identifying the potential interest in the scheme from developers and placing a reasonable value on potential contributions.

SUMMARY

The following table contains an overview of the key inputs to and outputs from the two financial models:

Description	LRT (Loop) (£000's)	LRT (scenario 2) (£000's)
Capital Costs	191,904	125,181
Revenue (2006)	10,260	2,661
Operating Costs (2006)	5,430	2,550
Net Present Costs (excl. Developer contributions)	154,386	120,101

- Given that the Loop option extends to 15,700 metres, approximately 74% greater than Scenario 2 it is not surprising that the outcome of a purely financial analysis as contained in this Chapter demonstrates that the LRT loop has the highest capital costs and also the highest net present costs.
- The Loop would also require an additional 6 vehicles and other associated costs with a larger scheme including increased depot and higher refit costs. It should be noted that these additional costs would benefit future extensions to the system which are for accounted for in the table above.
- The initial upfront costs are approximately £66 million higher for the Loop option; by the end of the thirty years the difference in cost (in real terms) has reduced to £34 million.
- It is also likely that higher developer contributions could be generated form the Loop option given larger area that the system will cover and the significant other benefits which this option would generate. No developer contributions have been factored into the financial model.
- The preferred option clearly has the greatest potential to generate revenue and it is clear from the experience of cities in England and Europe that successful LRT systems can be developed. The revenue generating capability of these systems will be key to the ability to attract operators and Scenario 2 looks marginal in this regard.

10 Risk Transfer

10.1 Introduction

One of the key considerations in a project of this nature is the treatment and valuation of risks. In the subsequent Chapter we consider the procurement options available and the potential involvement of the private sector. Maximising the potential for cost effective risk transfer is not simply a function of specifying the corresponding private sector obligations when individual contracts are let. The private sector will be reluctant to accept risk, at cost effective rates, where it cannot control the risks or risks are introduced into the project too late to influence risk mitigation. Furthermore, optimal risk transfer demands that risk is allocated to the private sector participant best able to manage that risk. This in turn requires the terms of the contract to be co-ordinated in order to achieve the optimal risk spread amongst private sector participants in the project.

At this stage we have not attempted to value the risks relating to the project; this analysis would be conducted in the Part 2 analysis. At this stage therefore, we have focused our analysis on certain key risks which may influence the project.

The risks we have considered relate mainly to different elements of the construction of the system, as historically it is this area which has resulted in increased costs during the procurement of similar projects. We have also included analysis of competition and patronage both of which are highly relevant to the success of this Project. The risks below were agreed by the Steering Group as the core risks of the project and have, therefore been dealt with individually. We would estimate that in a project of this nature the value of the risks transferred to a private sector contractor/operator would range between 12 and 20 per cent of the scheme value.

10.2 Contract Price

The price of the contract would include the cost of supply risk which would be transferred to the private sector. It is likely that this may also include utility costs. However, expenditure related to the cost of infrastructure i.e. measures to remedy “straight current” issues or physical changes to the system required by Railtrack due to potential interference issues or physical changes caused by health and safety risk would be retained by the public sector.

Any issues of benchmarking and potential amendments to the contract price, either up or down, could be incorporated into the contract, however, it may be preferable to agree a fixed price over the contract term. This decision should be analysed within the best value framework.

As highlighted by the above example the risk transfer issues relating to contract price are not clear cut. It would be reasonable to assume that the majority of the sub risks within the contract price risk would transfer to the private sector, however there would also be certain sub risks, which would remain with the public sector.

10.2.1 Design Risk

Design risk would be a risk which could be important to this scheme given Edinburgh’s status as a world heritage site. While many best practices in design of streetscapes are

now available this risk could lead to a delay in the scheme being implemented. It is likely this risk would be a shared risk, however, this may be mitigated by the fact the promoter would be CEC.

10.2.2 Material Cost

The private sector would be responsible for the material costs relating to the delivery of the system. They would require to assess the costs within their bid and price this accordingly. Therefore any increases in material costs post the contract being signed would be the responsibility of the selected consortia if either a PPP route or an operating contract were to be followed.

10.2.3 Labour Cost

These costs are similar in nature to the material costs and would follow the same arguments for being transferred to the private sector. If the private sector were responsible for the construction and operation of the scheme they would be able to control the labour costs of delivering the scheme. They would therefore be in a strong position to accept these risks without the need for a significant premium being incorporated into their bid. The private sector would also require to assess the labour cost of staff during the operational period.

10.2.4 Utilities Diversion Costs

On other similar LRT projects these costs can account for a substantial amount of the upfront capital costs. Due to the uncertain nature of these costs, the public sector will require to invest considerable time and effort to establish what the utility diversion costs are prior to their bid for funding being finalised. They will also require to ensure that these costs are as accurate as possible. It is likely that the private sector will require to perform their own surveys and estimates of cost when bidding for the project. It is likely that the private sector estimate will be higher than the public sector estimate, due to the risk premium they will require to build in. Therefore the transfer of this risk would be dependent on the best value analysis and the relative pricing of this risk by the public and private sectors.

10.2.5 Commissioning

The commissioning risk would relate to both the costs and the time elements of commissioning. If the private sector was responsible for the construction of the scheme, they would also be responsible for commissioning the scheme. Any additional costs, which were incurred in commissioning the scheme, would be the responsibility of the private sector. The contract to deliver the scheme will specify a date for commencement of operations. If additional time was incurred in the commissioning of the scheme which delayed the expected date of commencement, it is likely that financial penalties may be payable by the private sector.

There may be some additional issues around the commissioning to consider if a single consortium is not responsible for both the construction and operation of the scheme. Therefore this issue would require to be addressed within the contract provisions to ensure the responsibilities and risks for commissioning are clearly identified.

10.2.6 Delivery and cost of Vehicles

Unless the public sector procure the vehicles directly through purchasing or leasing arrangements the risk of delivery would be transferred to the private sector. The preferred bidder for the scheme may include a vehicle manufacturer within the

consortium. If this is the case they would have direct control of the risk of delivery of the vehicles, and would therefore be best placed to accept this risk.

The cost risk of the vehicles could be transferred on the same basis as the delivery risk. Any changes to the specification (after contract signature) which are requested by the public sector would remain a public sector risk and they would therefore be responsible for any additional costs.

10.2.7 Potential Railtrack/Scotrail Compensation

Potential compensation to Railtrack or Scotrail can be split into two separate risks:

- Land acquisition;
- Other Railtrack works.

The cost of land is likely to remain a public sector risk, as the public sector promoter will be able to invoke any Compulsory Purchase Orders that may be required. It is unlikely the private sector would be in a position to accept and price a risk of this nature. Therefore the public sector would require to take the risk on the acquisition of land for the scheme in terms of availability and price.

Other Railtrack works would include items such as changes required for reinforcing embankments, amendments to infrastructure, which cause interference with Railtrack systems and similar type costs. The private sector would require this issue to be negotiated and agreed with Railtrack prior to any final offer being submitted. In this situation the private sector would aim to sign the agreement of works with Railtrack either prior or simultaneously to the project reaching financial close. If this was achieved the private sector would have certainty as to what works were required and they would be prepared to accept the risk associated with the cost of the agreed works.

10.2.8 Operational Cost Changes

If the preferred bidder was contracted to operate the system through a concession type arrangement it would require to accept the risks associated with movements in the operational costs over a specified period. This risk would be strongly linked to the contract price risk noted above. Depending on the structure of the contract there may be sub risks which the private sector may not be prepared to take or alternatively will price them so highly that it would not be regarded as value for money for the Public Sector. The issue for the public sector promoter will be the extent to which it wishes to share in any profits rising from the operating contract and how this impacts on the risks transferred and Value for Money achieved.

10.2.9 Competition

Competition risks will relate to the measures, which the current operators of public transport will take to maintain a viable service that will both compete with and complement the proposed scheme. While it should be highlighted that CEC have an equity holding in one of the main bus operators, Lothian Buses it is unlikely that this would influence any of the competition risk and issues which Lothian Buses may face as they operate as a separate commercial business.

The private sector would accept the risk of competition as a standard operational risk, which would be priced into their bid. The premium for this risk would depend on a number of related factors such as, how concessionary fares are to be paid for, the level

of patronage risk the private sector is expected to take and the traffic priority measures for the system in relation to other modes of transport.

To an extent this risk would be a shared risk. The private sector would take a view on the risk of competition from other modes of transport and how this might impact on any subsidy dividend, whereas the public sector through Lothian Buses would require to absorb any loss in revenue caused by either lower patronage or lower fares.

10.2.10 Patronage

One of the key factors relating to the Waterfront development and other projects occurring in North Edinburgh is the likely phasing of the programme of development. The Masterplan does not forecast the completion of the development for approximately ten to fifteen years, although it is recognised that this timeframe may shorten. There are significant other developments taking place in North Edinburgh which could have a beneficial impact on patronage. The question which will require to be addressed further in Part 2 is the certainty of the developments and the passenger numbers they could generate. A private sector operator running the system for the first time will require comfort that the projections of revenue can be achieved. This is particularly important as the system incurs costs in advance of generating revenue.

SUMMARY

- **Certain key risks have been identified which will impact on the development of the scheme;**
- **Major issues are design, cost, interface with other operators and demand;**
- **Detailed analysis of the impact will depend upon the preferred procurement route.**

11 The Procurement Process

11.1 Procurement Options

11.1.1 Introduction

Over the past ten years, a considerable number of public transport infrastructure projects have been developed across the world through an approach that in some measure involves the introduction of the private sector in a risk bearing capacity. In airports, ports and roads, it has been possible to develop relatively straightforward funding models where a concession company takes over responsibility for the design, build, financing and operation of the scheme, in return for the right to the real or shadow revenue streams generated by the enhanced infrastructure. In urban and inter-urban rail and transit systems, while a number of projects have indeed been developed, their funding structures have generally been significantly more complex.

This complexity follows from a number of features commonly associated with rail and transit schemes:

- The planning process for major transport projects is, in most cases, extremely complex and commonly requires the development of detailed plans before planning permission is granted. Since the private sector has traditionally been reluctant to accept the costs and risks associated with gaining permission, much of this detailed design has therefore necessarily remained within the public sector;
- Urban transport projects do not, generally, generate sufficient revenue from the farebox to pay for the capital costs associated with the project. Indeed, in many instances even the long term operating costs of the schemes cannot be fully covered by this revenue. The public sector therefore maintains a major role; contributing an often very significant proportion of the capital costs. It has a real interest in ensuring that, in design and operation, the project meets its wider social benefit agenda as well as the necessary commercial agenda pursued by the concession company;
- Much of the benefit of a public transport service is only generated through integration with the other parts of the system. This will impose significant additional demands on the way the project can be structured, with the design and operation of the system often severely constrained, and the policy of revenue collection prescribed by an external transit authority;
- Increasingly (especially within the European arena) the public sector is seeking to obtain the maximum economic benefit from the rail system through the separation of procurement and operation of the infrastructure and the operation of the on-rail services themselves. While this separation might ensure competitive use of the infrastructure and a more transparent application of subsidy, it does introduce a new complexity to the financial operations of the industry. While not yet a major influence in many urban rail systems, the approach is now being developed for the privatisation of London Underground.

Although it is not possible to define a single pro forma model for such projects, a significant number of projects have been developed across the world – and especially in the United Kingdom, where Government policy has driven public sector development

down the PPP/PFI path. Each of the different funding structures has been developed to meet:

- the particular financial situation facing the project;
- the objectives of the public sector sponsor;
- the operating rules of the competing transport system;
- government rules for triggering central capital subsidy.

The purpose of this chapter is to examine the implications of certain of these issues for the future procurement of this project.

11.1.2 Design Build Finance and Operate (“DBFO”)

Background

Under this method of procurement the private sector would be responsible for the design, build, finance and operation of the preferred option. The private sector would form a consortium of companies which would specialise in the elements of the contract required by the procuring body. This would include construction companies, rolling stock providers, operators, maintenance providers and finance providers. Typically the consortia would create a newly formed company (a Special Purpose Vehicle “SPV”) with the specific aim of bidding for the project. It is likely that most if not all, of the consortium members will be required to take an equity stake in the SPV. This stake is likely to be between 5 and 10% of the total capital cost of the scheme. Such a holding would give the procuring body and the funders comfort that the SPV and the respective shareholders are committed to the scheme. The SPV will be responsible for operating the system over a specified period of 25 to 35 years. After this initial period the system could revert back to the public sector at no cost or a second contract could be let through a competitive process. Throughout the operational period the SPV may retain the farebox revenue generated from the operation of the system. If this revenue, as is likely, is insufficient to allow the SPV to service their debt and achieve a reasonable return a subsidy will require to be paid to the operator by the relevant public sector body. The subsidy could either be paid as a lump sum up-front to meet the capital costs of the scheme or by way of an annual revenue subsidy. The profile of this subsidy could vary over the contract period depending on inflationary increases and the amount of farebox revenue generated. The Granton Masterplan is scheduled to be completed in 15 years and it is likely that the patronage will increase over this period. The effect the increased patronage will have on the farebox revenue will depend on the level of fares and concessionary travel provided to meet the social objectives of the scheme, this in turn will influence the amount of subsidy required.

Contract

If the DBFO was considered the preferred procurement route a contract and invitation to negotiate (“ITN”) would be developed by the procuring body and their advisers. The shortlisted consortium would respond to the ITN and after evaluating the bids a preferred bidder would be selected with a view to achieving financial close as soon as possible thereafter. The contract would govern the way in which the preferred option was designed, built, operated and to a certain extent maintained. This contract would provide benchmark performance measures which the various consortia, at each stage would

require to achieve. An incentive mechanism would be provided for in the contract, to ensure the private sector is meeting the required performance targets.

There are a number of advantages in procuring the solution under this method as listed below:

- By contracting with a single private sector point of contact (the SPV) for all aspects of the project including construction, operation and maintenance reduces interface issues that can arise if there are operational issues to resolve;
- Allows a significant proportion of the private sector subsidy to be conditional upon the performance of the system, during the operational phase it ensures there is a direct link between the services provided and the payment made for that service by the procuring body;
- Encourage the consortium members, including the contractor, system and vehicle supplier and operator to work together to ensure the long-term success of the system;
- Simplify contract enforcement, by making all enforcement rights enforceable against a single SPV leaving the participants in that consortium to resolve any disputes between themselves.

This structure is likely to maximise the project risk which can be transferred to the private sector as it involves the private sector being responsible for all aspects of the scheme including;

Bankability

As noted above the private sector will be responsible for raising the finance for this scheme during the construction phase, and taking the benefit of any subsidy from the public sector which is received throughout the operational concession. This concession period may last for 25 to 35 years, however the subsidy may be linked to the phasing of revenue build up which will be influenced by the progress of the Masterplan over the next 15 years. The private sector element of funding for the scheme may take the form of equity provided by the consortium members, this typically accounts for up to 5% of the total funding. Subordinated debt, which is similar to equity, can also be provided by the consortium members or other external investors, typically up to 5% of total funding and finally senior debt/ bond finance will be provided by the funding institution, typically 90% of total funding.

The majority of the private finance would be provided by the funding institutions including banks and building societies. These institutions will require to satisfy themselves that under various "what if" scenarios the debt repayments and required cover ratios are maintained throughout the project. If the funders are unable to get comfortable on this issue it is unlikely this procurement route would be a feasible option.

The bankability of the scheme will be dependent, in part, on the balance between the incentive mechanism and the penalty regime which would cover situations of default by the private sector operators in meeting reliability, performance, customer satisfaction, and other similar criteria for system performance. If the penalty regime is too harsh and does not reflect the realities involved in operating such a scheme then it is likely the operator will price this in to their bid, which may increase the cost and not offer value for money.

Another key factor in terms of the bankability of this structure would be the requirement of the procuring body to have an influence in setting fares including future increases and the provision of concessionary travel. The Steering Group has already identified that one of the key aims and objectives of the transportation link between Granton and the City Centre is to promote social inclusion and encourage economic regeneration. As noted above a balance between the private sectors requirement to earn a return and service the debt and the procuring body public sector objectives will require to be achieved to ensure the bankability of the project is not undermined. Further analysis of the patronage will be required at the next stage to underpin this.

Subsidy

It is expected that the preferred option will require to be subsidised, at least over the initial years of the development, by public funds, in addition to the farebox revenue generated and the private sector contributions detailed above. Under this procurement method, more generally referred to as PPP, the subsidy would be paid to the SPV during the operational phase of the contract. It will be important to ensure the length of concession is therefore sufficient to allow the private sector to achieve a return.

It is possible that this scheme will form the first phase of a rapid transport solution for Edinburgh. The difficulties in predicting when the other phases would be awarded would make it difficult to award a long-term concession as the situation may arise that the concession requires to be retendered prior to the other phases being awarded. Therefore the contract should be structured in such a way as to cover this issue. In other transportation projects a flexible break clause has been used. This provides for a minimum guaranteed period of operation of the current system. After this period the procuring body would have the right, at its option, to award a combined DBFO contract for any additions to the network and to terminate the concessionaire's operating rights in return for pre determined compensation payments. This compensation would typically be based on the projected return the private sector would expect from the original concession period, adjusted to provide a discount for the elimination of operating risks, early receipt of returns and would be varied upwards or downwards to reflect actual operating experience. The procuring body may seek to pass the costs of the compensation payable to the first consortium to the consortium that wins the subsequent contract. However this risk would require to be assessed in the value for money assessment of the procurement options.

The other option of allowing the preferred bidder to run one system and to procure an extension to the system in isolation could prove problematic in terms of operations (ticketing, timetabling etc.). There would also be difficulty in ensuring a level playing field for the bidders at the next phase if one of the potential bidders was operating an existing element of the system.

11.1.3 Design Build Operate and Maintain ("DBOM")

Background

This procurement method is similar to the DBFO, however it is the public sector that retain responsibility for raising the finance for the scheme. As with the DBFO the consortium would form an SPV which would contain companies with the expertise required to design, build, operate and maintain the preferred option. Consistent with the DBFO option the consortium members may be required to provide equity into the SPV which would require to operate the scheme for a specified contracted period. Under this option the subsidy would be paid against the capital costs and the SPV would be

expected to operate the scheme on an annual basis without receiving any further subsidy. This option was adopted for Phase 1 of the Metrolink in Manchester and Line 1 of the Midland Metro.

Contract

The contract will be similar to that described for the DBFO solution and will therefore have similar advantages as those outlined above, in terms of the consortium members working closely together to ensure the long term success of the system and “one point of contact” for the public sector.

Bankability

As detailed above the funding for the capital costs would be provided by the public sector: to the extent that 100% public sector funding is available this should reduce the bankability issues with this option. However, if the private sector is expected to operate the system without a subsidy then the transportation forecasts will be rigorously tested and if the system is unable to cover the operating costs it is unlikely there would be any interest from the private sector. Therefore the tests in terms of the contract and payment mechanism issues will be similar to the DBFO contract.

The length of the contract will require to be sufficient to allow the private sector to achieve a return and as consistent with the DBFO the issues of phasing will require to be fully provided for in the contract agreement. This would allow the initial partners to be bought out at an early stage of operation if subsequent contracts were awarded for other elements of the network. It is likely that any concession period could be shorter under this option. This would be possible as the SPV would not require to service significant amounts of debt at the front end and that, if allowable by the finance companies, leases relating to rolling stock and similar items held by the private sector could be transferred to a subsequent operator.

The rights of each party in relation to setting fares and the subsequent increases, in addition to a policy of concessionary fares will also have to be agreed and detailed in the contract. This would be particularly important as one of the potential tenants for the Waterfront is Telford College with a large number of students who are likely to be heavy users of the system between the campus and the City Centre. In addition, it is clear from the consultation process and to meet the social inclusion objective there will be a requirement to offer concessionary travel to residents of areas surrounding the development area.

Subsidy

Under this option the public sector funding is related to the capital works phase of the contract. However the public sector interest in terms of economic and social benefits can be viewed as being directly related to the service that is delivered rather than paying simply for completion of construction and the physical system. This procurement can also result in the public sector subsidy being paid during the construction stage, rather than being deferred over a longer period.

11.1.4 Traditional Public Sector Procurement

Background

Under traditional procurement the procuring body would seek money from The Scottish Executive to fund the capital cost of the scheme. The procuring body would then enter into a contract with either a consortium or individual firms to construct the preferred

option. Once the system is build the procuring body would directly recruit the personnel required to operate the scheme.

Contract

As the procuring body would be the operator of the scheme there would be no need for additional contracts with third parties unless an element of the scheme was outsourced (e.g. maintenance). All the contracts would be managed directly through the procuring body or alternatively through a Direct Labour Organisation. The procuring body would set its own performance standards in terms of customer satisfaction, delays etc. and self monitor its performance against these criteria.

This structure could cause interface issues as the contractor responsible for constructing the system and the operator i.e. the procuring body will not be the same organisation. Therefore if a problem arose with the operation of the scheme the contractor may blame the problem on the way it has been operated by the procuring body, the direct accountability of a consortium has been lost with this procurement method.

As the procuring body will have the responsibility for the design, build, finance and operation of the scheme all the risks and rewards of the scheme will remain with the public sector. There may be scope to transfer some of this risk through the construction phase with the contractor by using penalty clauses for late delivery of the scheme. However this method of procurement leaves the procuring body with the majority of the risks. These risks require to be valued to ensure there is comparability between this option and the other procurement options outlined in this Chapter.

Bankability

As the procuring body would be responsible for funding the scheme in both construction and operational periods there would be limited issues of bankability of the scheme. The procuring body would also have the ability to pursue more freely the public sectors aims and objectives of social inclusion and economic development through setting the fares and making allowances for concessionary travel. However during the operational phase any excess or shortfall in revenues would require to be accounted for by the procuring body and if this was a shortfall it could divert funds away from other areas. This option does not provide any degree of cost certainty throughout the operational period.

Subsidy

The capital costs would require to be fully subsidised during the construction and operation phases and any revenue surpluses or deficits would also have to be directly accounted for.

One of the main benefits cited for utilising public funds especially in the construction phases is that the public sector can borrow at lower rates of interest than the private sector. While this may be true, the costs savings achieved from lower finance costs require to be set against.

Interest rate increases over the repayment period. The private sector typically “lock in” to funding rates for 20 to 25 years and have the option to refinance the debt if this is advantageous. However the public sector are unable to do this and may be burdened with interest rates later in the project than the private sector would ultimately have to pay.

This procurement method leaves the risk of time delays and construction cost overruns with the public sector.

11.1.5 Concession Arrangements

Background

There are a number of concession arrangements, which can be used for the procurement of the preferred option including both regulated and unregulated arrangements. Under a typical arrangement (regulated concession) the procuring body would fund the construction of the scheme through the construction period. When complete the procuring body would then aim to recoup most of the initial funding by selling the private sector the concession to operate the system for a number of years. At the end of the concession period the system would be handed back at no cost to the procuring body. This arrangement was the outcome of the Sheffield Supertram.

Contract

Depending on the structure agreed upon (regulated or unregulated) the contract would be similar to the DBOM. The private sector would be responsible for the operation, service levels and maintenance of the scheme throughout the concession period. There may be interface issues with this procurement method as there are two separate SPV's one responsible for the design, construction and the other for the operation of the scheme.

Bankability

As the private sector would require to purchase the concession it is likely that funding will be required from lending institutions. Therefore the issues of patronage, payment mechanisms including incentives and penalties, debt service and cover ratios will all require to be adequately resolved. The price received by the procuring body would be dependent on the forecasts of the scheme.

Subsidy

As detailed above the procuring body, if the patronage projections were sufficiently attractive, could seek to raise finance through the sale of the concession to the successful private sector operator. The concession payment could be structured as an initial lump sum payment or a payment to be made by the operator throughout the operational period or as a combination of the two options.

Depending on the expected revenues generated in relation to the costs of the scheme a subsidy may be required from the procuring body. This could take the form of a "top up" of the farebox revenue or alternatively the procuring body could agree an annual payment to be made to the operator and retain the farebox income. It is likely that the first option would be preferred as this would transfer the risk of collection to the private sector.

SUMMARY

There are a number of procurement routes which could be followed to take this project forward at Stage 3. In considering which route to model we have had regard to a number of matters which could affect the system development.

- **Many other schemes in the UK have adopted contractual structures which have proved to be inflexible.**
- **The Preferred Option represents a significant element of the Local Transport Strategy, and accordingly could well form the first element of a rapid transport solution for Edinburgh. It is therefore not appropriate at this stage to recommend a DBFO concession or PPP type arrangement.**
- **At this stage is felt that the most appropriate way to take the scheme forward is to let a contract for the design, construction and installation of the system, including supply of vehicles. A fully complete system would then be handed over to an operator who would be granted an operating and maintenance contract.**
- **The operating contract would be for a period of between 7 and 10 years and the successful operator would be the one which offered the best package of service quality and franchise value. The operator would be allowed to bid a franchise value either by way of a capital sum or an annual share of revenue.**

12 Implementation

The work which has been undertaken to support the preparation of this report has indicated that a rapid transport scheme for North Edinburgh is a feasible option and one which would generate revenue streams attractive to a potential operator. The scheme addresses the key criteria set by the Waterfront Steering Group and meets the objectives of the local transport strategy. Accordingly, it is regarded by the Steering Group members as worthy of taking through the Stage 2 STAG evaluation process.

In this Chapter we identify the steps which, the procuring body, which we assume to be City of Edinburgh Council, should take to implement the scheme together with an indicative estimate of costs required to take the scheme through the Stage 2 STAG process.

The key determinant to the timetable is to progress the Stage 2 application process for submission to the Scottish Executive in August 2003. We have set the date of August 2003 as an aggressive target to be met in order to commence the procurement process as rapidly as possible after submission of the Stage 2 report. It will be key to the success of the Waterfront development and the regeneration of North Edinburgh that a quality rapid transport link is established as soon as possible. A key factor in this will be the progress of the necessary orders through the Scottish Parliament. This will be the first occasion that a scheme of this nature has gone through Parliament and this could well have an impact on timing. Further consideration of the work which would be required in this regard is set out below.

The second issue which could cause delay is that procurement of a private sector operator, under the procedures dictated by European Public Procurement Regulations, can itself take up to twelve months

12.1 Preparatory Measures

In order to progress to a successful Stage 2 application we believe the following workstreams require to be completed:

- Refinement of patronage modelling to a degree where potential bidders will be able to rely on these numbers as part of their bid process. It is accepted that the bidders will undertake their own due diligence;
- Development of economic impact analysis;
- Refinement of route alignment, including detailed investigation of structures on the route and assessment of technical solutions to identified “pinch points”;
- Completion of a detailed environmental study into the route alignment;
- Agreement on route alignment removing sub-options from the analysis;
- Finalisation of depot site location and area required;
- Refinement of cost estimates based on work undertaken above in order to determine the level of subsidy required;

- Identification of development opportunities on the route which could secure contributions to the cost of the scheme. This should generate an evaluation of the likely proceeds arising from such schemes;
- Development of a financial analysis of the preferred solution;
- Development of the preferred procurement route;
- Completion of a detailed consultation exercise;
- Development of a project structure and timetable;
- Development of proposed regulatory regime, together with safety case and performance monitoring arrangements, including integrated ticketing proposals;
- Conduct of workshops and other consultations with the private sector;
- Provision of information and marketing of the proposals to potential private sector partners and the wider community;
- Development of the Bill to progress the scheme (further detail on these elements is set out below);
- Conduct of a public inquiry.

12.2 Legal Input

We have considered in some detail the requirements for legal input to the next stage of the process.

12.2.1 *Drafting of the Bill*

The drafting of the Bill will require the following tasks to be undertaken:

- a statement by the Presiding Officer on legislative competence (Scottish Parliament to provide);
- Explanatory notes to the Bill;
- a Promoter's memorandum;
- a Promoter's statement;
- an assignation of copyright/licensing agreement or agreements with the Scottish Parliamentary Corporate Body;
- an Estimate of Expense and Funding Statement;
- certain maps, plans, sections and book of reference (see Procedural note in Appendix 8);
- an Environmental Statement.

(Bills which seek to authorise the construction or alteration of certain classes of works or the compulsory acquisition or use of any lands or buildings must be accompanied by the last three documents noted above.)

12.2.2 Parliamentary Procedure

- General monitoring of progress of the Bill in order to identify particular concerns or queries arising throughout the Committee's consideration. This would include analysing the objectives submitted to the Committee by members of the public during the initial stages. (This effectively takes the place of the more traditional public inquiry);
- Provision of evidence at Committee meetings. This could take the format of either written or oral evidence and could be on any number of matters depending on the interests/concerns of relevant MSPs. It is the responsibility of the Promoter to ensure the Committee are fully informed and understand the proposals in the Bill and therefore the Promoter must make available to the Committee those specialists or advisers necessary such as lawyers, engineers, architects and so on;
- Amendments to the Bill - It is highly likely that amendments will be required on an ongoing basis to the Bill at the preliminary and consideration stages of the Committee meetings;
- General legal advice.

It is estimated that, given the likely sensitivities of the project, the estimated timescale of lodging and proceeding with the Bill through Parliament could be 18-24 months.

12.2.3 Other Related Legal Work

- Property title diligence on the affected land. Given the number of title deeds to be investigated in order to complete a proper diligence exercise, this could be a substantial task. External mapping agents may require to be employed and their costs do not form part of this estimate;
- Planning advice;
- Environmental Impact Assessment;
- Construction and engineering:- advice on procurement strategy;
- Property advice relating to CPOs;
- Parliamentary advice in relation to the procedures.

12.3 Environmental Assessment

The key elements of this environmental work would be:

- consult with environmental statutory bodies and other groups;
- undertake an Environmental Impact Assessment (including scoping exercise);

- production of an Environmental Statement for submission to Parliament;
- provision of environmental technical support for Parliamentary committee stage (possibly involving ES addendums, as appropriate);
- pre-Public Inquiry work (Rebuttals, Statement of Case, Proofs of Evidence etc);
- Public Inquiry and provision of expert witnesses for various aspects of the environment.

12.4 Future Demand modelling and Appraisal

The modelling and appraisal work that has been undertaken to date has demonstrated that there is a strong case for a light rail system in North Edinburgh and that it is worthwhile to undertake further development work leading to an application for powers and then the letting of a concession.

In the project development phase three tranches of demand forecasting can be identified, these are:

- i. to support the design process and the application for powers (at which stage it has to be shown that there is a prima facie economic and funding case for the scheme).
- ii. to support a funding application and any subsequent negotiation. This is usually made once powers have been obtained.
- iii. to support the establishment and letting of a concession.

While each of these three tranches has a different focus and emphasis, it is envisaged that a single modelling system can be used to support each. However, it should be recognised that a certain degree of model development and refinement may be required at each stage.

Earlier in this report when reviewing the modelling exercise a number of modelling development issues for the next stage of the projects development were noted. A significant programme of model development will need to be undertaken prior to making a Parliamentary Submission. To recap, the model development tasks are:

- the collection of public transport origin-destination data;
- the collection of roadside interview data;
- the collection of stated preference data and the derivation of Edinburgh-specific mode choice parameters;
- the refinement of trip generation forecasts from the development sites;
- the development of a trip distribution model for development related trips.

Prior to Parliamentary Submission the incorporation of these items in the modelling framework will provide detailed:

- input into the design process to ensure the supply provided is appropriate to the forecast demand
- input into a Part 2 STAG Appraisal

Once a funding application has been made there is likely to be a focus on sensitivity tasking and possibly an external audit. Here, the main thrust of work is establishing the robustness of the cause to a range of possible outturn scenarios.

The third stage of modelling work is to support the letting of a concession. Bidders will have a different focus to Government and that focus will be dependent on the structure of the concession. For example, if there is a significant transfer of revenue risk bidders will wish to explore via the modelling framework the sensitivity of revenue (as opposed to benefits which is Government's main interest). However, alternative concession structures may have a focus on other issues (such as operational performance) rather than revenue.

12.5 Technical and Design

Based on past experience of similar projects, we anticipate that the engineering costs would be of the order of £1.5M for a scheme of these proportions. This estimate includes all anticipated engineering inputs up to the enactment of a Parliamentary Bill, based on the proposed Scenario 3 alignment, subject to the following exclusions.

- i. Public and Non-Statutory Consultation as it is difficult to estimate the quantum of work which will be required;
- ii. Planning Supervisor Inputs;
- iii. Land Referencing Agent Inputs;
- iv. Urban Design Inputs; and
- v. Scheme Justification.

The following work included in the above estimate assumes LRT technology and is based on the Scenario 3 alignment.

- Appoint sub-consultants where appropriate;
- Appoint and manage topographical surveying contractor;
- Design of ground investigation;
- Appoint and manage ground investigation contractor;
- Obtain up-to-date background mapping;
- Obtain up-to-date Public Utility Apparatus plans;
- Undertake Geological/Geotechnical desk study;

- Undertake structural inspection/survey and assessment of existing structures;
- Incorporate Public Utility Apparatus plan information on background mapping;
- Define basic horizontal and vertical alignments;
- Refine horizontal and vertical alignments;
- Define/review stop locations;
- Make choice between remaining sub-options to Scenario 3 alignment;
- Prepare 1:1250 route alignment plans;
- Preliminary engineering design of significant structures;
- Liaise on diversion of public utility apparatus and obtain estimate of costs ;
- Assess impact of Public Utility Apparatus;
- Consider need for draft agreements with Railtrack and others;
- Prepare 1:500 route alignment plans for street running sections;
- Traffic management and urban traffic control (UTC) interface consultations with CEC City Development,
- Consultations with relevant CEC Departments other than City Development (e.g. Planning);
- Development proposal interface consultations;
- Railtrack/HMRI Consultations in respect of parallel running at Haymarket;
- HMRI Consultations;
- Define detailed horizontal and vertical alignments;
- Define maintenance depot requirements and size;
- Locate suitable site(s) for maintenance depot;
- Define LRV parameters;
- Vehicle selection;
- Preliminary/conceptual design of overhead electrification line equipment (OHLE);
- Outline design of signalling (inc. any immunisation of Railtrack signalling), control & communications;
- Identify major work sites;

- Capital cost estimates and “Engineers Estimate of Expense” for Parliamentary Submission;
- Develop Parliamentary plans and sections;
- Incorporate limits of deviation and land reference information on Parliamentary Plans;
- Finalise Parliamentary Plans and sections;
- Prepare works descriptions for Parliamentary Submission;
- Finalise, print and issue engineering deliverables for Parliamentary Submission;
- Review petitions against order;
- Negotiation and resolution of petitions;
- Development and preparation of precognitions for Public Inquiry;
- Preparation and provision of expert witness at Public Inquiry;
- Public Inquiry attendance; and
- Monthly progress meetings.

12.6 Financial Structuring

The Stage 2 process will involve a number of key workstreams for the financial advisers including:

- Development of the financial analysis of the scheme and its NPV;
- Development of the financial structuring of the scheme;
- Identifying potential procurement routes and contract structures;
- Identifying potential alternative funding routes;
- Identifying the value and source of developer contributions;
- Liaison with potential developers;
- Liaison and consultation with potential contractors and operators;
- Preparation of the Stage 2 bid document;
- Development of information for Parliamentary Submission;
- Development of information for, and attendance at Public Inquiry.

12.7 Costs

The tables below set out an assessment of the internal and external costs likely to be incurred by the procuring body, City of Edinburgh Council, to develop the analysis contained in this report to a Part 2 STAG appraisal. These costs are based on the assumption that the Stage 2 submission is made in August 2003.

12.7.1 *Procuring Body Internal Costs*

The costs likely to be incurred over three years by the procuring body in securing the STAG Part 2 approval to proceed with procurement of the scheme and support the Parliamentary process have been estimated by CEC as follows.

Promoter costs	Cost (£)
Project manager	171,000
Project manager assistant	145,000
Technical support	123,000
Administrative support	86,000
Total	525,000

12.7.2 *External Advisers*

In order to deliver a Part 2 STAG submission we have identified the costs of the external advisers required to take the scheme to that stage based on the analysis above. For clarity these costs have been analysed to highlight the costs expected to complete STAG Part 2 and the additional costs to take the Bill through Parliament. These are set out in the table below and are based on costs estimated by consultants in the applicable discipline.

Part 2 STAG Process

External Advisor costs for Stage 2 process	Cost (£)
Legal advice to progress Bill, including drafting	200,000
Legal work in connection with procurement route, title deeds, planning, etc.	250,000
Environmental analysis	200,000
Demand and revenue analysis (including surveys)	850,000
Appraisal (incl. Economic impact analysis)	200,000
Design and technical specifications	1,600,000
Financial structuring and Stage 2 documentation development	500,000
Project management up to Stage 2	450,000
Total	4,250,000

Costs to take Bill through Parliament

External Advisor costs for Stage 2 process	Cost (£)
Legal advice and support through Parliamentary process etc, as outlined above.	400,000
Demand and revenue analysis and appraisal, support through Parliamentary process etc, as outlined above	150,000
Design and technical specifications, support through Parliamentary process etc, as outlined above	300,000
Financial structuring, support through Parliamentary process etc, as outlined above	200,000
Project management support through Parliamentary process etc, as outlined above	200,000
Total	1,250,000

The tables above indicate the total costs which it is envisaged would be required to progress the scheme to a Part 2 STAG application in August 2003 and the related costs to take the proposed Bill through Parliament. This is predicated on the assumption that the preferred option, as identified in this report, is the focus of the effort and that sub-options are reduced to a minimum. We are aware from other similar schemes progressing in England that the estimated costs are in line with the figures noted above.