

EDINBURGH TRAM CYCLE INTEGRATION STUDY



EDINBURGH TRAM CYCLE INTEGRATION STUDY

Final Report

July 2009



THE TRANSPORTATION CONSULTANCY

EDINBURGH TRAM CYCLE INTEGRATION STUDY

EDINBURGH TRAM CYCLE INTEGRATION STUDY

July 2009

PREPARED BY:

Transportation Planning (International) Ltd
28 Rutland Square,
Edinburgh,
Scotland,
EH1 2BW
Tel: +44(0)131 221 6525 –
Fax: +44(0)131 221 6524
E-mail: [REDACTED]@tpi-world.com

Document Control

Project Title: EDINBURGH TRAM CYCLE INTEGRATION STUDY

Project No: 22250

Document Ref:

Document Status: Final Report

Document Approval:

Project Director:

Project Manager:

Issue Date and History:

2009-05-05	First Draft Report
2009-06-17	2 nd Draft Report
2009-07-06	Final Report

Distribution:

External:		TIE
		Local Transport Projects
Internal:	File Library	

Contents

- 1.0** Introduction and Study Context
- 2.0** Reasons for Study
- 3.0** City of Edinburgh Cycling Policy
- 4.0** Further Consultation
- 5.0** Benchmarking With Other Tram Systems
- 6.0** Main Routes and Conflicts Addressed
- 7.0** On-Route Analysis and Recommendations
- 8.0** Off-Route Analysis and Recommendations
- 9.0** Cycle Storage and Carriage
- 10.0** Signage, Education, Publicity and Training
- 11.0** Monitoring and Feedback Recommendations
- 12.0** Conclusions and Overall Recommendations

List of Tables

- Table 1.1 – Context and Aims of Study
- Table 2.1 – Key sites requiring investigation
- Table 7.1 – Conflicting Issues
- Table 8.1 – Access to Haymarket Station
- Table 8.2 – Access to NCN Route 1 near Coates Gardens
- Table 8.3 – Access to NCN route 1 via George Street

List of Figures

- Figure 1.1 – Study Process
- Figure 5.1 – Green Squares in Manchester
- Figure 5.2 – Nottingham Cycle Leaflet cover
- Figure 5.3 – Nottingham Cycle Leaflet page 1
- Figure 5.4 – Nottingham Cycle Leaflet page 1
- Figure 5.5 – Nottingham Cycle Map
- Figure 5.6 – Manchester Cycle Routes following future extension of Tram Network
- Figure 5.7 – Nottingham Slippery Rails Sign
- Figure 6.1 – Overview of Alternative Routes adjacent to Leith Walk
- Figure 6.2 – Alternative Routes to Leith Walk (Leith)
- Figure 6.3 – Alternative Routes to Leith Walk (Picardy Place)
- Figure 6.4 – Alternative Route through the City Centre towards Haymarket Station + Roseburn
- Figure 8.1 – Hanover St/The Mound Junction
- Figure 8.2 – Road markings (Croydon)
- Figure 8.3 – Alternative routes near Waverley Station

Appendices

- A. Detailed analysis of on-route Traffic Regulation Order Drawings
- B. Review of on-route Road Safety audits
- C. Detailed analysis of proposed off-route alternatives
- D. Detailed benchmarking documentation
- E. Notes of consultation meetings and correspondence
- F. City of Edinburgh cycling policy

1.0 Introduction and Context

Background

- 1.1 The Edinburgh Tram Project is a major capital project, with the initial phase involving over £500m capital expenditure. Construction has already commenced, with completion of the first stage, (Phase 1a between Newhaven, the City Centre and the Airport), scheduled for 2011.
- 1.2 As part of the scheme, cycling groups have been consulted, primarily in the context of the impact on cycle routes across, along and parallel to the tram routes. This includes SPOKES, the Lothian cycling campaign group.
- 1.3 Although SPOKES have been positive and supportive of tram throughout the development providing constructive criticism, there has recently been explicit criticism with SPOKES, expressing fears that cycle routes, especially in Princes Street and Leith Walk, will be adversely affected.
- 1.4 Experience in other UK cities indicates that cyclists can be vulnerable to accidents on tram routes, especially during the early stages following implementation.
- 1.5 Although TIE are well progressed with the design, there are still opportunities at this stage in the construction to tackle these issues, ensuring that cycling within Edinburgh continues to be promoted, that 'safe routes' are available and promoted and that appropriate information and training is available for both existing and potential cyclists.
- 1.6 Contractors, operators and the local authorities all have a stake in providing the best possible facilities for cyclists, also working with local groups representing cyclists

Context and Aims of the Study

- 1.7 In November 2008, TPi completed a Scoping Study to determine the requirements for more detailed work to ensure that the needs of cyclists are fully incorporated into the Edinburgh Tram Project. The outcome of this Scoping Study was agreement to undertake a further piece of work.
- 1.8 The following table sets out the aims of each of the stages in this project, entitled the *Integration Study*.

Table 1.1 – Context and Aims of Study

Stage	Description	Expected Achievements
Consultation	Further discussions with CEC, SPOKES and other stakeholders	• Commitment to work • Confirmation of priorities • Understanding of scope of project • Assistance with later elements
Benchmarking	Establish approaches used on other UK trams	• Approaches to meeting needs of cyclists used by Notts, Sheffield etc. • Outstanding problems and proposed solutions • Contacts for further work

Stage	Description	Expected Achievements
Assessing Main Access Routes	Define the end-to-end routes to be maintained (including schools)	• Prioritised routes to be maintained & guarded (eg Leith Docks to City Centre) • Definitive maps • Routes to schools • Long-term aspirational routes
Establishing Conflicts	Establish where the above routes are compromised by the tram	• Maps of routes, junctions etc. • Identification of cycle facilities currently in place, to be implemented or to be lost • Key Road Safety Audit issues
Mitigation Plans – On-route	Proposals to improve facilities on the tram route	• Comments on RSAs • Feedback from stakeholders, including SPOKES • Input to TROs • Cost/benefit analysis (usage)
Mitigation Plans – Off-route	Proposals for alternative routes away from the tram	• Maps setting out proposed alternatives • Photos, video and testimonial • Outline designs/costs • Cost/benefit analysis (usage)
Cycle Storage	Establish capacity, design options and processes for storage at stops	• Options for cycle storage based on experience elsewhere • Individual stop proposals, integrated with stop designs • Process for increasing, reducing & removing storage
Signage, education, publicity & training	Advice on tram driver & cyclist training and on signage & publicity	• Experience from elsewhere, including advice on non-prescribed signage • Advice on signage approach to follow • Identification of target groups based on experience elsewhere and priorities from Edinburgh • Guidance on training programme scope & content for cyclists & tram drivers

Stage	Description	Expected Achievements
Monitoring & feedback	Advice on collection, analysis and review processes	• Future consultation guidance • Accident and feedback monitoring • Reporting and review procedure advice • Information sharing with other authorities

- 1.9 Although this is a stand-alone project, the implementation of the results may require further detailed design work as detailed in the diagram below:

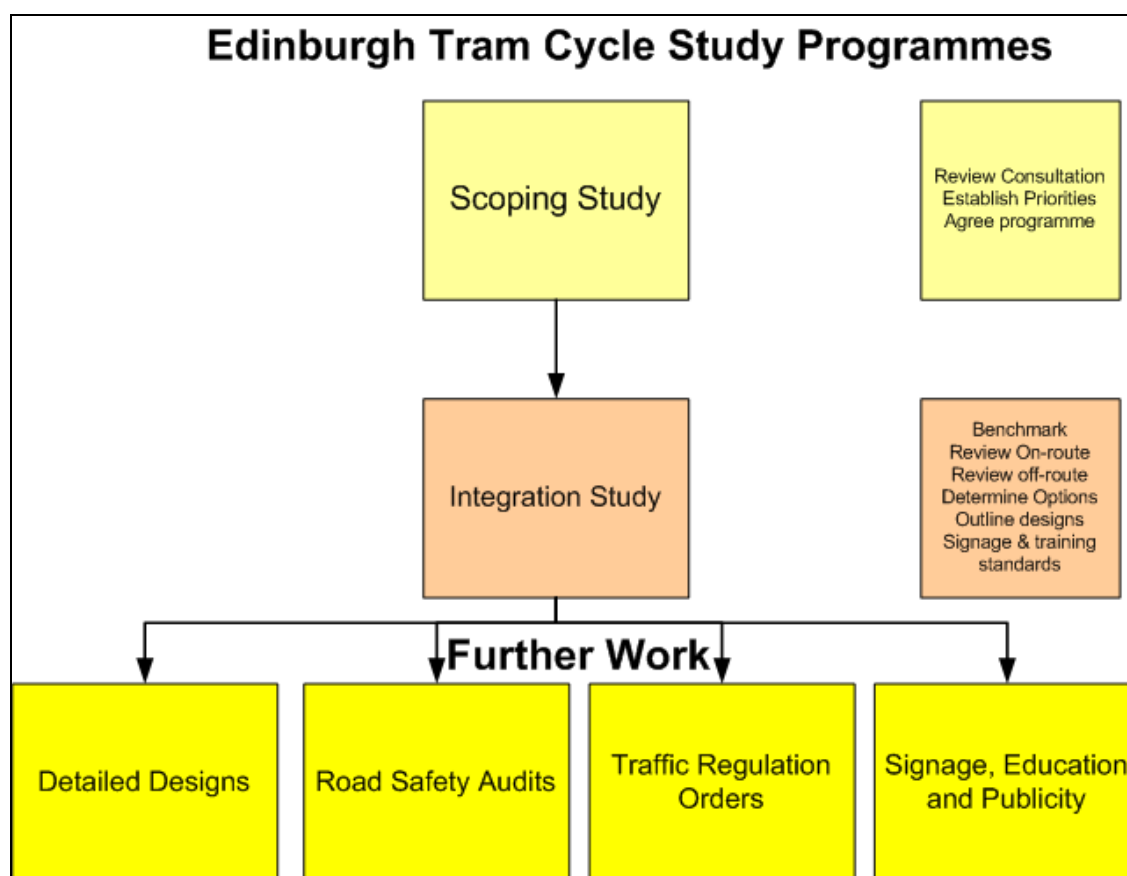


Figure 1.1 – Study Process

Aim of the Study

Structure of the Report

- 1.10 Following this introductory chapter this report comprises of twelve further chapters:

- Chapter 2 – The reasons for this study
- Chapter 3 – City of Edinburgh Council Cycling Policy
- Chapter 4 – Further consultation undertaken
- Chapter 5 – Benchmarking with other tram systems in the UK
- Chapter 6 – Main routes and conflicts addressed in this study
- Chapter 7 – On-route analysis and recommendations

- Chapter 8 – Off-route analysis and recommendations
- Chapter 9 – Cycle storage and carriage
- Chapter 10 – Signage, education publicity and training
- Chapter 11 – Monitoring and feedback recommendations
- Chapter 12 – Conclusions and overall recommendations

2.0 Reasons for the Study

Introduction

- 2.1 This study was commissioned as a result of TIE/CEC's view, reinforced by the earlier 'scoping study' that there were still unresolved issues in terms of ensuring that the needs of cyclists, in terms of safety and access, were met during the development, construction, commissioning and operation of the Edinburgh Tram.

Findings of the Scoping Study

- 2.2 The Scoping Study completed in December 2008 established a number of key sites which required investigation:

Table 2.1 – Key Sites requiring Investigation

SPOKES Priority	Location	Comments
1	Leith Walk	Construction starts Jan 09
2	Picardy Place roundabout/London Rd	
3	Princes Street	
4	Haymarket Yard	On National Cycle Route 1. Long-term dependent on future developments. Need short-term solution
5	Haymarket/West Maitland Street	
6	Constitution Street	
7	Shandwick Place & West End	
8	St Andrews Square	
9	Balbirnie Place	2 cycle routes split
-	Lothian Road (Sth Charlotte Street)	Identified only by CEC/TIE
-	Lindsay Road Tram Stop	Identified only by CEC/TIE
-	Existing Guided Busway section	Identified only by CEC/TIE (Bankhead Station area)
-	North St Andrew St	Junction with York Place Dublin Street - NCN route Identified only by CEC/TIE

- 2.3 Concerns were expressed by consultees that the needs of cyclists had not been fully taken into account in the design process. To address this, TPi / LTP were asked to review the Traffic Regulation Order (TRO) drawings and make additional recommendations as appropriate.
- 2.4 Although no new road safety audit work was incorporated within the Integration Study, a number of the Stage 2 Road Safety Audits were reviewed. Additional advice and comments, linked to the above TRO process, has been incorporated in this report.
- 2.5 Of particular concern was the need for alternative routes where the tram route itself was either unsuitable (for all or some cyclists) or was actually closed to cyclists. A major element of the *Integration Study* was the detailed audit of such alternatives, along with recommendations for required improvements in order for them to provide viable alternatives, especially for less confident cyclists.
- 2.6 To complement the above, benchmarking with other UK cities with existing tram systems was identified as a requirement. This element was designed to guide TIE in developing its approaches to:

- Cycle storage at tram stops and on trams
- Signage on and around the tram route, especially in the use of any non-standard traffic signs
- Publicity for cyclists with regard to safety and access on and around the tram route
- Signage for cyclists on and around the tram route.
- Training for tram drivers and cyclists
- Ongoing consultation with cycling groups
- Ongoing monitoring regimes, including accident monitoring and reporting.

2.7 In considering all of the above, the *Integration Study* took account of the projections for increased traffic, displaced by the tram, on surrounding roads. This will help TIE to assess any additional requirements for improved cycle facilities on surrounding roads, either affecting existing cycle routes or those identified as suitable alternatives to current 'on-route' cycle routes.

3.0 City of Edinburgh Cycling Policy

Introduction

- 3.1 For some considerable time there have been active policies in place to promote cycling and provide appropriate facilities for cyclists within Edinburgh. Benchmarking undertaken by the Cycle Touring Club in 2000 identified good practice in Edinburgh which demonstrates a long-term commitment. Specific examples relevant to this study identified the policies giving a presumption in favour of cyclists in infrastructure design and of a presumption in favour of 4.25m wide bus lanes to assist cyclists.
- 3.2 These commitments were made in the Local Transport Strategy (2000-2004):
- C1: There will be a presumption in favour of new traffic management schemes always incorporating measures for cyclists, particularly:
 - Exemptions from road closures and new one-way streets
 - Advanced stop lines and/or cycle lanes at traffic signal controlled road junctions
 - All new pedestrian crossings to be assessed as potential Toucans
 - At least advisory and preferably mandatory cycle lanes in all schemes involving main roads with speed limits over 20 mph and no bus lanes
 - C2: There will be a presumption against constructing any new roundabouts with more than one entry, exit or circulating lane within the built up area.
 - C3: Where new pedestrian / cycle paths are constructed or designated, there will be a presumption in favour of segregating cyclists from pedestrians by a raised white line or kerb.
 - C4: In conjunction with the awareness raising campaign, the council will work closely with Lothian and Borders Police to ensure that the rights – as well as legal obligations – of cyclists are respected and properly enforced.
- 3.3 Since these commitments were made in 2000, they have been maintained and reinforced in the Local Transport Strategies 2004-2007 and 2007-2011. The extract from the current Local Transport Strategy (2007-2011) is appended to this document. TPi helped with aspects of this latest document and could provide further support if required.
- 3.4 Further details of these policies can be found in Appendix F.

4.0 Further Consultation

Introduction

- 4.1 As well as two meetings with TIE, additional consultation was undertaken with SPOKES, Sustrans and City of Edinburgh Council. Notes of the relevant meetings can be found in Appendix E.

SPOKES

- 4.2 A meeting was held with SPOKES on 25th March (see details in Appendix E), followed by subsequent emails and telephone discussions. In addition, TPI attended a SPOKES evening public meeting, also on 25th March.
- 4.3 Details of the SPOKES views have been taken into account in the detailed on-route and off-route analyses in Appendices A, B and C.
- 4.4 Following the 25th March meeting, SPOKES have suggested that TPI should be asked to appraise the proposals to close Princes Street to all traffic except trams and cycles. This is not within the scope of this study but is raised in Section 12 (Conclusions and Recommendations)

Sustrans

- 4.5 On 19th March, TPI met with Sustrans to obtain their views. Further email and telephone discussions followed on 6th May. All of the results of these discussions have been incorporated into this report.
- 4.6 In particular, Section 8 (Off-Route Analysis and Recommendations) details the various suggestions for alternative routes around Haymarket Station and the options for National Cycle Routes 1 and 75 in this area and elsewhere.
- 4.7 Clearly not all issues raised have been resolved. Some aspects will require further discussion and may be the subject of a workshop. Other proposals, such as a 'Shared Space' approach to Haymarket Yards and the opportunities presented by the closure of Princes Street to all traffic except trams and cycles are outside of the scope of this study and would need to be the subject of separate work.

City of Edinburgh Council

- 4.8 Discussions have been held throughout the project with CEC staff dealing with cycling issues, with tram design issues, with wider area highways issues and with school and employer travel plans.
- 4.9 All elements of this have been taken into account in the subsequent sections of this report.

5.0 Benchmarking With Other Tram Systems

Introduction

- 5.1 The Benchmarking process consisted of telephone conversations with various stakeholders including city council representatives and driver training managers from the tram operators. Where appropriate, documents were requested to support these discussions.
- 5.2 Further details, in terms of reports and other documents, can be found in Appendix D.
- 5.3 Information was obtained from Nottingham Express Transit, Sheffield Supertram, Sheffield City Council, Manchester Metrolink and Manchester City Council. Some information was also obtained from Croydon.

The Initial design stages

Nottingham

- 5.4 In the initial design stages, Nottingham Express Transit (NET) worked closely with PEDALS, Nottingham's local cycling campaign group. Details of this can be found on the PEDALS Website (http://www.pedals.org.uk/cyclists_and_the_net). NET sought views and gathered feedback on potential obstacles and ideas for facilities along the route. This helped NET to identify and address any concerns that pedals may have had. These concerns were mainly over negotiating the tram rails.
- 5.5 As a result of this, NET provided parallel alternative routes that reduced journey times and where required, installed toucan crossings. Advanced Stop Lines were also provided on sections that required right turns to follow a cycle route. NET produced a substantial pamphlet of safety information for cyclists which also includes a map of the alternative routes and cycle facilities, which tied into the signing of the alternative routes on-street. A copy of this can be found in Appendix D.

Sheffield

- 5.6 In Sheffield, 'Cycle Sheffield', the local cycle campaign group at the time, lobbied the Highways Design service with their concerns. Their main issue prior to the tram opening was carriage of cycles. It appears that cyclists safety was not considered to be the main issue.

Facilities for Cyclists

Nottingham

- 5.7 In Nottingham, parallel routes to the tram route are provided but cycling along the tram route is not banned. However the dangers of cycling near the tram or the rails are highlighted in a specially designed pamphlet directed at cyclists.

Manchester

- 5.8 In Manchester, the majority of routes in Phase 1 run on old railway lines and are subsequently off street for the majority of the route. Where there are rails on street, road markings and segregated cycle lanes have been provided to enable cyclists to cross rails at as close to 90 degrees as possible. However, Manchester City Council have taken measures in recent proposals and designs to avoid creating facilities which are perceived as complicated or will increase journey time significantly for cyclists.
- 5.9 Originally a very 'cautious' approach was taken when the tram was first conceived. This has been increasingly 'softened' in the light of experience of operation in the City Centre where

tram speeds are low. Trams fit well into the urban environment and co-exist with pedestrians and cyclists.

- 5.10 Manchester City Council have found that cyclists will not use facilities if they are too complicated, preferring to take more direct routes, including undertaking banned turns. Examples of this occur on the Aytoun Street junction close to Manchester Piccadilly train station. Experience shows that banning cyclists from making turns does not work as cyclists will ignore such restrictions unless they are rigorously enforced. Unless there are clear conflicts affecting the safety of cyclists or road users, turning bans are not currently favoured.
- 5.11 Initially, in Manchester, removal of cyclists from the route was seen as the best idea. However, this was shown to be difficult to achieve as cyclists will often use the shortest possible route. Any parallel routes need to be made a more attractive option to all cyclists. As a result, current schemes are being 'softened' and new safety measures introduced such as contraflow cycle lanes and signed alternative routes avoiding major junctions and heavy traffic.
- 5.12 To assist cyclists and other road users, dots on the carriageway are used to mark out the kinetic envelope of the tram. These assist tram drivers in judging whether a cyclist or other road user is within the envelope of the tram, enabling them to sound a warning.
- 5.13 Alternative routes which use quiet streets or parks give rise to concerns about personal safety for cyclists. Under Phase 1 of the Metrolink, there was limited need for such alternatives and much of the new phases (eg Ashton New and Old Roads) have good parallel routes available. VISSIM modelling is currently being undertaken to assess the effects of traffic displacement onto these alternative routes when the tram is built. Suitable facilities will be provided for cyclists to overcome any difficulties arising from this.
- 5.14 Where cycle lanes are provided, there is an absolute minimum width of 1.2 metres, with a desirable 1.5 metres. Where these standards cannot be met, cycle lanes are not marked. Green boxes containing marking 1057 from The Traffic Signs Regulations and General Directions 2002 guide (TSRGD 2002) are marked on the road, (see photo of Princess Steet, Central Manchester) have been used successfully to help guide cyclists where there is insufficient space for a cycle lane. Green tarmac is also used where there are potential conflicts affecting cycle lanes.
- 5.15 Consultation on the new Metrolink schemes will involve local cycle groups, where appropriate conflicts between trams and cycles arise. The views expressed are that cyclists should be catered for as on the route as far as possible with alternatives provided for less confident cyclists. If there are unavoidable conflicts, leading to cyclists being unable to use a section of route, there should be a viable, direct and well-signed parallel route.



Figure 5.1 – Green Squares in Manchester

Sheffield

- 5.16 The policy in the latest Sheffield Transport Plan is to provide alternative routes for cyclists where possible. This was based on previous difficulties across the network.
- 5.17 Sheffield also uses yellow dots on the carriageway to help cyclists to judge the swept path of the tram at points where conflicts may arise (eg Hillsborough Corner).
- 5.18 Particular problems were experienced in Hillsborough where the track branches at different angles and where a large percentage of cyclists wish to continue straight ahead. This was exacerbated by large numbers of motorised vehicles, increasing the pressure on cyclists.

Camera enforcement of the bus and tram restrictions at this junction has reduced the number of vehicles in the area, making the negotiation of the rails easier for cyclists.

Promotion

Nottingham

- 5.19 In Nottingham, pamphlets were sent out to local shops and to Pedals members. These pamphlets highlighted various aspects of the provisions and in some areas, improvements, made for cyclists. It also provided safety tips for cycling near tram rails and provided a map of alternative routes within Nottingham.
- 5.20 Signage of routes has been used alongside the leaflets, using consistent colour coding on standard signs.



Figure 5.2



Figure 5.3



Figure 5.4



Figure 5.5

Figures 5.3 to 5.5 – NET Cycling Leaflet. Larger versions are located in Appendix D

Manchester

- 5.21 Manchester's approach was to produce pamphlets at the inception of the tram about negotiating tram rails.
- 5.22 The use of 'smarter choices' initiatives which incorporate travel planning, cycle training, maps and publicity are seen as important, especially for workplaces close to the tram route.
- 5.23 Engagement with schools, parents and pupils is important in promoting the safe use of trams and road safety when walking or cycling on or near the route. This is linked to cycle training and 'Safe Routes to Schools' initiatives.
- 5.24 Pupils attending schools close to the tram route are heavy users of the tram, with trams seen as safer and more up-market than buses.



Figure 5.6 – Manchester Cycle Routes following future extension of Metrolink. Larger versions are located in Appendix D

Sheffield

- 5.25 In Sheffield, the advice produced at inception stage was general towards all road users. Sheffield City Council now provides specific advice for cyclists on its Website.

Driver Training

Nottingham

- 5.26 NET does not identify individual types of vehicle in driver training. The process of approaching any vehicle is considered to be the same and the training guidelines are that anything that is in the swept path of the tram is to be avoided or made aware of the approaching tram by the driver.
- 5.27 Every two months drivers are re-assessed by examiners using an assessment form including a section on approaching other road users, including cyclists.
- 5.28 It was felt by the representative of Driver training for NET that due to the Nottingham tram being relatively new; it was hard to confirm if training had been effective in reducing accidents involving cyclists.

Manchester

- 5.29 Metrolink train their drivers with general awareness of all road users. However drivers are advised on approaching cyclists. The assessment of this forms part of their general assessment of competence. Routine assessments are carried out annually on a formal assessment process. Within the driving cab, drivers are assessed on how they deal with hazards and Metrolink also hold development days.
- 5.30 New rolling stock will most likely require new developments training for the drivers as will the extension of the network which may present new hazards to Metrolink drivers as there is much more on-street running outside of the City Centre than on the first phase of the network.

Sheffield

- 5.31 In Sheffield, examination of the drivers is done by assessment sheets. When drivers are out training, should an encounter with a cyclist occur, the driver is examined on how they approach cyclists. Should no cyclists be encountered, the driver is questioned at the training centre about how they would approach a cyclist.
- 5.32 Refresher courses are conducted every year using footage recorded from CCTV cameras mounted on the front of the trams. Drivers are shown new videos and subsequently different situations every year and are asked questions regarding cyclists.

- 5.33 The format of driver training in Sheffield has changed over the past 10 years. Originally there was a general focus on all road users but this has been restructured to have a more directed focus towards cyclists as well as training towards other vehicles.
- 5.34 However, even with improved and more focused training measures, fatalities and accidents have occurred. It is felt that improved training measures have made a difference to cyclist safety. Liaison with Cycling Sheffield has been key to this to gather their views on how the driver training is having an effect. CCTV on the front of the tram is felt by the Supertram representative to have been the best method of reducing accidents.

Signage

Nottingham

- 5.35 Nottingham introduced specific signage towards cyclists. It was felt that signing of the danger of slipping on rails has proven to be effective. The Slippery rails sign is located prior to tram stops.
- 5.36 NET indicated that it would be sensible for all future alternative routes are constructed and signed prior to construction works for the on street tramway commencing. This will mean cyclists become accustomed to the alternative routes well in advance of the rails appearing in the road and that they do not conflict with the roadwork's. However this is not always achievable as routes may run adjacent to or cross the tramway and subsequently cannot be completed until track construction is complete.



Figure 5.7 – Nottingham
Slippery Rail Sign.
Courtesy of NET

Manchester and Sheffield

- 5.37 Manchester and Sheffield did not have any signage similar to Nottingham's slippery rail sign. The Manchester consultee did however note that painted cycle symbols on the road, even if there is no dedicated cycle lane, can raise awareness of cyclists for other road users.

Accident reporting

Nottingham

- 5.38 Minutes from the Greater Nottingham Rapid Light Transit Advisory Committee (GNRLT) meeting on 10th June 2008 indicated that members of the committee felt, whilst groups such as Pedals encouraged cyclists to formally report tram accident's, many did not and subsequently the number of actual incidents is potentially much higher than reported. The main type of incident is cyclists slipping on tram rails.
- 5.39 In a NET directors report entitled dated 10th June 2008, point 5 states that between the installation of the rails in 2002 and June 2008, there had been 22 cycle accidents reported to the police along the extent of the tramway. Rails were considered to be a contributing factor in 7 of these accidents, two of which involved serious injury. It was acknowledged that there may be an element of under-reporting.
- 5.40 Whilst NET had released safety advice to cyclists, people had written in claiming that there was no information freely available warning them of the dangers. Whilst this does not seem to be the case, it was felt that it was inevitable that visitors and some less experienced cyclists would not be aware of the potential hazards.

Sheffield

- 5.41 The Sheffield City Council representative stated that there was a gross under-reporting of accidents on the tram network. The vast majority of cycle related incidents are wheels caught

in the rails but are not reported by the police as an accident, due to no other vehicles involved.

- 5.42 The 1998 report entitled “an investigation into cyclist safety on the Supertram network in Sheffield, South Yorkshire” contains an in depth section on accident analysis. This report can be found in Appendix D. The problems with accident reporting and legal definitions are highlighted within section 3 of the appended Report.
- 5.43 The report highlighted that five sources or types of accidents were analysed for the report. They were as follows:
- Stats 19 records in which a pedal cyclist has been injured following an accident where the cycle wheel was in contact with the tram rail/track.
 - Stats 19 records in which a pedal cyclist has been injured in an accident on the Supertram network, but there is no indications of any problem with any aspect of the Supertram network
 - Newspaper or journal reports of accidents, which are recorded by the technical information unit within Sheffield CC
 - A list of incidents recorded by S Yorks Supertram Ltd
 - Information from letters to the council.
- 5.44 No official local hospital or NHS records were analysed in the report but the Sheffield Telegraph quoted what it be claimed to be official figures of an internal study into admissions caused by the tram rails. The Sheffield Telegraph claimed that between May 1994 and May 1995, there had been 72 accident victims. 29 of these accidents reportedly involved cyclists. However, with no official public report produced by the local Health Authority, these figures are difficult to substantiate .
- 5.45 Incidents which require hospitalisation are logged by Her Majesty’s Railway Inspectorate (HMRI) and the Railway Accident and Investigation Branch (RAIB).
- 5.46 In a discussion with a cycling engineer from Manchester City Council, it was felt that Tram drivers tend to be relatively cautious compared with other drivers. Although there are irregular incidents within Manchester, there have been no records of any serious incidents recently. The main threat of an accident involving collision with the tram occurs when a cyclist has not anticipated the tram’s swept path.

Manchester

- 5.47 The new Metrolink trams due to be operational in summer 2009, are to have covered bogies to reduce the possibility that pedestrians and cyclists get caught under the tram. The Manchester City Council representative mentioned that some cyclists would actually say the tram is safer than buses and cars as trams have a predetermined line in the road so it is easier to predict their behaviour. Trams in Manchester also drive slowly on street, using horns if they need to make other users aware of their presence. The design of a route is the difficult part due to the importance of providing interaction and giving space.
- 5.48 Taking into account all the information for this Section, there appears to be no common way of reporting accident data or at least no obvious way of reporting an accident, other than through the STATS19 process.
- 5.49 With regards to the Edinburgh Tram it is recommended that the public are urged to report any accidents involving injury to cyclists, even if they are cycle, loss of control accidents not involving any other vehicles, to the police. In addition, hospital records and complaints made

to CEC, TIE and SPOKES should be logged and then compiled together. This would ensure that accident and incident records are significantly more accurate than in current systems.

Cycle Carriage and Parking

- 5.50 No tram operators in the UK are prepared to carry cycles other than folding cycles (on some networks only if in bags). It is noted that a commitment to trial cycle carriage on the Edinburgh Tram has been made.

Nottingham

- 5.51 NET provides storage facilities at or very close to, the tram stops in Nottingham. Some stops have cycle lockers or cycle stands. Cycle lockers are situated within car parks in the immediate vicinity of tram stops in the city centre. Facilities are also provided at park and ride sites. All the storage facilities are monitored by CCTV.

Manchester

- 5.52 In Manchester, there are cycle lockers provided at various Metrolink stops. These are operated by GMPTE as a Bike Lockers Users Club (BLUC). BLUC is a cycle parking scheme to encourage people to use their cycles to travel to train, tram and bus locations across Greater Manchester. Any BLUC Locker across Greater Manchester can be used by a registered member. Further information on the scheme can be found at http://www.gmppte.com/content.cfm?subcategory_id=5081801. A copy of the membership form is located in Appendix D.

- 5.53 A minimum of 3 cycle stands is specified for each tram stop. Many have considerably more. Since park-and-ride facilities are limited (especially on the new lines) cycle parking is seen as a cost-effective solution.

Sheffield

- 5.54 In Sheffield, there are park and facilities located at peripheral stops of the Supertram Network.

Changes over time, what would be done differently and future plans

- 5.55 NET felt that they were happy with the approach they had taken towards cycling issues around the tram and were happy with the level of training and infrastructure that they had used to address any issues encountered in their phase 1 scheme.
- 5.56 Sheffield stated that they would alter some aspects of their tram infrastructure. Particular attention was on the design of tram stops. The rails at tram stops go very close to the kerb resulting in cyclists having to dismount prior to a tram stop to place themselves in the middle of the tram-rails then dismounting again after they had passed the tram stop. Tram stops in the centre of the highway enable the cyclist to avoid crossing the rails, provided that there is enough room given between the pavement kerb and the outside rail.
- 5.57 In Manchester, new line designs involving on street running intended to mark out the tram envelope to enable drivers to see if cyclists or other road users are within the tram envelope. The markings to be used would be the 1066 markings from TSRGD 2002. However these plans were later disregarded as cyclists and other road users would potentially treat the markings as a cycle lane and safety issues would therefore arise where the width between rail and kerb may be less than a 1.2 m wide cycle lane. One potential solution to this problem currently being investigated is to provide the previously mentioned green squares with 1057 markings from TSRGD.
- 5.58 In the construction phase, the new lines are also going to have all the relevant signal cabling needed laid for future situations which may require extra facilities such as toucan crossings.

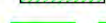
As detailed previously, there are plans to improve existing facilities, including new safety measures for cyclists.

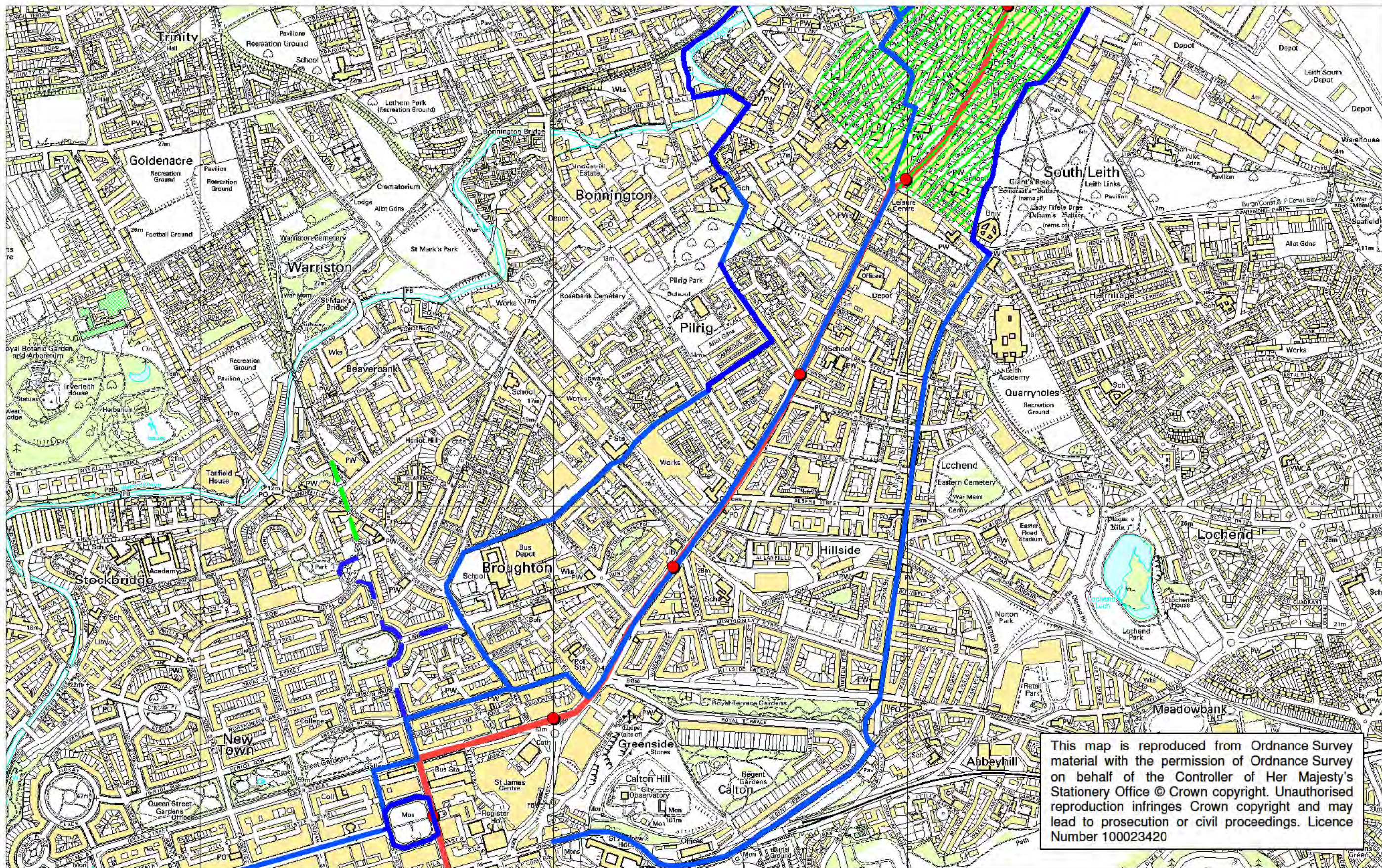
6.0 Main Routes and Conflicts Addressed

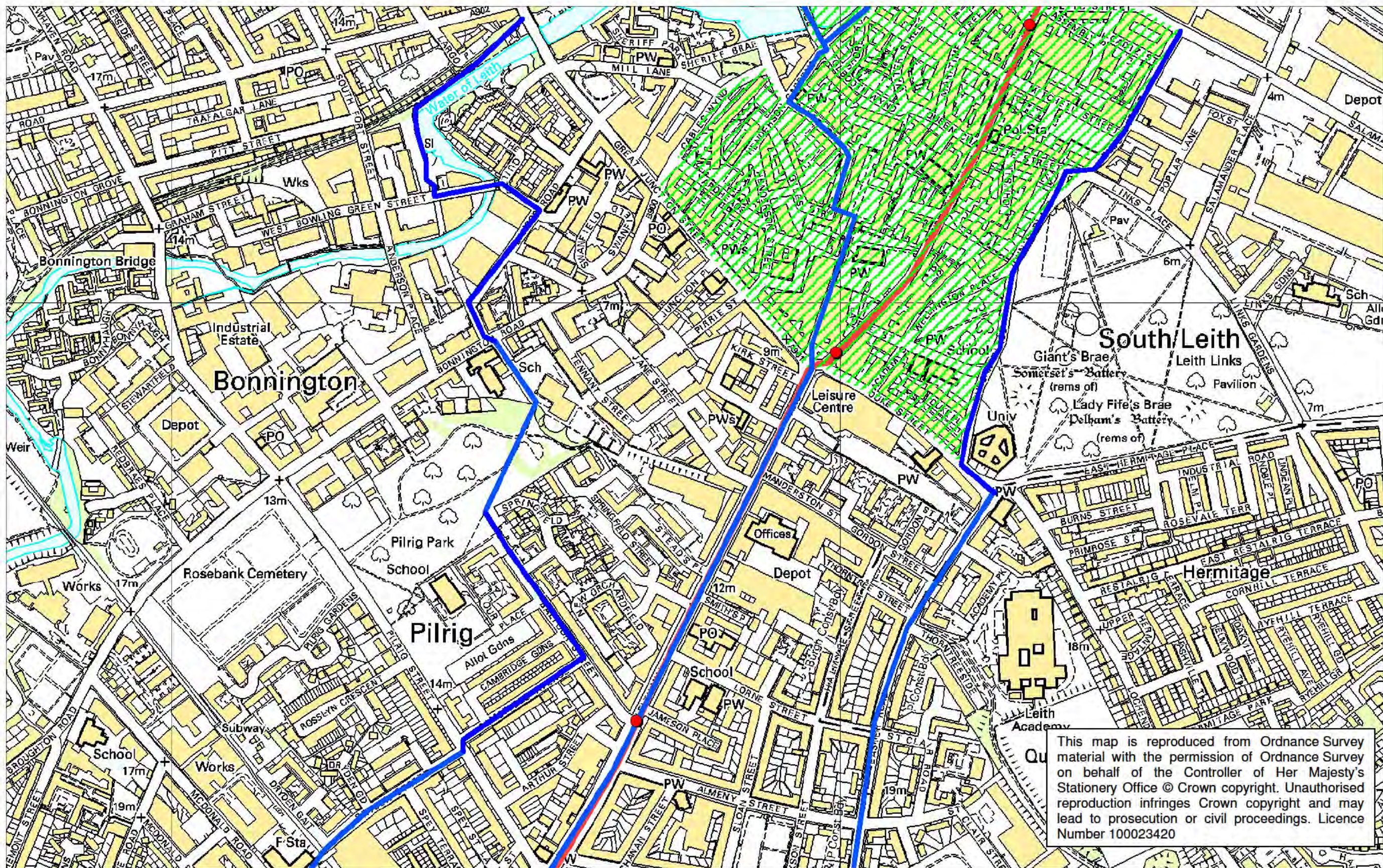
Introduction

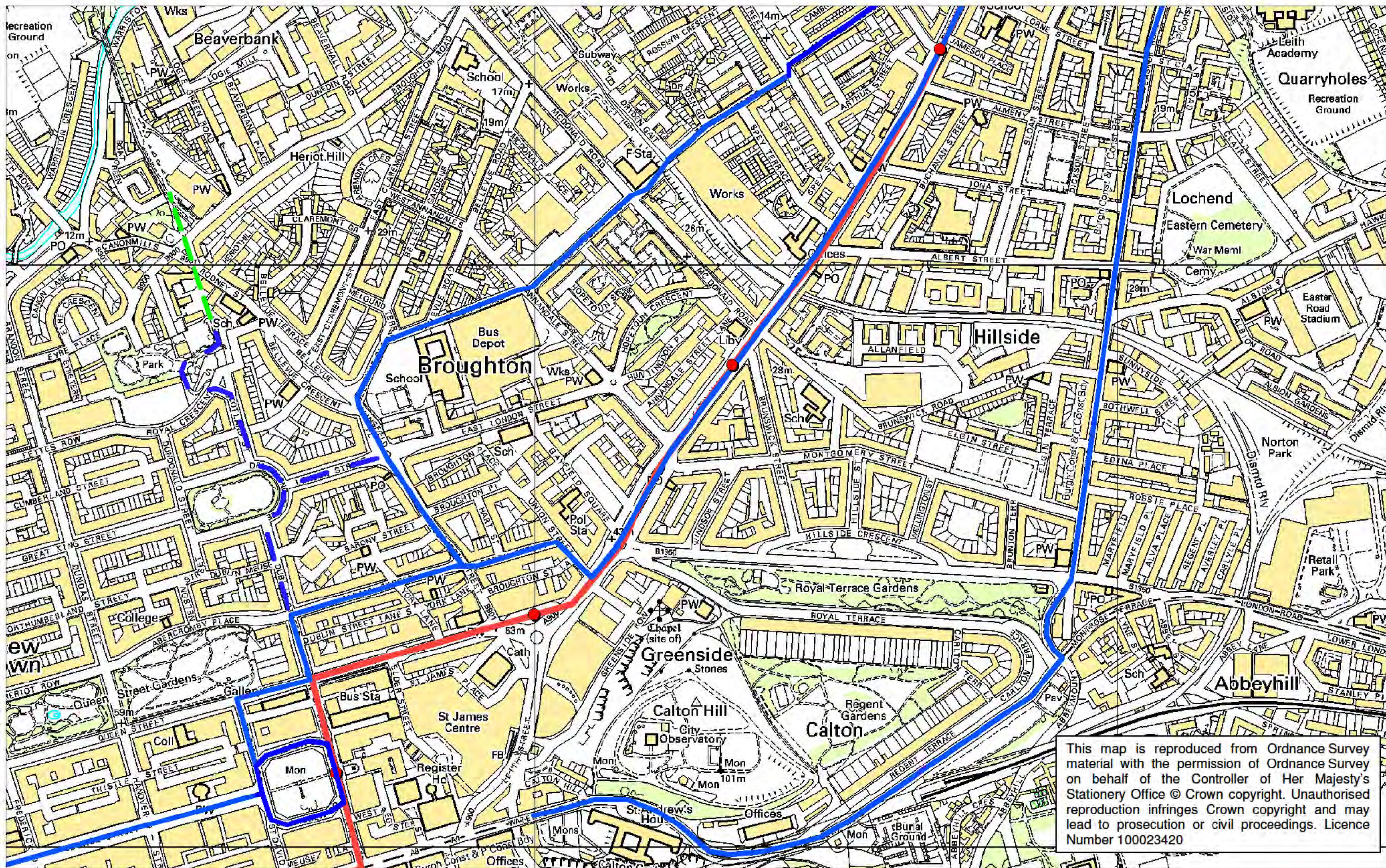
- 6.1 Figures 6.1 to 6.4 show the potential cycle routes investigated within Edinburgh. These ideas were developed from the initial site visit in February and analysis of current cycle routes through Edinburgh. Consultation with Spokes, Sustrans and CEC also contributed to the initial route ideas to be investigated.
- 6.2 Figures 6.1 to 6.3 map out the potential routes from Leith to the City Centre. Figure 6.1 gives an overview of the routes whilst figures 6.2 and 6.3 show the routes adjacent to Leith walk in greater detail. Figure 6.4 shows the route investigated adjacent to Princes Street.
- 6.3 All of these routes were investigated on the site visit and audited. These are summarised in Appendix C

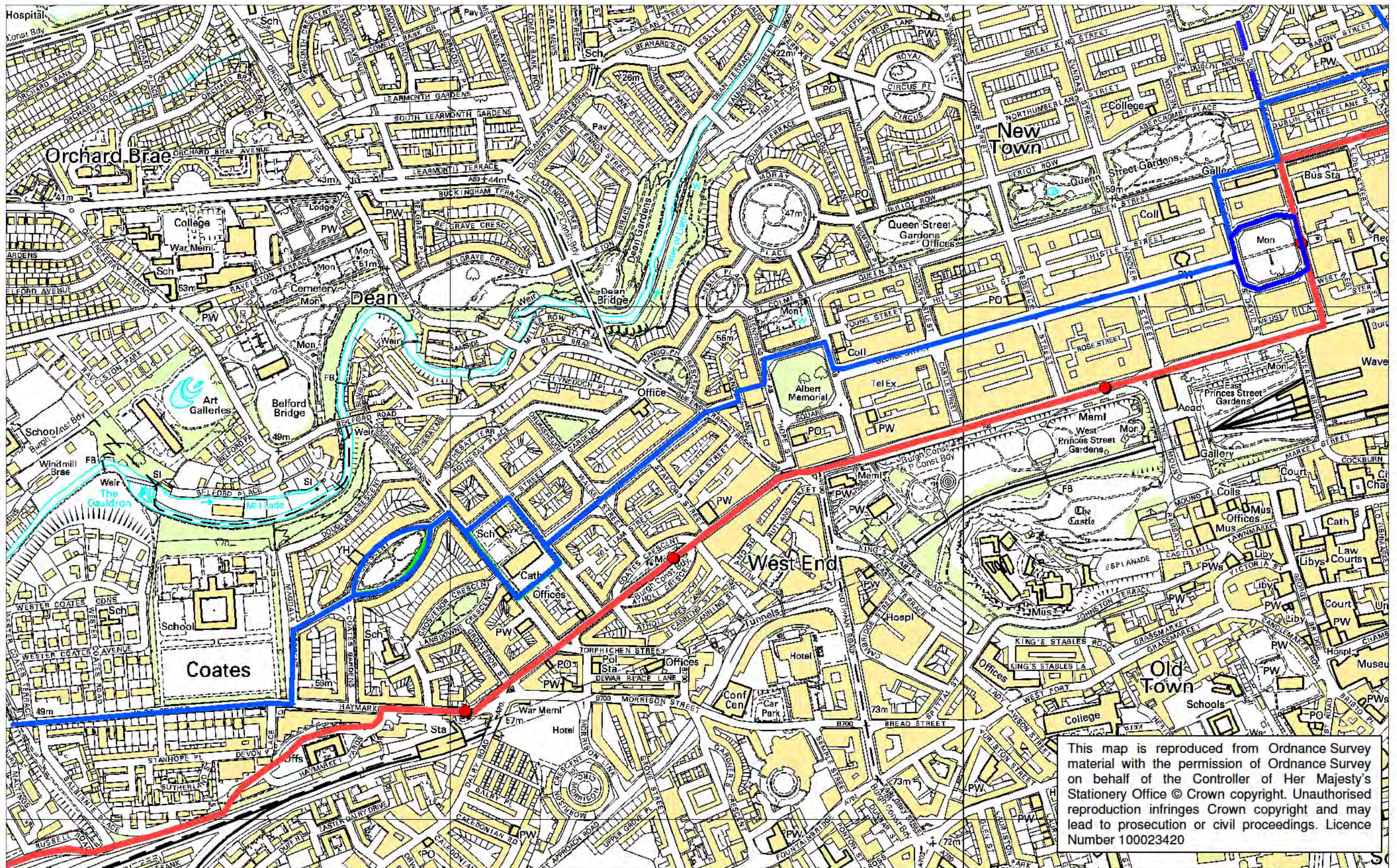
Map Key:

	= Potential Cycle Route
	= Sustrans Suggestion
	= Tram Route
	= Tram Stop
	= Cycle Area
	= Tunnel









Main Trip Generators and Attractors along the Tram Route

- 6.4 The City Centre is a major employment site, as are other parts of the City along the tram route. City of Edinburgh Council is a large Employer in the City with 3 main offices located in the centre of Edinburgh. There are also various parliament and government buildings located along the tram route including the Scottish Executive (Victoria Quay) Building in Leith. The Ocean Terminal area in Leith is also a large generator due to the number of residential units situated there.
- 6.5 Leith Walk is a large generator due to large amount of residential units situated on the feeder roads onto Leith Walk. The Waverley and Haymarket stations also attract cyclists. Some staff at the airport, (a large employer), may also choose to cycle to work.
- 6.6 The west end has a large number of financial buildings that will attract cyclists during the rush hours, with some of these journeys potentially coming from Leith Walk. A Royal Mail processing centre is located in Gyle as well as Gyle Shopping Centre.
- 6.7 The Edinburgh festival, football matches at Hearts F.C (McLeod Street) and rugby matches at Murrayfield (Roseburn Street), may not attract a large number of cyclists but there may be an increase in traffic along the tram route and along any parallel routes.
- 6.8 The conclusion from this is that cycle routes must be flexible, with City Centre destinations being especially so. To reflect this, the off-route alternatives explored in Section 8 and Appendix C were designed to link all parts of the City Centre with the main areas of housing. Given the importance of Leith, as both a trip generator and attractor, this was one of the key areas of focus for both on-route and off-route analysis.

Schools

- 6.9 As part of this study, Lorna Henderson was consulted in relation to the anticipated effect of the tram on cycle trips to schools.
- 6.10 Most schools close to the tram route are not actively encouraging cycling due to large volumes of normal traffic in these areas. Easter Road, Leith and Hermitage do not have a lot of children, if any, cycling to school
- 6.11 This is especially so in the Leith area, where for example Hermitage Primary School is not encouraging cycling. However, since 94% children have a bike, cycle training is undertaken by the school.
- 6.12 Although there are some road safety concerns, especially in the light of predicted traffic displacement from the route of the tram, these are primarily in relation to pedestrian safety.
- 6.13 In other areas, for example Trinity and Wardie, there is currently a significant level of cycling to school. However, since these schools are well away from the route of the tram and any anticipated displaced traffic, there are unlikely to be any problems.
- 6.14 Within this study, the principal recommendations relating to schools can be found in Section 10 (Signage, Education, Publicity and Training) as it is important that schoolchildren receive information on how to use the tram safely, as passengers, pedestrians or cyclists.

7.0 On-Route Analysis and Recommendations

Introduction

- 7.1 All Traffic Regulation Order (TRO) drawings for the tram route from Newhaven (Leith) to Haymarket Yards have been analysed by Andy Mayo of LTP Ltd.. It should be noted that the drawings provided were stamped “DRAFT” and did not constitute final design drawings. Much of the analysis was undertaken through detailed desk-based work on the supplied TRO drawings, supplemented by site visits where appropriate, cross referenced with the Safety Audit reports supplied and with the off-route audit also carried out. Following this analysis, TIE and CEC provided comments on the recommendations. This was through a combination of face-to-face meetings and written consultation. The detailed tables in Appendix A contain both the initial recommendations and the responses.
- 7.2 The full details of this analysis can be found in Appendix A. Since this is essentially a technical report, it is assumed that most readers will wish to look into the detailed analysis in this Appendix, using this alongside the TRO drawings used as the source.
- 7.3 The Stage 2 Road Safety Audits (RSAs) have been reviewed by Andy Mayo of LTP Ltd and the results of this work can be found in Appendix B. For presentation purposes, the route has been split into three sections.
- 7.4 Only those Road Safety Audits supplied by TIE, as listed in Appendix B, have been assessed. These were searched for references to ‘cycle’, ‘cycles’, ‘cycling’ etc. All relevant identified Safety Audit comments were then summarised together with relevant Designer and TIE / Project Manager comments. The summary table in Appendix B contains both the initial comments and recommendations resulting from this Safety Audit review and the TIE / CEC responses to the issues raised.
- 7.5 In some cases, there are recommendations for further work, primarily working up preliminary designs based on the observations recorded in the analysis. The table below summarises this. In a few cases the CEC responses to our initial recommendations conflict with the findings from our benchmarking work. The table identifies these issues.

Table 7.1 – Outstanding Issues

App A Ref	Location	Outstanding Work or Issues
7	Ocean Drive – existing roundabout	Detailed design of road markings around roundabout (though later drawings show pedestrian/cycle shared path)
10	Old Port Road	Detailed design of linkage of off-road cycleway on Old Port Road
15	Duke St/Leith Walk	Although the CEC response does not favour the use of additional guidance markings for cyclists, our benchmarking indicates that this has been shown to be an effective approach on other UK tram systems. Designs could be provided to address this
17	Whole route (ASLs)	Design of additional lead-in lanes to ASLs
18	Alternative route to West of Leith Walk	Design access to route via Balfour Street (TPI proposal) or Pilrig Street (CEC/TIE response)
25	Alternative route to avoid Picardy Place	Detailed discussion and design of route using McDonald Road, Annandale Street Lane
32	Dublin Street/Queen St/ North St Andrew St Junction	May be need for additional advice for signage to guide cyclists

App A Ref	Location	Outstanding Work or Issues
34	London Road/Leith Walk junction, northbound approach	Design of short length of advisory cycle lane
37	Leith Street/Little King Street junction	Amendments to TROs and redesign to permit contra-flow cycling. Reversing the one-way arrangement is under consideration.
40	Princes St/Waverley Bridge Junction	Design of central approach lane to facilitate right turns
41	South St David St Junction with Princes Street	Design of central approach lane or central cycle spur to facilitate right turns
46	Alternative westbound route between Lothian Road and Morrison St/Haymarket Station, avoiding Shandwick Place and West Maitland St	Redesign of junction and signage to permit cyclists to use West Maitland St. Design and signage of alternative to avoid Shandwick Place and West Maitland St

8.0 Off-Route Analysis and Recommendations

Introduction

- 8.1 As with the On-Route analysis in the previous section, the detailed analysis in Appendix C will be the main interest of technical readers of this report.
- 8.2 However, there are a number of key issues which require separate presentation in this section. Although the detailed analysis is a key part of this, it is essential that the following are taken into account:
- 8.3 The principal routes we were asked to consider include:
- **Alternatives to the NCN 1 route which currently uses Haymarket Yards.** Although cyclists will not be banned, this area is not considered to be suited to a National Cycle Route as the tram rails will occupy almost all of the available space, leaving room only for a narrow pavement
The proposed route would be via Magdala Crescent and West Coates to access the off-road section. Note that Sustrans have reservations about this (see table below). However, it is important to recognise that this is only an interim requirement until the proposed redevelopment of Donaldson's School provides an opportunity for an off-road link between Magdala Crescent and Western Coates Avenue, giving a direct link to the off-road section via the existing ramp. An additional link through Russell Gardens is also recommended.
 - **An alternative route to and from Haymarket Station onto NCN 1**
Access from Haymarket Station would be along Haymarket Place and West Coates (West-bound) or Magdala Crescent (East-bound). The recommended access to Haymarket Station has been the subject of considerable discussion, with detailed options reproduced in the table below.
 - **Improvements to the NCN Route 1 between Haymarket/Coates Gardens and the City Centre** (Princes Street/The Mound) and **NCN Route 75**, also between Haymarket/Coates Gardens, through St Andrews Square .
The recommended route uses Magdala Crescent (as opposed to the current Coates Gardens)
 - **Alternative routes, avoiding Leith Walk, from the City Centre (North of the tram route) and Leith area.**
From the City Centre it is possible to use Dublin Street to access the new tunnel at Cannonmills, accessing the off-road section of NCN 75. This links with the On-Route (TRO) analysis of the York Place area. In addition, a route using Albany Street and Broughton Road provides a link to the Leith area, avoiding Leith Walk. In later discussions with TfE, the use of Dublin Street all the way to London Road was favoured.
 - **Alternative routes to Constitution Street, part of which will be closed to cyclists**
The most appropriate alternative would be using the route through the New Kirkgate Shopping Centre. Alternatively, using Great Junction Street (to the West) or Laurie Street (to the East) were both explored. Detailed recommendations are made for a number of alternatives. Gaining permission to use the New Kirkgate Shopping Centre should be sought through a joint approach by City of Edinburgh Council, Sustrans and SPOKES. Rather than using a marked cycle part (which the shopping centre are less likely to agree to and which may cause more conflict than it solves) we recommend the use of 'green squares' with a cycle symbol, accompanied by "Cyclists, Slow" signs.
 - **Alternative routes from the Leith area to the City Centre South of the tram route.**
Using Easter Road and the Abbeyhill Area enables cyclists to avoid the tram route to access the Royal Mile area and other parts of the City Centre. These routes are currently used by many cyclists. Whilst a number of improvements area proposed, the most

important area lies in the junctions at the South end of Easter Road (London Road, Regent Road, Abbeyhill)

8.4 Following the fieldwork which recommended re-routing and re-signing NCN Route 1, further consultation with Sustrans was undertaken. This established that Sustrans had reservations regarding some of the proposals. These are set out, along with the context of the TPI proposals, in the tables below.

8.5 Access to Haymarket Station

Table 8.1 – Access to Haymarket station

Alternative	Proposed by	Pros	Cons	Additional Comments
Eastbound from Coates Gardens, along Haymarket Terrace to pedestrian crossing East of Roseberry Crescent. Dismount and wheel cycle into station which is only 50 metres away	TPI	The route is straightforward and easily signed	Having to dismount Area will be busy with pedestrians at peak times	There is insufficient width to provide a lead-in cycle lane in order to convert the crossing to a Toucan It is likely that some cyclists will make an illegal right turn into the station as taxis currently do
Eastbound along Haymarket Terrace to the gyratory at the Dalry Road junction. Provide a Toucan. Cyclists double back and enter the station by the vehicle route	Sustrans	Avoids dismounting	Requires doubling back	There is no room for a lead-in cycle lane on the road and the area is too busy with pedestrians for shared use. This makes a Toucan infeasible
Westbound from the station, using the vehicle exit onto Haymarket Terrace	Sustrans TPI			

- 8.6 Access to NCN 1 (currently via Coates Gardens, Haymarket Terrace and Haymarket Yards). Ultimately this route is planned to run off-road through the grounds of the former Donaldson's School; any re-routing should be temporary.

Table 8.2 – Access to NCN route 1 near Coates Gardens

Alternative	Proposed by	Pros	Cons	Additional Comments
Use Haymarket Terrace and West Coates, accessing NCN 1 via Balbirnie Place (Westbound) or Wester Coates Gardens (Eastbound)	TPI	Wide bus lane on West Coates keeps cyclists away from parked cars	Busy road, especially at peak times	TPI recommends the use of Magdala Crescent rather than Coates Gardens Sustrans asks that the Magdala Crescent/West Coates junction be signalised or equipped with a Toucan.
Retain the current route on Haymarket Yards and provide a shared use footway	Sustrans	Maintains the current route	The right turn into Haymarket Yards for Eastbound cyclists is and remains difficult, as is the right turn from Haymarket Terrace into Coates Gardens	CEC/TIE have stated categorically that this is not feasible due to lack of space A wholly 'shared space' (including the tram) on Haymarket Yards would be the only way to enable this

- 8.7 NCN Route 1 along George Street

Table 8.3 – Access to NCN route 1 via George Street

Alternative	Proposed by	Pros	Cons	Additional Comments
NCN 1 runs along George Street (as now)	TPI			Sustrans asks that 'best practice' design be used on George St
NCN 1 uses Princes Street if this becomes tram, pedestrian and cycle only	Sustrans SPOKES TPI			Additional work would be required to determine best route from the end of Princes Street towards the Haymarket area

- 8.8 Correspondence and notes relating to the above can be found in Appendix E.
- 8.9 One further area in which there are unresolved issues is the junction of Hanover Street and The Mound, crossing Princes Street. Figure 6.5 shows the layout of the junction. The issues here are:
- NCN Route 1 runs from Hanover Street to The Mound, requiring that the facilities provided cater for less confident cyclists, including families.
 - The southbound movement (i.e. from Hanover Street to The Mound) uses the left lane, with an Advanced Stop Line provided.

- If a cyclist undertakes this North-South movement using the marked traffic lane, the crossing angle, especially at the West-bound track, will be very acute. This presents a significant risk of wheels becoming trapped in the tracks.
- A South-North movement (i.e. from The Mound to Hanover St) does not present such a significant hazard

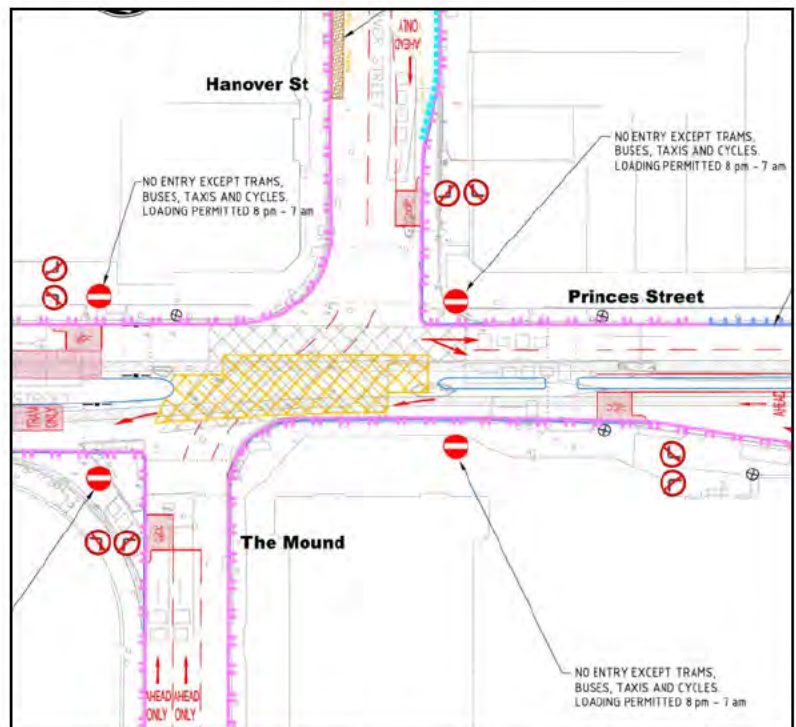


Figure 8.1 Hanover St - The Mound 1

8.10 The constraints in this area, with steps down from the Royal Scottish Academy (RSA) building on the South side of Princes Street, make it impossible to provide greater width to pull back the footway on the south side of Princes Street in order to create more space between the inside rail and kerb, and direct cyclists to this area from Hanover St at a less acute angle.

8.11 In order to increase the angle at which cyclists cross the tracks we strongly recommend the use of road markings such as those used in Croydon (see Figure 6.6). Alternative approaches, covered in more detail in Section 5 (Benchmarking), include the use of coloured tarmac and 'green squares'. All three approaches serve both to guide cyclists and to warn other road users of their presence and the path they are likely to take through a junction. These markings, at least in the initial period after implementation of the system, are likely to improve safety and help reduce the likelihood of claims. Since the markings will wear over time, it will be possible to review their effectiveness and determine whether they should be replaced.



Figure 8.2 Road Markings (Croydon)

8.12 In the case of Hanover St/The Mound, these approaches would serve to aid cyclists in converging with the path of other traffic moving N-S, directing cyclists almost due south towards the south footway on Princes St, marking out a wedge/triangular shaped area within which they can turn across the tracks.

8.13 Effectively, this would be a safety zone where they can turn without fear of collision with other vehicles.

- 8.14 Whilst this approach would be suitable for confident cyclists, the relative complexity of the movements would not be as suitable for less confident cyclists using the NCN Routes. Figure 8.1 proposes an alternative route, using North St Andrews St, South St Andrews St, Princes St, Waverley Bridge and Market Street. Whilst this alternative would be satisfactory for cyclists using Dublin St., for those using George St. it would present a significant diversion.

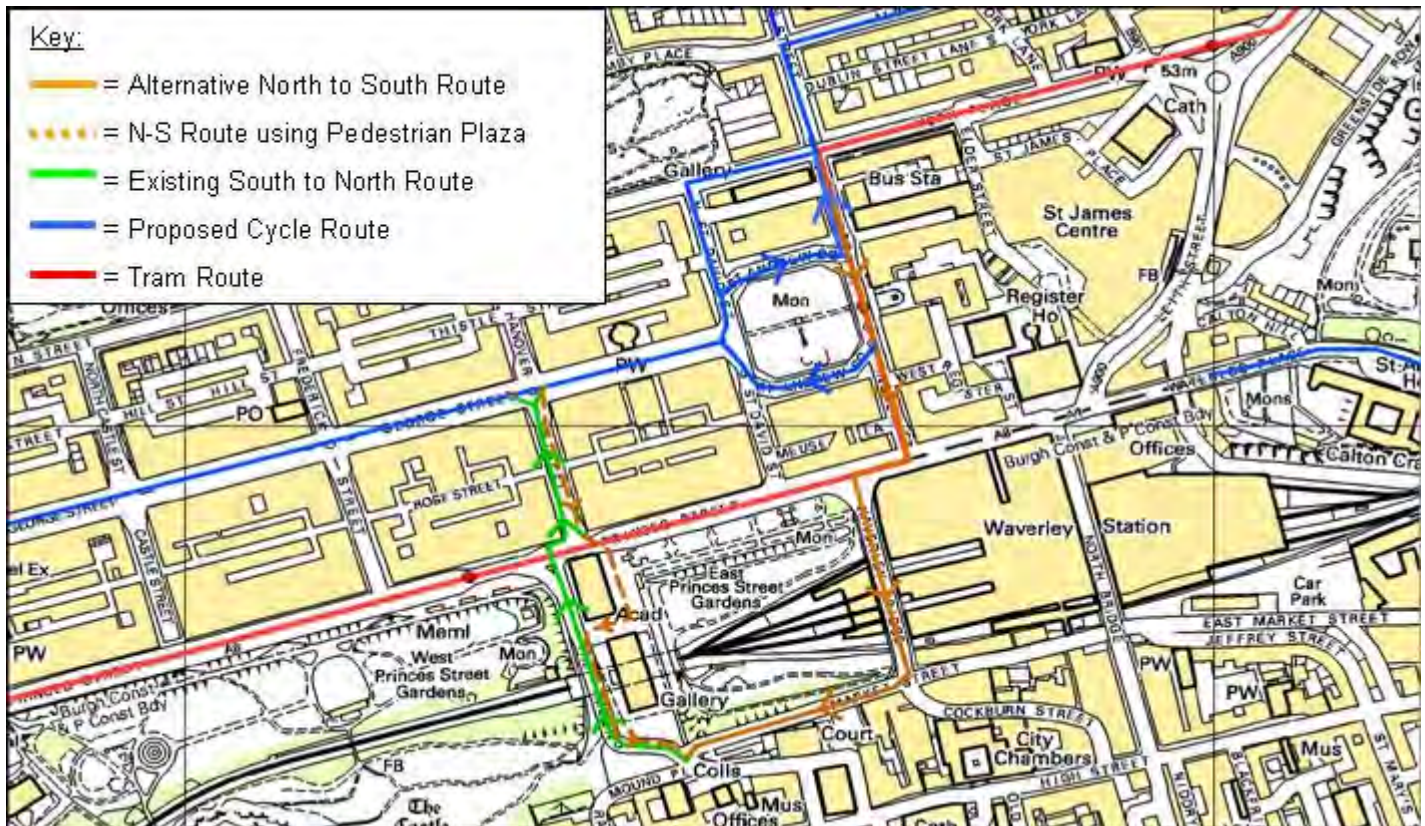


Figure 8.3 – Alternative routes near Waverley Station

- 8.15 We would recommend further consultation with Sustrans and Spokes on these alternatives, coupled it being included as an agenda item at a design workshop (as proposed in Section 12) to explore the issues.
- 8.16 Should Princes Street become tram, pedestrian and cycle only, these routes (Hanover St – The Mound and the alternatives) would need further revision, though it is likely that most of the issues would become much more straightforward.
- 8.17 There are a number of areas in which the 'Off-Route' analysis flagged up further work, beyond the details given in Appendix C. Appendix C provides details where, for example, additional Advanced Stop Lines or drop kerbs are required.

Signage

- 8.18 Appendix C provides details of where signage is specifically required. However, the benchmarking exercises and consultation have identified that:
- Signage should be installed well before the tram starts operation and preferably early in the construction phase. Whilst there may be practical difficulties in this, it is important that cyclists are kept away from construction works as far as possible.

- Signage must be visible and consistent, especially where routes are different in one direction from the other. Much of the signage on and around NCN Routes 1 and 75 in the City Centre will need to be replaced.
- We advise that the 'alternative routes' recommended are 'colour coded' to assist cyclists.

8.19 Detailed specifications for signage, including style, size and location will require further work, as described in Chapter 10.

Constitution Street

8.20 The recommended alternative to the section of Constitution Street which will be closed to cyclists is via the New Kirkgate Shopping Centre. The other routes surveyed would not offer the same direct, traffic-free route. The land ownership and right-of-way status of the Shopping Centre route was not clear to us but it is almost certainly private land. Given the importance of this link, we advise that CEC, Sustrans and Spokes work together at very senior levels to negotiate access with the owner and/or occupiers of the land.

Junction Improvements

8.21 Many of the detailed recommendations in Appendix C include improvements to the layout of junctions. Of particular note are:

- The roundabout at Broughton Street/London Street. Some preliminary design work has been undertaken to improve this roundabout for cyclists. However, more detailed design work will be required.
- The Duke St/Easter Road roundabout, which is a wide roundabout with no lane markings.
- The Broughton St/Albany St junction which would benefit from a right turn cycle lane to aid the uphill turn from Broughton St into Albany Street
- The junctions around the top of Easter Road, with London Road and with Abbeymount/Regent Road. Both should be redesigned to provide improved facilities for cyclists.

Road surfaces

8.22 A considerable number of roads suggested as alternatives are in poor condition. Although the presence of setts is not necessarily a problem in its own right, where they are in poor condition there may be merit in resurfacing (even if only in strips) to assist cyclists. In other cases, road surfaces (eg on West Coates) should be repaired appropriately.

9.0 Cycle Storage and Carriage

Introduction

- 9.1 Cycling and tram use can be complementary. Good access routes to the tram and cycle storage will encourage cycle park-and-ride. In Edinburgh, a compact, densely-populated city, the availability of good public transport and cycle facilities will discourage car ownership, providing a good commercial base for the tram.
- 9.2 Much of the earlier consultation with SPOKES and others focused on the carriage of cycles on tram vehicles. Whilst this has remained an issue, it is clear from the benchmarking that cycle storage at tram stops is more important in terms of encouraging cycle/tram journeys.

Carriage of Cycles on the Tram

- 9.3 A commitment has been made by Transdev, the tram operator, to trial off-peak cycle carriage once the system has bedded down. The results of this will be of interest elsewhere as to date no other tram operator in the UK has agreed to carry cycles on trams.
- 9.4 Discussions are currently under way on suitable ways to secure cycles, with a variant of the racks used on *Scotrail* trains being favoured. These could be folded when not in use. There main drawback is that cycles placed on the rack later than others need to be removed to access the earlier ones.

Cycle Storage at Stops

- 9.5 The benchmarking exercises established the importance of cycle storage both at tram stops and as part of the 'streetscene' in the City Centre.
- 9.6 In general, the advice is to set a low 'minimum standard' for all tram stops to ensure that users will be confident that the facility to park-and-ride exists. It is important that monitoring of usage is undertaken; increasing the number of stands as necessary. Our recommendation is that users are invited to participate in this process. This could be undertaken through the links with SPOKES, supplemented by a contact number publicised on leaflets and at tram stops. However, it is crucial that a system is put in place to check the issues raised and to take appropriate action.
- 9.7 A clear requirement for cyclists is their personal safety and the safety of a cycle left parked at a tram stop. If these concerns are not addressed, the potential for cycle park-and-ride will not be realised. Inevitable some more isolated tram stops will not be widely used. However, by identifying key stops on the network as being suited to larger-scale cycle park-and-ride, it will be possible to improve security.
- 9.8 Although CCTV can help, the most critical issues are the location and type of cycle stand and how well-frequented the area is.
- 9.9 Park and ride sites can be equipped with cycle lockers which are inherently more secure, though more costly and need a suitable management regime in place. However, compared with the cost of additional car spaces, these facilities are good value for money.
- 9.10 On-street and on-stop locations are best equipped with Sheffield stands which are relatively cheap (£50-£80 each, dependent on finish), secure and easy to use. It is recommended that every tram stop is equipped with 2-3 Sheffield stands with a clear plan for where additional stands would be located if demand grows.
- 9.11 In all cases we recommend that cyclists are encouraged to report any incidents, with a telephone number and a quality-assured response system to resolve any queries, pass

concerns on to the Police and inform the complainant of the action taken. The presence of such a system help to give users confidence. This same system can be used to report excess demand (as detailed above)

- 9.12 At manned park-and-ride sites, we have seen elsewhere the successful use of 'customer care' standards which include jump-starting of cars with a flat battery. We would recommend the extension of this to cyclists using the facilities, with pumps, repair kits and limited spares available for sale.

10.0 Signage, Education, Publicity and Training

Introduction

- 10.1 Experience from the tram systems elsewhere in the UK suggests that cyclists need special consideration in both construction and operation of the system. Whilst in Europe it is common to see systems being planned as combined 'tram and cycle' schemes, this approach has not been adopted in the UK. This emphasises the need to provide advice to cyclists, to guide their route, to provide publicity and to provide training both for cyclists and tram drivers.

Signage

- 10.2 The use by Nottingham of the 'slippery tracks' sign (see Figure 5.7) has raised interest within the other tram schemes we approached during the benchmarking exercise. It was generally acknowledged that cyclists were especially vulnerable to the slippery rails and that this can justify the use of specifically-targeted signage.
- 10.3 It is especially noted that warning signage must be installed early in the construction phase in order to warn cyclists of the dangers posed by tracks, irrespective of whether the tram is actually operating.
- 10.4 In addition, there was a general agreement that on-road markings were useful:
- Painted 'cycle' signs in the road raises awareness of cyclists amongst other road users. This is especially important where cyclists may have to turn sharply to avoid track crossings at an acute angle (eg near station platforms).
 - Marking of the tram 'envelope', using painted yellow dots provides cyclists (and other road users) with a clear indication of the behaviour of a tram, enabling them to avoid conflict. Even more importantly, these yellow dots enable tram drivers to determine if a vehicle, pedestrian, cyclist or other obstruction are within the swept path of the tram. This enables the tram driver to take action, eg sounding a warning. Note that it is crucial that these yellow dots are not raised as this constitutes a significant additional risk to cyclists already coping with complex situations.
 - To provide 'guidance' (using dotted lines) to ensure that cyclists cross the tracks at an appropriate angle. This can be combined with a formal cycle lane or on-road 'cycle symbol' markings.
 - Where there was insufficient space for a formal cycle lane, the use of 'green squares' (see Figure 5.1) provided both guidance to cyclists and a warning to other road users.
- 10.5 Whilst signage for alternative routes is clearly important, there is a danger that it will be lost in the general clutter, especially as the places most requiring signage will be those where cyclists will be dealing with complex traffic situations.
- 10.6 Where signage is used to guide cyclists onto 'alternative' routes, the system of route colours used in Nottingham provides the opportunity to repeat the colours used on the map (see Figure 5.5) on the sign. This would utilise the coloured box used to designate National (red) and local (blue) cycle routes. This would involve a non-standard variant of the sign, using other colours.
- 10.7 However, where favoured cycle routes are to be signed to avoid hazardous crossings of the tram tracks or to complex junctions, it is recommended that additional markings are provided on the road. The 'green squares' used in Manchester (apparently available in different colours) would be an effective option which avoids confusing lines.
- 10.8 Signage should also be provided during the construction phase to assist cyclists.

Publicity for Cyclists

- 10.9 One of the key findings has been the need to provide publicity materials well in advance. Leaflets setting out the implications of the Edinburgh Tram (in general terms) have already been produced. However, during the construction phase, there will be disruption to existing routes. When the construction phase is nearing completion complete, there will be for cyclists in Good examples from Nottingham and Manchester are reproduced in Appendix D. As soon as the routes are agreed, it is recommended that map leaflets are produced and circulated.
- 10.10 It will be necessary to revise and reissue the material, especially to take account of later modifications to junctions and changes such as improved cycle parking facilities at tram stops. Information should be available (as it currently is) through paper leaflets and the Websites of all appropriate organisations (including City of Edinburgh Council, the tram operator's website and SPOKES)
- 10.11 To increase the visibility of the publicity material, we would recommend carrying advertisements in local newspapers at critical times, such as the completion of a major section or the start of operation. This can be supplemented by editorial material issued through the City of Edinburgh Council to promote cycling in general, focusing less on 'problems' of the tram.
- 10.12 Working with SPOKES, it should be possible to promote the use of other media (especially blogs) to enable cyclists to swap advice and flag up issues. We would recommend that any involvement in this should be 'passive' to avoid any conflicts of interest with road safety responsibilities. However, by monitoring such communication and actively encouraging SPOKES to raise issues sourced through this, it will be possible for City of Edinburgh Council to monitor the actual views of cyclists.

Cyclists' Education and Training

- 10.13 Schools and employers should be targeted with training materials on safe cycling on and around the tram, though we would recommend that this is through a broader 'Smarter Choices' approach. Focusing on 'problems' caused to cyclists by the tram is unnecessarily negative.
- 10.14 Major employers in the City Centre and elsewhere served by the tram will find large numbers of their employees travelling to work by tram. We see this as an enormous opportunity for a major 'Smarter Choices' initiative aimed at reducing car commuting into the City. We would strongly recommend that the City of Edinburgh Council works with all transport operators to design and implement a major employee travel plan exercise across the City, timed to coincide with the start of tram operation. This will require funding which should be planned now.
- 10.15 This 'Smarter Choices' exercise should incorporate advice and training on cycling to work, including safe cycling on and around the tram and utilising the newly defined, publicised and signed cycle routes detailed elsewhere in this report.
- 10.16 It was noted that schools near to the tram route do not currently promote cycling (though many schools elsewhere in Edinburgh, in less heavily trafficked areas, do). At schools close to the tram route our work suggests that pupils and parents will become heavy users of the tram. Trams are seen as safer and more 'up-market than buses'. Schoolchildren should be given advice on the use of the tram. This should be coupled with School Travel Plans but can incorporate advice on safe cycling around the tram. It should be applied to all schools throughout Edinburgh and its surrounding settlements. This will need to be clearly set out to the City of Edinburgh Council School Travelplan Officers who will require help in developing relevant support material.

- 10.17 There is also evidence that children will misuse trams; 'tram-surfing' or being towed on rollerblades. This has happened throughout the UK where trams have been introduced and has required enforcement action and modifications to tram design. Whether telling children not to do it is helpful or not is not clear from our study.
- 10.18 Where *Bikeability* training is provided, this should be amended to include advice on cycling on or near the tram route. All local training agencies should be actively encouraged to do this and should routinely be given the latest cycle safety and routing leaflets.

Tram Driver Training

- 10.19 Clearly dealing with cyclists is a relatively small part of tram driver training. What has come from our study is the opportunity to use of the ongoing training undertaken by all the UK tram operators to take account of incidents, learning by drivers and changes to the road layouts.
- 10.20 Of all the initiatives we encountered, the use of 'forward facing' CCTV was by far the most useful. All tram operators use regular 'refresher' training, and the use of forward-facing CCTV enables drivers to discuss and learn from incidents recorded on other drivers' trams. It also enables any serious incidents of accidents to be investigated thoroughly –and used as a training aid where appropriate.

11.0 Monitoring and Feedback Recommendations

Introduction

- 11.1 It is clear from our work that all the UK tram operations have learned much from their experiences and have made significant improvements to a whole range of aspects following the first phase of implementation. Edinburgh will similarly learn from experience and it is important that this is done in a structured way. This section draws together some of the suggestions made earlier and makes recommendations on the monitoring and feedback mechanisms which will be required.

Accidents

- 11.2 Our benchmarking showed clear disparities between the official recording of accidents (by Local Authorities, the Police and the Railway Inspectorate) and anecdotal reports (eg in local press and by hospital staff). Assessing the real impacts and risks to cyclists, especially at specific locations, cannot be done accurately with such disparity.
- 11.3 We would recommend that cyclists are encouraged to report accidents (perhaps through the SPOKES website), along with the precise location of occurrence.
- 11.4 In addition, we recommend that local hospitals are approached to provide information on injuries to cyclists, including 'wheel stuck in rail' accidents. Whilst it is unlikely that precise location can be captured by this method, at least the numbers of incidents can be recorded. Data protection considerations need not apply as no personal information should be required or requested. Any existing data sharing agreements between City of Edinburgh Council and the NHS should assist in negotiating the release of this information.
- 11.5 All information, including official reports and those obtained as suggested above, can best be collated and reported through the Road Safety Section of the City of Edinburgh Council. It is recommended that these be incorporated into the routine performance management reporting alongside such statistics as patronage and punctuality.

Cycle Parking

- 11.6 In Section 9, we have recommended that the assistance of SPOKES is sought to help identify tram stops where insufficient cycle parking is available, together with reporting of any thefts or other incidents.
- 11.7 In addition, we recommend that the tram shelter maintenance teams are asked to collect routine information on
- Numbers of cycles parked at each tram stop on the designated stands provided
 - Other cycles parked nearby, including those locked to railings associated with the tram stop.
 - Any evidence of damage to cycles (eg buckled wheels)
- 11.8 The evidence from these reports can be analysed as part of the routine operational reporting system, with thresholds set at which a business case is developed for additional facilities or enhanced security monitoring.

Cyclist Behaviour

- 11.9 The Road Safety Audits undertaken on the tram designs must, of their essence, be conservative. However, all the other tram systems reviewed have found that the behaviour of cyclists is based on their own assessments of risk, taking account of the speed advantage which can be made is a route other than the recommended/allowed one is taken. In

particular, experienced cyclists will often use 'tram only' routes in preference to circuitous signal-controlled alternatives. There may be locations where this can be tolerated and others where a more active approach to enforcement is required in order to avoid risks to cyclists or other road users.

- 11.10 We recommend that an active programme of CCTV reviews is undertaken on a rolling basis across the network. The results of this, in terms of locations where cyclists are shown to be ignoring turn bans, traffic signals or sections where cycles are banned should be reviewed by Police, tram operational staff and CEC Road Safety staff. Where appropriate, such reviews can include SPOKES or SUSTRANS to provide a cyclist perspective.
- 11.11 This approach will enable a reappraisal of risk, enabling any enforcement activity to be targeted on areas where significant issues are shown to exist.
- 11.12 In other areas, it may be appropriate to redesign junctions (possibly through a combination of accident reporting and CCTV monitoring), possible to 'soften' the approach by perhaps lifting bans or other restrictions. It is recognised that this may not always be feasible, given the issues of liability where specific actions are taken.
- 11.13 On cycle routes off the tram route (eg NCN Route 1), it is recommended that additional consultation takes place, when the tram system is complete, with cyclists (through SPOKES and SUSTRANS) to fine-tune some of the alternative routes proposed. This will help resolve issues such as the best approach to signage, any required junction design improvements and the most appropriate route for cyclists to use where alternatives exist. Given the uncertainty of any traffic models, this is especially important in the light of the predictions of traffic displacement onto roads in the wider Edinburgh area.

Reporting and Management

- 11.14 Reporting of all the above, alongside the results of the trial of cycle carriage on trams, should be incorporated into the Performance Reporting and Management mechanisms adopted for the broader management of the tram system and its reporting to various stakeholders, including City of Edinburgh Council.

12.0 Conclusions and Overall Recommendations

Introduction

- 12.1 Much of the value of this study lies in its detailed recommendations, especially those contained in the various appendices. Since no high level policy decisions are involved, the overall conclusions relate only to some key messages coming through from the detailed analysis.

On-Route Cycle Facilities

- 12.2 Cyclists have made it clear, in the consultation undertaken and through the benchmarking exercises, that they require direct, safe routes. It is recognised, however, that building a tram system in a compact city like Edinburgh means that compromises need to be made.
- 12.3 The issues raised and recommendations made in Appendices A and B, alongside the detailed responses from the designers have addressed many of the issues regarding cyclists' use of the tram route. Some unresolved issues remain, though some of these (eg the layout of Picardy Place) probably cannot be fully resolved to the satisfaction of all stakeholders. Others will be resolved through the design process still under way whilst others can probably be best addressed through a process of review once the system is up and running. This report is intended to help with this ongoing review process as much as with the current phase of the system design and construction

Off-Route Cycle Facilities

- 12.4 As with the on-route facilities, there are still a number of unresolved issues, where different stakeholders disagree or where genuine alternatives exist. The detailed analysis in Appendix C, coupled with the evidence of the views of stakeholders such as Sustrans, is intended to help TIE and CEC to resolve these issues. However, since cyclists are free to use any road from which they are not specifically banned and the traffic modelling can never be certain, it will almost certainly be necessary to fine-tune some elements after the system is completed.
- 12.5 We would recommend that TIE and CEC commit to this review and fine-tuning process, putting forward a plan and timetable at this stage for consultation with SPOKES and Sustrans.
- 12.6 Design work on the wider area to cater for the predicted displaced traffic is already under way. In some cases this overlaps with the recommendations in Appendix C. We recommend that the off-route recommendations are incorporated into the designs for the wider area and that these are reviewed after implementation along the lines indicated above.

Benchmarking and Continual Improvement

- 12.7 Edinburgh has already benefited from the experiences of other tram systems in the UK and elsewhere. This report takes this further in terms of learning from other systems' facilities for cyclists. We would recommend that this learning process continues, both within Edinburgh and with other systems.
- 12.8 Setting up a benchmarking facility for the future would be worthwhile. For example, other tram systems will be keen to see the results of Edinburgh's planned experiment with cycle carriage on trams. TPI can help to set this up if required.

- 12.9 Within Edinburgh there need to be open and transparent mechanisms, as set out in Sections 9 to 11, whereby monitoring of the impacts of the tram can be assessed and the system improved.

Taking the Work Further

- 12.10 One option to take the work forward is to run one or more Design Workshops to decide on favoured options where alternatives exist and to define detailed design requirements. This proposal is being explored.
- 12.11 Some elements of detailed design on the off-route alternatives still remain. Some of these relate to signage, others to junction layouts, including roundabouts. Section 8 and Appendix C contain recommendations for specific routes. Given that there is an overlap between our recommendations and the work being undertaken as part of the wider network, taking account of the predicted traffic displacement, any further work should be programmed after this phase of the tram work.
- 12.12 However, once this is complete it will be possible to undertake further detailed design work, as proposed in Section 8 and Appendix C.
- 12.13 One aspect which is apparent at this stage is that gaining permission to use the New Kirkgate Shopping Centre as an alternative to Constitution Street should be undertaken through a joint approach by City of Edinburgh Council, Sustrans and SPOKES.

Future Developments

- 12.14 Some elements of the Edinburgh's development are not yet clear. In particular, there are plans to redevelop the St James Shopping Centre, there are proposals to make Princes Street pedestrian and cycle only (possibly as 'shared use') and proposals to make Haymarket Yards 'shared use'. All of these proposals would have significant impacts on the recommendations in this report.
- 12.15 The views expressed to date indicate that these proposals will be handled separately to the current tram design and construction. TPI would be able to participate in any design process to develop these proposals at a later stage.