

Transport and Environment Committee

10.00am, Thursday, 28 February 2019

Edinburgh Tram – York Place to Newhaven Final Business Case

Item number	7.1
Report number	
Executive/routine	
Wards	4 – Forth, 11 – City Centre, 12 – Leith Walk, 13 – Leith
Council Commitments	22

Executive Summary

Edinburgh is a successful and prosperous city, regularly voted as one of the best places in the world to live, work and visit. With a strong and varied economy, growing inward investment, a flourishing cultural offering and the UK's second most visited city by tourists, the Capital has solid foundations on which to build.

However, this success brings with it challenges and it is now more important than ever that we provide a first-class, fully-integrated transport system. Put simply, Edinburgh has to manage the growth that its ongoing success is fuelling. As Scotland's fastest growing city, things simply cannot continue as they are – the transport system must evolve to cater to a rapidly growing population.

Since launching in 2014, Edinburgh Trams has become an essential part of an integrated transport network worthy of a major capital city. With near-perfect customer service ratings, patronage for the tram continues to rise year on year, with approximately 7.4 million journeys made in 2018 - up 10 per cent on 2017 and surpassing expectations.

A tram to Newhaven would not only provide a direct link for the people of Leith to the city centre and out to the airport, but would connect residents and visitors to major employment and travel hubs along the route.

It will serve one of the most densely populated areas of the city providing high capacity public transport alongside high quality cycling and walking routes and provides Leith and Newhaven with the opportunity to become destinations in their own right.

Completing the original vision for the first phase of the Edinburgh Trams network plays a key role in shaping the pattern of future growth and development, and hence in delivering the spatial strategy and the long-term economic growth that this will support.

It unlocks a large swathe of the city for housing development and employment opportunities that would not be possible without high capacity public transport. It will also help to reduce air pollution by providing efficient, sustainable transport solutions while opening up people-friendly transport links for individuals and communities from all walks of life.

Edinburgh Tram – York Place to Newhaven Final Business Case

1. Recommendations

- 1.1 It is recommended that the Committee:
 - 1.1.1 Notes the findings set out in the Final Business Case (FBC);
 - 1.1.2 Notes the anticipated cost of the project and associated funding arrangements;
 - 1.1.3 Notes the project cost assumptions set out in the Financial Case of the FBC;
 - 1.1.4 Notes the risk analysis contained within the FBC;
 - 1.1.5 Notes the economic appraisal contained within the FBC;
 - 1.1.6 Notes that a paper will be taken to Finance and Resources Committee on 7 March 2019 on the procurement of contracts associated with this project;
 - 1.1.7 Notes that a support scheme for businesses along the route will be put in place prior to any works commencing;
 - 1.1.8 Refers this report to City of Edinburgh Council at its meeting on 14 March 2019 for approval of:
 - 1.1.8.1 the FBC; and
 - 1.1.8.2 the increased prudential borrowing authorised limit and operational boundary reported in paragraph 5.3.

2. Background

- 2.1 The Edinburgh Tram York Place to Newhaven project completes the originally envisaged Phase 1a of the Edinburgh tram network.
- 2.2 In [December 2015](#), the Council approved in principle the option of completing the existing tram line to Newhaven, and approved the commencement of Stage 1 activities.
- 2.3 A commitment was made to update and refine the project financials during Stage 1, and bring a report back to Council by summer 2017 recommending a way forward.
- 2.4 In [September 2017](#) an Outline Business Case (OBC) was presented to Council, prepared in accordance with Transport Scotland guidance and implementing the

business case development process set out in Office of Government Commerce and HM Treasury guidance.

- 2.5 The Council approved the OBC and approved commencement of Stage 2 activities, which have included detailed design consultation, a procurement process, the development of a financial model and the completion of the FBC for consideration.
- 2.6 The FBC attached at Appendix 1 has been prepared in accordance with Transport Scotland guidance and builds on the work done for the updated OBC reported to Council in September 2017.
- 2.7 The Council has the powers under the Edinburgh Tram (Line One) Act to complete the Edinburgh Tram York Place to Newhaven project.
- 2.8 A number of lessons learned from the first phase of tram are incorporated into the FBC. The Council will consider further recommendations arising from the Lord Hardie Tram Inquiry as the project progresses.

3. Main report

- 3.1 The Edinburgh tram system currently operates between Edinburgh Airport and a temporary terminus at York Place in the city centre. Passenger services commenced on 31 May 2014 and passenger numbers have grown consistently over the first three years of operations, reaching 7.4 million passengers in 2018.
- 3.2 The Edinburgh Tram York Place to Newhaven route is 4.6km long and includes a mix of shared and segregated running on-street. The junctions at Picardy Place and London Road are reconfigured to allow for the safe operation of tram and general traffic movements.
- 3.3 The completed line will provide eight stops in total, with the existing temporary terminus at York Place being de-commissioned and replaced by a new tram stop at Picardy Place. A further seven tram stops are provided along the route.

Strategic case

- 3.4 The York Place to Newhaven project is fully consistent with, and supports the delivery of the key strategies that will shape the future development of Edinburgh, including:
 - 3.4.1 The Edinburgh City Region Strategic Development Plan;
 - 3.4.2 Edinburgh Local Development Plan;
 - 3.4.3 Edinburgh Economy Strategy;
 - 3.4.4 Edinburgh Local Transport Strategy 2014 to 2019;
 - 3.4.5 Transport 2030 Vision;
 - 3.4.6 Sustainable Energy Action Plan; and
 - 3.4.7 Transport for Edinburgh's Strategy for Delivery 2017 to 2021.

- 3.5 The project supports the delivery of SESPlan's Proposed Strategic Development Plan (SDP) for the Edinburgh city region and is specifically identified in the proposed SDP as a strategic project that is likely to have region-wide benefits.
- 3.6 Over the next decade Edinburgh and its surrounding area is expected to be home to a faster growing population than anywhere else in Scotland. The Edinburgh Local Development Plan directs most of the planned growth of the city to strategic development areas directly served by tram.
- 3.7 The City of Edinburgh Council's "Edinburgh Economy Strategy" notes that delivery of high quality enabling infrastructure and services is a lever for change that the Council can use to assist delivery of the Economy Strategy and to enable good growth. The Strategy also recognises that investment in infrastructure and managing the growth of the economy are key to building a resilient and adaptable economy.
- 3.8 Completing the Edinburgh Tram York Place to Newhaven project will link Edinburgh Airport, the city centre and the Waterfront area: three of the Council's four priority investment zones under its Economy Strategy.
- 3.9 The Edinburgh Local Transport Strategy 2014 to 2019 notes that one of the key challenges facing Edinburgh is that city centre streets are dominated by motor traffic, and recognises that completion of the line to Newhaven presents a great opportunity to change this.
- 3.10 The project supports the Council's plans to:
 - 3.10.1 improve the pedestrian experience in the core city centre area and increase space for pedestrians;
 - 3.10.2 improve access to the city centre;
 - 3.10.3 increase space for other uses (e.g. street cafes, entertainment, markets);
 - 3.10.4 offer dedicated cycle provision in the area; and
 - 3.10.5 reduce the detrimental impact of motor vehicles on the city centre environment.
- 3.11 Out-with the city centre, the Local Transport Strategy (LTS) notes that Edinburgh's growth is focussed in three areas, West Edinburgh (including Edinburgh Park/Gyle and the Airport area), South East Edinburgh and the Waterfront. The LTS concludes that to grow in a way that protects the city's environment, these areas need supporting transport investment focussed on public transport, walking and cycling.
- 3.12 The Strategy also notes that improved transport connections will drive the renewal of Edinburgh's waterfront. While much of the required urban infrastructure is already in place, improved connections to the city centre are needed to unlock the area's sustainable regeneration.
- 3.13 The project is also fully consistent with the Edinburgh LTS which recognises that improved connections to the city centre are needed to unlock the sustainable

regeneration of Edinburgh Waterfront. The project supports all the vision outcomes set out in the Council's transport strategy, Transport 2030 Vision.

- 3.14 Furthermore, the Transport 2030 Vision envisages that by 2030 Edinburgh's transport system will be healthy - promoting Active Travel with streets appropriately designed for their functions, with an emphasis on encouraging walking, cycling and public transport use and a high quality public realm; improving local air quality.
- 3.15 Tram supports this outcome by providing accessible public transport, public realm improvements along the route, excellent walking and cycling provision between Picardy Place and Foot of the Walk, and improvements in local air quality through reduced emissions. Bicycles are carried on trams, opening up wider transport choices for cyclists. While bus alone has served Edinburgh well in the past, as set out in the 2030 Vision future public transport growth within the city requires at its core a rapid mass transport mode which has been demonstrated by the very successful introduction of tram.
- 3.16 The Sustainable Energy Action Plan notes that the opening of the existing tram line has contributed positively to more sustainable choices of transport as well as reducing carbon emissions in the city. The project supports this key aim as the tram is emission free at the point of use and also accommodates sustainable transport through creation of cycling infrastructure alongside the project.
- 3.17 The project is also consistent with Transport for Edinburgh's Strategy for Delivery 2017 – 2021 to extend, adapt and develop an integrated public transport network that is reliable and convenient throughout the City Region throughout the day, and week.

Economic case

- 3.18 The economic appraisal of the Edinburgh Tram York Place to Newhaven project has been revised to take account of updated planning assumptions, scheme design, costs and forecasts.
- 3.19 In support of this FBC, a high-level options assessment has been carried out to validate the conclusions reached in the 2006 STAG 2 appraisal, which formed the basis for the Edinburgh Tram (Line One) Act 2006. This work included the assessment of viable modal options against assessment criteria and objectives derived from the original Scottish Transport Appraisal Guidance (STAG) appraisal in light of current policy.
- 3.20 The assessment concluded that the completion of the tram to Newhaven will provide a seamless, modern and accessible public transport option directly from the Airport. The tram option out-performed bus and Bus Rapid Transit against the following STAG objectives:
 - Supporting the local economy;
 - Sustainability;
 - Social benefits;
 - Safety and security;

- Value for money;
 - Affordability; and
 - Commercial and management.
- 3.21 The assessment concluded that tram is the preferred modal choice for the route to Newhaven and modelling in the FBC has been carried out on this basis.
- 3.22 The forecasting framework and models have been updated to address findings of the independent audits undertaken of the 2015 options assessment business case and the 2017 updated OBC.
- 3.23 The project is forecast to generate an additional demand of 7 million passenger journeys in its opening year.
- 3.24 The project has a positive economic case, delivering over £1.40 of benefit for each £1 spent with the benefit to cost ratio remaining positive under all the sensitivity tests considered.
- 3.25 As well as the traditional cost benefit analysis the project also delivers wider economic benefits and performs extremely well against a range of objectives set out in the STAG.
- 3.26 Wider economic benefits are additional to standard transport user benefits and represent the potential economic impacts of transport improvements upon business and workers' productivity and the resulting increase in output. Agglomeration benefits are the largest of these, and reflects the economic benefits from the clustering of high-value knowledge-intensive sectors, such as finance, business services, legal, and bio-science, which characterise the Edinburgh economy and underpin its national and international competitiveness. Investment in tram will reduce transport costs and thereby increase the agglomeration of business activity, improve employment accessibility and increase the number of jobs in the area served by tram by facilitating higher employment densities.
- 3.27 The project also supports the change in scale and location of jobs through:
- 3.27.1 directly supporting the bringing forward of employment related development in the Leith Waterfront area; and
 - 3.27.2 increasing the attractiveness of the employment locations in the city centre and Edinburgh Park by expanding the effective labour market catchment through reduced travel costs, and through helping bring forward major residential development in Leith Waterfront.
- 3.28 These benefits have not been quantified as part of this update of the business case. However, the inclusion of such benefits for public transport projects in large urban areas (UK outside London) typically adds in the range of 15% to 40% above conventional transport benefits.
- 3.29 The Edinburgh Tram York Place to Newhaven project also connects major existing and planned employment destinations (city centre, Edinburgh Park) with the Leith corridor, which has among the highest population density in the city, and major

planned areas for new residential developments along Leith Waterfront towards Newhaven.

- 3.30 Through this the tram will connect existing and new jobs with existing and new residents, ensuring that labour market accessibility is enhanced (businesses will find it easier to recruit, and workers have access to more jobs), and that the economic growth that this supports will be delivered in a sustainable manner, though integrated transport and land use planning.
- 3.31 This report also provides an outline assessment against the range of objectives set out in STAG. The project performs well against a number of key objectives including:
 - 3.31.1 supporting the spatial strategy;
 - 3.31.2 sustainable economic development;
 - 3.31.3 connecting areas of relatively high unemployment and deprivation;
 - 3.31.4 transport interchange; and
 - 3.31.5 land use transport integration.
- 3.32 This provides a validation that the project remains consistent with, and supportive of, the wider spatial planning and policy objectives that it was originally developed to meet.

Financial case

- 3.33 The tram line to Newhaven is affordable, on the basis that the £1.9 million cashflow challenge can be funded from reserves. Reserves used would be replenished from profits in future years, with all reserves being repaid by 2027. Moreover, there are opportunities to reduce the requirement for reserves from efficiencies in tram maintenance and further maximisation of tram advertising income.
- 3.34 This conclusion is based on robust and prudent analysis of costs and revenues and assumes an extraordinary dividend from Lothian Buses of £20 million over a 10 year horizon.
- 3.35 In the longer term, tram revenues can fund the extension and provide additional income to the Council.
- 3.36 However, in recognition of the work done by Oxford Global Projects, it is recommended that an allowance is made for an additional £50 million as further contingency. This contingency allowance increases the £1.9 million challenge to £14.8 million requiring a series of measures to be implemented to fund or mitigate the risk.
- 3.37 All risk and contingency will be overseen by the Head of Finance and administered through the governance structure set out in chapter 7 of the FBC.
- 3.38 Analysis of opportunity costs has been carried out setting out the amount that could be available to spend on other projects if the capital investment were not made. This opportunity cost however needs to be viewed in the context of the monetary and wider economic benefits the project delivers.

- 3.39 Sensitivity testing has been undertaken on the base case showing the financial impact of changes to key assumptions and the impact on reserves.

Commercial case

- 3.40 The updated OBC provided detailed commentary on a range of procurement issues and concluded that:
- 3.40.1 the project is delivered under a design and build contract, incorporating tram infrastructure and tram control and communications systems;
 - 3.40.2 the maintenance of the York Place to Newhaven line should be procured separately;
 - 3.40.3 the appropriate form of contract for the main works should be the NEC4 Option C target price contract; and
 - 3.40.4 there was likely to be little or no market appetite for taking full construction risk which would negate a PFI approach.
- 3.41 The procurement strategy was developed based on key procurement objectives and a consideration of the lessons learned on the first phase of tram and from other tram projects in the UK and internationally.
- 3.42 Analysis of the most appropriate contracting strategy for below ground obstructions, including utilities and archaeology, was completed during this stage of the project and the Council has adopted a model that was used successfully on the first phase of tram, post mediation.
- 3.43 The Council has adopted an Early Contractor Involvement model for the project bringing together all key participants for a period of six months prior to any physical works being carried out. During this period a number of predefined tasks will be completed and all parties will work together to plan the works, investigate any value engineering opportunities and provide additional certainty around the project cost plan.
- 3.44 A comprehensive risk identification and assessment has been carried out, and allocation of risks under the contractual framework are set out in this FBC.
- 3.45 The Council has conducted two procurements for the main works and the below ground obstructions works. Both procurements have now concluded and the pricing and risk information contained in the successful tenders has been used to develop this FBC.
- 3.46 Based on lessons learned from the construction of the first phase of tram, the project delivery strategy is underpinned by the following core principles:
- 3.46.1 traffic management will be deployed which facilitates opening large sections of the work site at any one time and the project will not be subject to any city traffic embargoes;
 - 3.46.2 a continuous approach to construction will be deployed wherever possible whereby the diversion of utilities will be carried out immediately prior to the installation of the tramway avoiding the need to excavate twice, thus

minimising disruption, minimising cost, and speeding up the construction process;

3.46.3 a support for Business scheme has been developed to maintain the vibrancy, desirability and accessibility of the streets affected by the project during construction; and

3.46.4 works will be carried out in accordance with the Code of Construction Practice.

- 3.47 The strategy for dealing with heritage items and archaeological remains has been agreed with the City Archaeologist.
- 3.48 To mitigate the impact on passenger services, it is proposed to decommission the York Place tramstop as part of the last construction activities and introduce temporary measures (including temporary crossover west of Elder Street) to allow services to run as far as St Andrew Square until the new line is operational.
- 3.49 A programme has been developed based on the general principle of continuous working and adopting a traffic management plan which facilitates opening up large sections of the work site at any one time. Overall the project will take approximately 46 months from award of contract to open for revenue service. This duration is within industry norms for a tram project of this scale and complexity.
- 3.50 In developing the road layout and public realm for the scheme, a number of supplementary projects have been identified that support the finally developed road layouts between York Place and Newhaven. These projects will be funded from the Place capital programme budget and will be delivered in parallel with the tram project.

Management case

- 3.51 Robust governance, change management, and risk management procedures are in place on the project that draw on lessons learned from the first phase of tram delivery, post mediation, and other major projects.
- 3.52 An outline Stakeholder and Communications Management Plan has been prepared for the project which describes the processes for ensuring an effective strategy for the management of stakeholders on the project. It details how the project will identify and manage all stakeholders impacted by the works, engage with them and optimise their experience of the project and empower them in the local decision making process. The plan adheres to the Scottish Government's Seven Standards of Community Engagement to ensure an equality of access for all.
- 3.53 A contractor insolvency mitigation plan has been developed for the project that sets out a number of financial, contractual and management measures that will be put in place to reduce the impact of this risk.

4. Measures of success

- 4.1 The findings of the FBC demonstrate that that an economic case for extending the current tram line would accrue positive benefits to the city. These are set out in this report and in more detail in the FBC. In line with HM Treasury and Scottish Government guidance an evaluation report will be produced at the close of the project to assess delivery of these benefits.

5. Financial impact

Base Case

- 5.1 The projected cost of the line from York Place to Newhaven is £207.3 million, including costs to develop this FBC of £5.5 million. After allowing for developer contributions (£7.8 million), the support for business scheme which will be funded from revenue (£1.9 million) and costs already incurred in bringing the project to this stage (£5.5 million), there is a net capital funding requirement of £192.1 million. Under the income-based repayment profile, capital financing costs are repaid as interest only in the four-year construction period, with principal and interest repayments for the 30 years following commencement of operations. The associated financing cost of this investment is estimated to be a principal repayment of £192.1 million and interest costs of £165.4 million totalling £357.5 million. This represents average annual loans fund payments of £10.5 million over a 34 year period, based on an indicative loans fund interest rate of 4.1%.
- 5.2 The FBC demonstrates that, in the medium to longer-term, the cost of financing and operating the line to Newhaven can be met from public transport revenues in the form of Edinburgh Tram operating surpluses and an extraordinary £20 million dividend from Lothian Buses. It is also assumed that Edinburgh Trams will benefit from group tax loss relief, by setting losses against taxable profits generated by other Council-owned companies. This is as a result of changes to the operating agreement between Edinburgh Trams and the Council reported to Transport and Environment Committee on [6 December 2018](#).
- 5.3 In the short-term there is a £1.9 million challenge spread over financial years 2022-23 and 2023-24, which can be met from reserves and replenished from profits in future years, with all reserves being repaid by 2027. The reason for this challenge is that capital expenditure needs to be incurred and financed in advance of the new line opening for service.

- 5.4 On this basis, an increase in the Council's existing operational boundary and authorised limit for External debt is affordable to the Council and the revised Prudential Indicators are:

	2019/20	2020/21	2021/22	2022/23	2023/24
	£m	£m	£m	£m	£m
Operational Boundary for External Debt	1,953	2,160	2,280	2,361	2,438
Authorised Limit for External Debt	2,239	2,392	2,479	2,483	2,538

Risks and Sensitivity

- 5.5 In light of the reliance on the financial modelling and to improve confidence in modelling outputs, the following scenarios have been tested:

Scenarios	Revised reserves requirement (£m)	Reserves repaid by (Year)
Demand reduced by 5%	7.5	2035
Airport demand reduced by 15%	6.2	2029
Marginal interest rate increased by 50 basis points	5.1	2028
Project costs increased to £257.6m (based on reference class study conducted by Oxford Global Projects)	14.8	2037

- 5.6 In recognition of work done by Oxford Global Projects, it is recommended that contingency planning is undertaken for an additional £50 million. This contingency provision increases the £1.9 million challenge to £14.8 million requiring a series of measures to be implemented to fund or mitigate the risk.
- 5.7 Possible mitigation measures include forward borrowing to lower the cost of funding, reviewing fare strategy, maximising tram advertising income and bringing forward operational efficiencies including potential savings on tram and infrastructure maintenance.

Opportunity Cost

- 5.8 The FBC also considers the opportunity cost of proceeding with the project, that being the amount that could be available to spend on other projects if the capital investment were not made.
- 5.9 As the project is funded almost entirely from future public transport revenues, the amount available to fund other priorities is limited to the Lothian dividend and the surplus cashflows from the existing tram line, totalling £58 million over eleven years.
- 5.10 The dividend from Lothian and the surplus cashflows from the existing tram line could be available to the Council to fund other priorities provided the profile of these sums matched an alternative investment.

- 5.11 This opportunity cost however needs to be viewed in the context of the monetary and wider economic benefits the project delivers. As well as delivering in excess of £395 million in benefits, the project contributes to a range of wider policy objectives and outcomes.

Potential Abortive Costs

- 5.12 The next phase of the project is Early Contractor Involvement (ECI) whereby the Council will work closely with the proposed contractors and technical advisors to finalise the detailed scope, programme and cost of the project. Should the outcome not be acceptable to either the Council or the proposed contractors, contract termination provisions exist allowing the project to be ceased. The estimated cost to be incurred during this stage of the project is £4.8 million and would require to be funded from the revenue budget should the project be aborted at this point.
- 5.13 The public inquiry led by the Right Honourable the Lord Hardie is underway into the original Edinburgh Trams project but has not yet published its findings. Whilst the FBC incorporates a number of lessons learned from the first phase of tram, there remains a risk that the findings of the inquiry could result in the Council resolving to take additional action which may have expenditure implications.

Supplementary Projects

- 5.14 In developing the road layout and public realm for the scheme, a number of supplementary projects have been identified that support the finally developed road layouts between York Place and Newhaven. These projects can be funded from the Place capital programme budget and will be delivered in parallel with the tram project. Detailed business cases will be produced for each supplementary project and approved by Council.

6. Risk, policy, compliance and governance impact

- 6.1 The recommendations set out in this report are in alignment with all key strategic regional and city wide plans.
- 6.2 There are a number of risks which require careful management throughout the project. The capital cost presented in the FBC include a substantial allowance for risk. This has been calculated in compliance with government guidance using quantitative risk analysis. An additional contingency is available to the project to reflect the reference class forecast report provided by Professor Flyvbjerg and Dr Budzier of Oxford Global Projects.
- 6.3 The cost plan and economic appraisal and patronage forecasts have been independently audited by Atkins and Faithful and Gould and are thus considered robust at this stage of project development.
- 6.4 Robust governance arrangements are required to effectively manage the project to completion. The FBC sets out those governance arrangements.

7. Equalities impact

- 7.1 The proposals and recommendations described in this report could contribute to the public sector general equality duty to: (i) advance equality of opportunity. There is no distinct relevance in respect of the general duties to; (ii) eliminate unlawful discrimination, harassment and victimisation, or; (iii) foster good relations.
- 7.2 An Equalities and Rights Impact Assessment has been prepared and is available as background reference. There are no direct negative equalities or human rights impacts anticipated.

8. Sustainability impact

- 8.1 The project will be undertaken in consideration of the three elements of the Climate Change (Scotland) Act 2009 Public Bodies Duties. This aligns with the requirements of the LTS. The potential to expand the tram network aligns with and is cognisant of the requirement to reduce carbon emissions and the need to travel. In doing so, this will promote a shift to more sustainable modes of transport that will bring reduced carbon dioxide and nitrogen oxide emissions.
- 8.2 The promotion of a high capacity, high quality public transport system aligns with the LTS and draft Local Development Plan and will help achieve a sustainable Edinburgh, as both documents' actions include improving the extent of the public transport offered in Edinburgh, thus enhancing social inclusion and equality of opportunity.
- 8.3 The road design proposals aim to improve facilities for cyclists and pedestrians and this is further supported by the supplementary projects referred to in the FBC.

9. Consultation and engagement

- 9.1 A major element of the design development carried out since the OBC was presented is the development of the road layouts and public realm for the project. These designs were initially developed ahead of a major public consultation activity which was undertaken between March 2018 and November 2018. This consultation has resulted in a road alignment and public realm design for the project that will be used to develop the detailed design and Traffic Regulation Orders (TROs).
- 9.2 In addition, a package of measures has been developed in consultation with the business community and elected members to support business through the construction period.
- 9.3 The recommendations set out in this report have been discussed with representatives of the Capital Coalition, Opposition Groups, Transport for Edinburgh, Edinburgh Trams, Lothian Buses as well as between relevant services within the Council.

10. Background reading/external references

- 10.1 Please see Council papers dated [November](#) and [December 2015](#), Transport and Environment Committee paper dated [September 2017](#) and [Council](#) paper dated September 2017.

Paul Lawrence

Executive Director of Place

Contact: Hannah Ross, Senior Responsible Officer

E-mail: hannah.ross@edinburgh.gov.uk | Tel: 0131 529 4810

11. Appendices

Appendix 1 Final Business Case

Edinburgh Tram York Place to Newhaven Project

Final Business Case

February 2019

Contents

1	Executive Summary	1
	Introduction	1
	Meeting the strategic need	1
	Project economics	3
	Project finances	5
	Commercial	6
	Management	6
2	Introduction	8
	Chapter summary	8
	Project description.....	8
	Edinburgh Tram system.....	9
	Project history.....	10
	Scope of the Final Business Case	11
	Availability of Parliamentary Powers and Land Assembly.....	11
	Edinburgh Tram Inquiry & Lessons Learned.....	12
	Assurance.....	13
3	The Strategic Case	14
	Chapter summary	14
	Background	14
	Strategic context.....	15
	Edinburgh City Region Strategic Development Plan.....	15
	Edinburgh Local Development Plan.....	15
	Edinburgh Economy Strategy	17
	Edinburgh Local Transport Strategy 2014-19	17
	Transport 2030 Vision.....	18
	Sustainable Energy Action Plan 2015-2020	19
	Strategy for Delivery 2017-2021.....	20
	Measuring the Strategic Benefits	20
	Conclusions.....	20
4	The Economic Case	21

	Chapter summary	21
	Introduction	21
	Assessment of modal options.....	21
	Modelling inputs.....	22
	Forecasting approach	23
	Population and employment projections.....	23
	Demand, revenue and benefits forecasts.....	24
	Capital costs, operating costs, lifecycle costs and revenues	25
	Economic appraisal	27
	Sensitivity tests.....	29
	Wider economic benefits.....	30
	Outline STAG assessment	32
	Performance against planning objectives	32
	Measuring the Economic Benefits	35
	Conclusions	35
5	The Financial Case	36
	Chapter summary	36
	Introduction	36
	Project costs.....	37
	Lifecycle costs	39
	Revenue and cost assumptions	40
	Capital costs and financing	41
	Modelling results	42
	Lothian Buses viability	43
	Opportunity cost.....	43
	Oxford Global Projects – Optimism bias using reference class forecasting	45
	Risks and sensitivity	47
	Conclusions	48
6	The Commercial Case.....	50
	Chapter summary	50
	Introduction	50
	Outstanding procurement matters	52

	Risk apportionment	54
	Procurement process.....	56
	Conclusions	58
7	The Management Case	59
	Chapter summary	59
	Introduction	59
	Construction phase plan	60
	Programme	65
	Project Execution Plan	66
	Conclusions	70

Figures

Figure 1: Existing tram route and York Place to Newhaven route (blue)	9
Figure 2: Performance of Edinburgh Trams since opening	10
Figure 3: Edinburgh LDP Spatial Strategy Summary Map	17
Figure 4: Undiscounted Tram Costs over 60-year appraisal period	26
Figure 5: Index of Deprivation (from Scottish Index of Multiple Deprivation Interactive Map)	34
Figure 6: Council Cumulative Cash Flows	42
Figure 7: Top level governance	67

Tables

Table 1: Powers under Edinburgh Tram Acts	12
Table 2: Transport 2030 Vision Outcomes	18
Table 3: Modelling inputs	22
Table 4: Demand forecasts	24
Table 5: Incremental operating and maintenance costs	26
Table 6: Economic appraisal assumptions	27
Table 7: Economic appraisal results	28
Table 8: Sensitivity test results	29
Table 9: Wider economic benefits assessment	32
Table 10: Assessment against planning objectives.....	32
Table 11: EALI assessment.....	34

Table 12: Assessment of Integration Impacts	35
Table 13: Accessibility and social inclusion assessment.....	35
Table 14: Programme milestones.....	38
Table 15: Project cost estimate	39
Table 16: Net capital funding and debt service requirement.....	42
Table 17: Opportunity cost	44
Table 18: Common causes of cost overrun and steps taken by project.....	46
Table 19: Sensitivity test results	48
Table 20: Risk allocation	55
Table 21: Scope split	56
Table 22: Advantages & disadvantages of proposed traffic management approach	61
Table 23: Traffic management proposals by route section.....	62
Table 24: Strategy for dealing with city heritage items.....	64
Table 25: Supplementary Projects.....	65
Table 26: Pre-contract award programme	66
Table 27: Risk reporting.....	69

1 Executive Summary

Introduction

- 1.1 The Edinburgh Tram York Place to Newhaven project completes the originally envisaged Phase 1a of the Edinburgh tram network.
- 1.2 This Final Business Case has been prepared in accordance with Transport Scotland guidance and builds on the work done for the updated Outline Business Case reported to Council in September 2017.
- 1.3 The Council has the powers under the Edinburgh Tram (Line One) Act to complete the Edinburgh Tram York Place to Newhaven project.
- 1.4 A number of lessons learned from the first phase of tram are incorporated into this Final Business Case. The Council will consider further recommendations arising from the Tram Inquiry as the project progresses.

Meeting the strategic need

- 1.5 Edinburgh is a successful and prosperous city, regularly voted as one of the best places in the world to live, work and visit. With a strong and varied economy, growing inward investment, a flourishing cultural offering and the UK's second most visited city by tourists, the Capital has solid foundations on which to build.
- 1.6 However, this success brings with it challenges and it is now more important than ever that we provide a first-class, fully-integrated transport system. Put simply, Edinburgh has to manage the growth that its ongoing success is fuelling. As Scotland's fastest growing city, things simply cannot continue as they are – the transport system must evolve to cater to a rapidly growing population.
- 1.7 Since launching in 2014, Edinburgh Trams has become an essential part of an integrated transport network worthy of a major capital city. With near-perfect customer service ratings, patronage for the tram continues to rise year on year, with approximately 7.4 million journeys made in 2018 - up 10 per cent on 2017 and surpassing expectations.
- 1.8 A tram to Newhaven would not only provide a direct link for the people of Leith to the city centre and out to the airport, but would connect residents and visitors to major employment and travel hubs along the route.
- 1.9 It will serve one of the most densely populated areas of the city providing high capacity public transport alongside high quality cycling and walking routes and provides Leith and Newhaven with the opportunity to become destinations in their own right.
- 1.10 Completing the original vision for the first phase of the Edinburgh Trams network plays a key role in shaping the pattern of future growth and development, and hence in delivering the spatial strategy and the long-term economic growth that this will support.
- 1.11 It unlocks a large swathe of the city for housing development and employment opportunities that would not be possible without high capacity public transport. It will

also help to reduce air pollution by providing efficient, sustainable transport solutions while opening up people-friendly transport links for individuals and communities from all walks of life.

- 1.12 The York Place to Newhaven project is fully consistent with, and supports the delivery of the key strategies that will shape the future development of Edinburgh, including:
- The Edinburgh City Region Strategic Development Plan
 - Edinburgh Local Development Plan
 - Edinburgh Economy Strategy
 - Edinburgh Local Transport Strategy 2014 to 2019
 - Transport 2030 Vision
 - Sustainable Energy Action Plan
 - TfE Strategy for Delivery 2017 to 2021
- 1.13 The project supports the delivery of SESPlan's Proposed Strategic Development Plan (SDP) for the Edinburgh city region, and is specifically identified in the proposed SDP as a strategic project that is likely to have region-wide benefits.
- 1.14 Over the next decade Edinburgh and its surrounding area is expected to be home to a faster growing population than anywhere else in Scotland. The Edinburgh Local Development Plan directs most of the planned growth of the city to strategic development areas directly served by tram.
- 1.15 The City of Edinburgh Council's "Edinburgh Economy Strategy" notes that delivery of high quality enabling infrastructure and services is a lever for change that the Council can use to assist delivery of the Economy Strategy and to enable good growth. The Strategy also recognises that actions in the Strategy to invest in infrastructure and manage the growth of the economy are key to building a resilient and adaptable economy.
- 1.16 Completing the Edinburgh Tram York Place to Newhaven project will link Edinburgh Airport, the city centre and the Waterfront area: three of the Council's four priority investment zones under its Economy Strategy.
- 1.17 The Edinburgh Local Transport Strategy 2014 to 2019 notes that one of the key challenges facing Edinburgh is that city centre streets are dominated by motor traffic, and recognises that completion of the line to Newhaven presents a great opportunity to change this.
- 1.18 The project supports the Council's plans to:
- improve the pedestrian experience in the core city centre area and increase space for pedestrians
 - improve access to the city centre
 - increase space for other uses (e.g. street cafes, entertainment, markets)
 - offer dedicated cycle provision in the area
 - reduce the detrimental impact of motor vehicles on the city centre environment
- 1.19 Out-with the city centre, the Local Transport Strategy notes that Edinburgh's growth is focussed in three areas, West Edinburgh (including Edinburgh Park/Gyle and the Airport area), South East Edinburgh and the Waterfront. The Strategy concludes that

to grow in a way that protects the city's environment, these areas need supporting transport investment focussed on public transport, walking and cycling.

- 1.20 The Strategy also notes that improved transport connections will drive the renewal of Edinburgh's waterfront. While much of the required urban infrastructure is already in place, improved connections to the city centre are needed to unlock the area's sustainable regeneration.
- 1.21 The project is also fully consistent with the Edinburgh Local Transport Strategy which recognises that improved connections to the city centre are needed to unlock the sustainable regeneration of Edinburgh Waterfront. The project supports all the vision outcomes set out in the Council's transport strategy, Transport 2030 Vision.
- 1.22 Furthermore, the Transport 2030 Vision envisages that by 2030 Edinburgh's transport system will be healthy - promoting Active Travel with streets appropriately designed for their functions, with an emphasis on encouraging walking, cycling and public transport use and a high quality public realm; improving local air quality.
- 1.23 Tram supports this outcome by providing accessible public transport, public realm improvements along the route, excellent walking and cycling provision between Picardy Place and Foot of the Walk, and improvements in local air quality through reduced emissions. Bicycles are carried on trams, opening up wider transport choices for cyclists. While bus alone has served Edinburgh well in the past, as set out in the 2030 Vision future public transport growth within the city requires at its core a rapid mass transport mode which has been demonstrated by the very successful introduction of tram.
- 1.24 The Sustainable Energy Action Plan notes that the opening of the existing tram line has contributed positively to more sustainable choices of transport as well as reducing carbon emissions in the city. The project supports this key aim as the tram is emission free at the point of use and also accommodates sustainable transport through creation of cycling infrastructure alongside the project.
- 1.25 The project is also consistent with Transport for Edinburgh's *Strategy for Delivery 2017 – 2021* to extend, adapt and develop an integrated public transport network that is reliable and convenient throughout the City Region throughout the day, and week.

Project economics

- 1.26 The economic appraisal of the Edinburgh Tram York Place to Newhaven project has been revised to take account of updated planning assumptions, scheme design, costs and forecasts.
- 1.27 In support of this Final Business Case a high-level options assessment has been carried out to validate the conclusions reached in the 2006 STAG 2 appraisal, which formed the basis for the Edinburgh Tram (Line One) Act 2006. This work included the assessment of viable modal options against assessment criteria and objectives derived from the original STAG appraisal in light of current policy.
- 1.28 The assessment concluded that the completion of the tram to Newhaven will provide a seamless, modern and accessible public transport option directly from the Airport. The tram option out-performed bus and Bus Rapid Transit against the following STAG objectives:

- Supporting the local economy
 - Sustainability
 - Social benefits
 - Safety and security
 - Value for money
 - Affordability
 - Commercial and management
- 1.29 The assessment concluded that tram is the preferred modal choice for the route to Newhaven and modelling in the Final Business Case has been carried out on this basis.
- 1.30 The forecasting framework and models have been updated to address findings of the independent audits undertaken of the 2015 options assessment business case and the 2017 updated Outline Business Case.
- 1.31 The project is forecast to generate an incremental demand of 7m passenger journeys in its opening year.
- 1.32 The project has a positive economic case, delivering over £1.40 of benefit for each £1 spent with the benefit to cost ratio remaining positive under all the sensitivity tests considered.
- 1.33 As well as the traditional cost benefit analysis the project also delivers wider economic benefits and performs extremely well against a range of objectives set out in the Scottish Transport Appraisal Guidance (STAG).
- 1.34 Wider economic benefits are additional to standard transport user benefits and represent the potential economic impacts of transport improvements upon business and workers' productivity and the resulting increase in output.
- 1.35 Agglomeration benefits are the largest of these, and reflects the economic benefits from the clustering of high-value knowledge-intensive sectors, such as finance, business services, legal, and bio-science, which characterise the Edinburgh economy and underpin its national and international competitiveness. Investment in tram will reduce transport costs and thereby increase the agglomeration of business activity, improve employment accessibility and increase the number of jobs in the area served by tram by facilitating higher employment densities.
- 1.36 The project also supports the change in scale and location of jobs through:
- Directly supporting the bringing forward of employment related development in the Leith Waterfront area
 - Increasing the attractiveness of the employment locations in the city centre and Edinburgh Park by expanding the effective labour market catchment through reduced travel costs, and through helping bring forward major residential development in Leith Waterfront
- 1.37 These benefits have not been quantified as part of this update of the business case. However, the inclusion of such benefits for public transport projects in large urban areas (UK outside London) typically adds in the range of 15% to 40% above conventional transport benefits.

- 1.38 The Edinburgh Tram York Place to Newhaven project also connects major existing and planned employment destinations (city centre, Edinburgh Park) with the Leith corridor, which has among the highest population density in the city, and major planned areas for new residential developments along Leith Waterfront towards Newhaven.
- 1.39 Through this the tram will connect existing and new jobs with existing and new residents, ensuring that labour market accessibility is enhanced (businesses will find it easier to recruit, and workers have access to more jobs), and that the economic growth that this supports will be delivered in a sustainable manner, though integrated transport and land use planning.
- 1.40 This report also provides an outline assessment against the range of objectives set out in Scottish Transport Appraisal Guidance (STAG). The project performs well against a number of key objectives including:
- Supporting the spatial strategy
 - Sustainable economic development
 - Connecting areas of relatively high unemployment and deprivation
 - Transport interchange
 - Land use transport integration
- 1.41 This provides a validation that the project remains consistent with, and supportive of, the wider spatial planning and policy objectives that it was originally developed to meet.

Project finances

- 1.42 The tram line to Newhaven is affordable. There is a cashflow challenge in years 2022-23 and 2023-24 which amounts to £1.9m spread over those two years. The business case is based on the £1.9m cashflow challenge being funded from reserves. Reserves used would be replenished from profits in future years, with all reserves being repaid by 2027. Moreover, there are opportunities to reduce the requirement for reserves from efficiencies in tram maintenance and further maximisation of tram advertising income.
- 1.43 This conclusion is based on robust and prudent analysis of costs and revenues and assumes an extraordinary dividend from Lothian Buses of £20m over a 10 year horizon.
- 1.44 In the longer term, tram revenues can fund the extension and provide additional income to the Council.
- 1.45 However, in recognition of the work done by Oxford Global Projects, it is recommended that an allowance is made for an additional £50m as further contingency. This contingency allowance increases the £1.9m challenge to £14.8m requiring a series of measures to be implemented to fund or mitigate the risk.
- 1.46 All risk and contingency will be overseen by the Head of Finance and administered through the governance structure set out in chapter 7.
- 1.47 Analysis of opportunity costs has been carried out setting out the amount that could be available to spend on other projects if the capital investment were not made. This opportunity cost however needs to be viewed in the context of the monetary and wider economic benefits the project delivers.

- 1.48 Sensitivity testing has been undertaken on the base case showing the financial impact of changes to key assumptions and the impact on reserves.

Commercial

- 1.49 The updated Outline Business Case provided detailed commentary on a range of procurement issues and concluded that:
- The project is delivered under a design and build contract, incorporating tram infrastructure and tram control and communications systems
 - The maintenance of the York Place to Newhaven line should be procured separately
 - The appropriate form of contract for the main works should be the NEC4 Option C target price contract
 - There was likely to be little or no market appetite for taking full construction risk which would negate a PFI approach
- 1.50 The procurement strategy was developed based on key procurement objectives and a consideration of the lessons learned on the first phase of tram and from other tram projects in the UK and internationally.
- 1.51 Analysis of the most appropriate contracting strategy for below ground obstructions, including utilities and archaeology, was completed during this stage of the project and the Council has adopted a model that was used successfully on the first phase of tram, post mediation.
- 1.52 The Council has adopted an Early Contractor Involvement model for the project bringing together all key participants for a period of 6 months prior to any physical works being carried out. During this period a number of predefined tasks will be completed and all parties will work together to plan the works, investigate any value engineering opportunities and provide additional certainty around the project cost plan.
- 1.53 A comprehensive risk identification and assessment has been carried out, and allocation of risks under the contractual framework are set out in this Final Business Case.
- 1.54 The Council has conducted two procurements for the main works and the below ground obstructions works. Both procurements have now concluded and the pricing and risk information contained in the successful tenders has been used to develop this Final Business Case.

Management

- 1.55 Based on lessons learned from the construction of the first phase of tram, the project delivery strategy is underpinned by the following core principles:
- Traffic management will be deployed which facilitates opening large sections of the work site at any one time and the project will not be subject to any city traffic embargoes
 - A continuous approach to construction will be deployed wherever possible whereby the diversion of utilities will be carried out immediately prior to the installation of the tramway avoiding the need to excavate twice, thus minimising disruption, minimising cost, and speeding up the construction process

- A Support for Business scheme has been developed to maintain the vibrancy, desirability and accessibility of the streets affected by the project during construction
 - Works will be carried out in accordance with the Code of Construction Practice
- 1.56 The strategy for dealing with heritage items and archaeological remains has been agreed with the City Archaeologist.
- 1.57 To mitigate the impact on passenger services, it is proposed to decommission the York Place tramstop as part of the last construction activities and introduce temporary measures (including temporary crossover west of Elder Street) to allow services to run as far as St Andrew Square until the new line is operational.
- 1.58 A programme has been developed based on the general principle of continuous working and adopting a traffic management plan which facilitates opening up large sections of the work site at any one time. Overall the project will take approximately 46 months from award of contract to open for revenue service. This duration is within industry norms for a tram project of this scale and complexity.
- 1.59 In developing the road layout and public realm for the scheme, a number of supplementary projects have been identified that support the finally developed road layouts between York Place and Newhaven. These projects will be funded from the Place capital programme budget and will be delivered in parallel with the tram project.
- 1.60 Robust governance, change management, and risk management procedures are in place on the project that draw on lessons learned from the first phase of tram delivery, post mediation, and other major projects.
- 1.61 An outline Stakeholder and Communications Management Plan has been prepared for the project which describes the processes for ensuring an effective strategy for the management of stakeholders on the project. It details how the project will identify and manage all stakeholders impacted by the works, engage with them and optimise their experience of the project and empower them in the local decision making process. The plan adheres to the Scottish Government's Seven Standards of Community Engagement to ensure an equality of access for all.
- 1.62 A contractor insolvency mitigation plan has been developed for the project that sets out a number of financial, contractual and management measures that will be put in place to reduce the impact of this risk.

2 Introduction

Chapter summary

- The Edinburgh Tram York Place to Newhaven project completes the originally envisaged Phase 1a of the Edinburgh tram network
- Edinburgh tram has performed well since its opening, carrying 7.4 million passengers in 2018
- This Final Business Case builds on the work done for the updated Outline Business Case reported to Council in September 2017, taking into account the outputs of the tendered prices, design consultation, revised detailed quantitative cost and schedule risk assessments, support for business proposals and further work in relation to optimism bias
- The Final Business Case has been prepared in accordance with UK Government and Transport Scotland guidance
- The Council has the powers under the Edinburgh Tram (Line One) Act to complete the Edinburgh Tram York Place to Newhaven project
- A number of lessons learned from the first phase of tram are incorporated into this Final Business Case. The Council will consider further recommendations arising from the Tram Inquiry as the project progresses

Project description

- 2.1 The Edinburgh Tram York Place to Newhaven project is a continuation of the tram line, commencing at the current York Place temporary stop and running along Leith Walk, Constitution Street and through the Port of Leith via Ocean Terminal to Newhaven. The project completes the originally envisaged Phase 1a of the Edinburgh tram network.
- 2.2 The route is approximately 4.6km long and includes a mix of shared and segregated running on-street. The junctions at Picardy Place and London Road are reconfigured to allow for the safe operation of tram and general traffic movements.
- 2.3 The existing temporary terminus at York Place is de-commissioned and replaced by a new tram stop at Picardy Place. A further seven tram stops are provided along the route at the following locations:
- McDonald Road
 - Balfour Street
 - Foot of the Walk
 - Constitution Street/Bernard Street
 - Port of Leith
 - Ocean Terminal
 - Newhaven
- 2.4 The route alignment and tram stop locations are illustrated in Figure 1. The alignment is consistent with the route defined in the Edinburgh Tram (Line One) Act, which was developed after consideration of several alternatives.
- 2.5 In depth stakeholder consultation has taken place with regards to the configuration of the streetscape since the updated Outline Business Case in 2017. The Council has run two formal consultations which have led to some significant changes in road layouts,

consistent with the feedback received. These changes form the basis for the costings set out later in this Final Business Case and the Council will finalise plans and apply for the necessary approvals, including formal Traffic Regulation Orders, at the next stage of the project.

Edinburgh Tram system

- 2.6 The Edinburgh tram system currently operates between Edinburgh Airport and a temporary terminus at York Place in the city centre. Passenger services commenced on 31 May 2014 and passenger numbers have grown consistently over the first four years of operations, reaching 7.4 million in 2018.



Figure 1: Existing tram route and York Place to Newhaven route (blue)

- 2.7 The performance to date in terms of patronage and revenues is shown in Figure 2.

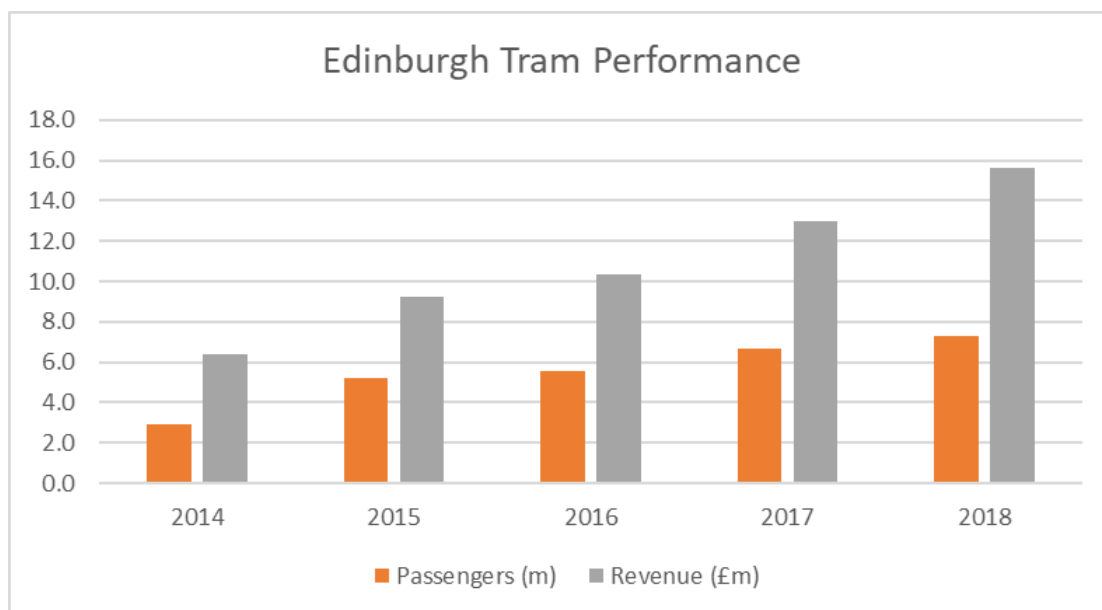


Figure 2: Performance of Edinburgh Trams since opening

- 2.8 The success of the tram to date has seen the introduction of a new timetable in January 2017, with additional peak hour services being provided to meet the growing demand.

Project history

- 2.9 On 11 December 2014, the Council approved the recommendations presented in the report 'Future Investment in Public Transport – Potential Tram Extension', which were that the Council:
- noted that investment in public transport and active travel is a key enabler in supporting and sustaining the anticipated growth in the capital city, and is a catalyst in driving economic development and employment opportunities in Edinburgh
 - noted against this background and context that it may be appropriate at this time to consider the implications of extensions to the current Edinburgh Tram network and further integration opportunities with other public transport companies, including bus and rail operators
 - noted the expiry dates associated with certain powers as set out in the Edinburgh Tram (Line One) and (Line Two) Acts (2006)
 - acknowledged the requirement for further design work and ground investigation survey work to integrate any future extensions to the tram network with the St James Quarter redevelopment and the Leith Programme projects
- 2.10 The Council authorised officers to prepare a detailed assessment of the economic, financial, business case, procurement and programme implications of extending the tram network. This work was completed and the findings were set out in an Outline Business Case, which was considered by Council at its meetings in November and December 2015.
- 2.11 In December 2015, the Council approved in principle the option of extending the existing tram line to Newhaven and approved the commencement of Stage 1 of the

project, including the mobilisation of internal and external resources, the carrying out of site investigations, the preparation of procurement documentation for the project and the development of an updated Outline Business Case.

- 2.12 In September 2017, the Council considered the updated Outline Business Case for the project and approved the commencement of a range of activities on the project including the commencement of procurement to allow affordability to be tested based on tendered prices. Council further agreed that, prior to any contracts for the main construction works being signed, they would be reviewed by an independent assessor from out-with the Council and further approvals would be sought.
- 2.13 Details of the work carried out since September 2017 are set out in this Final Business Case.

Scope of the Final Business Case

- 2.14 This Final Business Case has been prepared in accordance with Transport Scotland guidance, which implements the business case development process set out in Office of Government Commerce and HM Treasury guidance.
- 2.15 This Final Business Case builds on the work done for the updated Outline Business Case reported to Council in September 2017:
- The strategic case has been updated to bring it in line with any changes in strategy or policy since 2017
 - The transport modelling and economic appraisal have been updated in line with Scottish Transport Appraisal Guidance (STAG) to take account of the most up-to-date available travel and planning data
 - The cost estimates have been updated based on the outcome of the design consultation, the tendered prices, revised detailed quantitative cost and schedule risk assessments, support for business proposals and further work in relation to optimism bias
 - The financial modelling has been updated to incorporate the updated cost estimates and the performance of the tram system in 2017 and 2018, and the funding proposals have been updated
 - The commercial case has been updated following completion of the procurement process
 - The management case has been updated to take account of public consultation and more detailed construction planning carried out during 2018
- 2.16 As before, the Final Business Case continues to take cognisance of lessons learned from the previous tram planning and construction phases.
- 2.17 The work during 2018 was overseen by the All Party Oversight Group (APOG), in conjunction with an officer led Project Board to monitor progress and the approved budget for this stage of the project.

Availability of Parliamentary Powers and Land Assembly

- 2.18 The Edinburgh Tram (Line One) Act defines a route accommodating Princes Street, Leith Walk, Leith Docks, Newhaven and Granton, looping back towards the city via an off-street section following the disused railway line between Granton and Roseburn and joining the existing route at Roseburn delta.

- 2.19 The Edinburgh Tram (Line Two) Act overlaps Line One from the City Centre and follows a route adjacent to the Edinburgh/Glasgow railway line to Edinburgh Park, then north towards Edinburgh Airport, with a spur line heading west towards Newbridge.
- 2.20 The Council was granted powers under both Tram Acts to acquire land under compulsory purchase powers and to commence construction on new sections of tramway. The expiry dates for these powers are set out in Table 1.
- 2.21 While the powers to acquire land under the Line One Act have now expired, the Council has acquired, or has entered into binding legal agreements to acquire, all the land needed for Line One, including the Edinburgh Tram York Place to Newhaven project.
- 2.22 In addition, the Council intends to provide tram stabling at Newhaven. Heads of Terms have been agreed with Forth Ports to acquire this land under a long lease. This land was not included in the Edinburgh Tram (Line One) Act.

Table 1: Powers under Edinburgh Tram Acts

Edinburgh Tram Acts (2006)	Powers to Acquire Land Expiry Date under Section 40(1)	Powers to Commence Construction Expiry Date under Section 74
Line One	May 2016	March 2021
Line Two	April 2021	March 2026

Edinburgh Tram Inquiry & Lessons Learned

- 2.23 A public inquiry led by the Right Honourable the Lord Hardie is underway into the original Edinburgh Trams project. This inquiry aims to establish why the project incurred delays, cost more than originally budgeted and through reductions in scope delivered significantly less than projected. Oral hearings concluded during 2018 although the report is yet to be published.
- 2.24 This Final Business Case however incorporates a number of lessons learned from the first phase of tram by the Council including:
- The use of industry standard contracts to govern the project
 - Rigorous project governance with highly qualified key personnel with experience of delivering light rail projects in the UK and abroad
 - Setting up cross industry networks with other cities including Manchester, Birmingham and Dublin to ensure best practice is being adopted at each stage of project development
 - Adopting traffic management plans that provide the contractor with expanded sites to ensure that works can continue in the event that problems are encountered during construction as well as adopting a strategy of only opening up roads once and completing all works prior to reinstatement - no double-dig
 - Carrying out robust quantitative risk analysis and ensuring the contingencies set aside for unforeseen events
 - Ensuring robust measures are incorporated into the construction contracts to ensure build quality, and a strong client team is present on site to monitor build quality

- Carrying out comprehensive formal consultation with the market to road test the overall delivery strategy for the project and encourage strong competition
- Developing a Support for Business scheme to maintain the vibrancy, desirability and accessibility of the streets affected by the project during construction. Measures include logistics hubs, open for business campaign, on street customer service officers, business skills development and a business continuity fund
- Ensuring all works are carried out in accordance with the Code of Construction Practice
- Ensuring that the work underpinning the analysis set out in this report has been robustly scrutinised

2.25 The Council will consider further recommendations arising from the Inquiry as the project progresses.

Assurance

2.26 In support of this Final Business Case the Council has commissioned Atkins to audit the economic case and Faithful & Gould to audit the project cost plan. Scott Moncrieff, the Council's external auditor, has also reviewed the financial model and Internal Audit has reviewed the Final Business Case and the management and governance proposals underpinning the next stage of project delivery. Oxford Global Projects at the University of Oxford have also carried out a study, this is discussed in detail in chapter 5.

3 The Strategic Case

Chapter summary

- The development of transport infrastructure plays a key role in shaping the pattern of future growth and development, and hence in delivering the spatial strategy and the long-term economic growth that this will support
- The Edinburgh Tram York Place to Newhaven project supports the delivery of SESPlan's new Proposed Strategic Development Plan (SDP) for the Edinburgh city region, and is specifically identified in the proposed SDP as a strategic project that is likely to have region-wide benefits
- Over the next decade Edinburgh and its surrounding area is expected to be home to a faster growing population than anywhere else in Scotland. The Edinburgh Local Development Plan directs most of the planned growth of the city to strategic development areas directly served by tram
- The project is consistent with, and supports the delivery of, the spatial strategy and the overall growth of Edinburgh in a sustainable manner as set out in the Local Development Plan
- Completing the Edinburgh Tram York Place to Newhaven project will link Edinburgh Airport, the city centre and the Waterfront area: three of the Council's four priority investment zones under its strategy for jobs
- The project is fully consistent with the Edinburgh Local Transport Strategy which recognises that improved connections to the city centre are needed to unlock the sustainable regeneration of Edinburgh Waterfront
- The project supports all the vision outcomes set out in the Council's transport strategy, Transport 2030 Vision

Background

- 3.1 Edinburgh is a successful and prosperous city, regularly voted as one of the best places in the world to live, work and visit. With a strong and varied economy, growing inward investment, a flourishing cultural offering and the UK's second most visited city by tourists, the Capital has solid foundations on which to build.
- 3.2 However, this success brings with it challenges and it is now more important than ever that we provide a first-class, fully-integrated transport system. Put simply: Edinburgh has to manage the growth that its ongoing success is fuelling. As Scotland's fastest growing city, things simply cannot continue as they are – the transport system must evolve to cater to a rapidly growing population.
- 3.3 Since launching in 2014, Edinburgh Trams has become an essential part of an integrated transport network worthy of a major capital city. With near-perfect customer service ratings, patronage for the tram continues to rise year on year, with approximately 7.4 million journeys made in 2018 - up 10 per cent on 2017 and surpassing expectations.
- 3.4 A tram to Newhaven would not only provide a direct link for the people of Leith to the city centre and out to the airport, but would connect residents and visitors to major employment and travel hubs along the route.
- 3.5 Completing the original vision for the first phase of the Edinburgh Trams network unlocks a large swathe of the city for housing development and employment

opportunities. It would also help to reduce air pollution by providing efficient, sustainable transport solutions while opening up people-friendly transport links for individuals and communities from all walks of life.

Strategic context

- 3.6 The development of transport infrastructure plays a key role in shaping the pattern of future growth and development, and hence in delivering the spatial strategy and the long-term economic growth that this will support.
- 3.7 The project supports the spatial development strategy and the wider economic objective of supporting the planned population and jobs growth within Edinburgh in a sustainable manner.
- 3.8 This chapter sets out the rationale for investment in the Edinburgh Tram York Place to Newhaven project, by reference to existing strategic developments and transport strategies and plans.

Edinburgh City Region Strategic Development Plan

- 3.9 The Strategic Development Plan (SDP) for the Edinburgh city region is prepared by SESPlan, the Strategic Development Planning Authority for Edinburgh and South East Scotland. The SDP, last published in 2013, is in the process of being updated, and SESPlan submitted its new Proposed Strategic Development Plan in October 2016 for examination. A report on the outcome of the examination was published in July 2018 by the Planning and Environmental Appeals Division of the Scottish Government. The Scottish Ministers are considering the terms of that examination report and a decision on the approval of the SDP will be published shortly.
- 3.10 The proposed SDP sets out a vision for a city region where it is easier to move around, and where there are better public transport options. It proposes a spatial strategy focused on growth corridors with good public transport options.
- 3.11 Edinburgh Waterfront is a high priority location for growth under the proposed SDP, which notes that the tram is fundamental to achieving a thriving low carbon waterfront community connected to the city.
- 3.12 The proposed SDP identifies significant business clusters as key areas for investment based on their potential contribution to the city region's economy, and identifies opportunities for continued growth associated with redevelopment of the city centre and expansion in Leith supported by the tram project.
- 3.13 The tram line from York Place to Newhaven is specifically identified in the proposed SDP as a strategic project that is likely to have region-wide benefits.

Edinburgh Local Development Plan

- 3.14 There is significant growth planned for Edinburgh over the coming decades. This reflects its status as Scotland's capital city, its quality of life and its role in key economic growth sectors including finance and business services, legal, bio-science and others.
- 3.15 Over the next decade Edinburgh and its surrounding area is expected to be home to a faster growing population than anywhere else in Scotland. National Records of

Scotland projections published in 2016 suggest that the city should be planning for an additional 47,000 people by 2024 and an additional 102,000 by 2039, taking the total population from 492,610 to 594,712 over the 25-year period from 2014 to 2039. The Local Development Plan (LDP) sets out the spatial strategy for how this growth should be planned for and accommodated.

- 3.16 Edinburgh is a major employment hub which attracts a workforce from both within the city and surrounding areas. The city's economy has been relatively resilient during the economic downturn and is set to grow strongly as economic conditions improve. The latest 'central' forecast from Oxford Economics predicts that total employment in the city will grow by 7.6% between 2013 and 2022 (from 324,900 to 349,700).
- 3.17 The Edinburgh LDP, published in November 2016, sets out the spatial strategy for how this growth should be planned for and accommodated.
- 3.18 The spatial strategies direct most of the planned growth of the city to the four strategic development areas identified in the 2013 Strategic Development Plan: West Edinburgh; the City Centre; Edinburgh Waterfront; and South East Edinburgh, as shown in Figure 3. The Edinburgh Tram York Place to Newhaven project will result in three of these strategic development areas being directly linked by a fast, frequent and reliable transport service.
- 3.19 The LDP prioritises housing delivery on brownfield sites, particularly in the waterfront areas of Leith and Granton. Completion of the tram connection to these areas would help boost that delivery. In addition, Leith is one of the defined strategic business centres to which major office development is directed, and a location with significant employment land potential.
- 3.20 The LDP strategy for retail centres prioritises the city centre, including Edinburgh St James and Leith Walk, as well as defined commercial centres including Ocean Terminal.
- 3.21 The tram line to Ocean Terminal and Newhaven offers the potential to:
 - Increase the attractiveness of major development sites, enhancing their overall viability and potentially bringing them forward at a faster rate than would otherwise be the case
 - Support the nature and scale of development, by supporting higher density development with a lesser requirement for parking than would be the case without tram

entertainment, life sciences, tourism and Leisure. Its World Heritage Site status provides unique opportunities and challenges.

- 3.28 The Strategy notes that one of the key challenges facing Edinburgh is that city centre streets are dominated by motor traffic, and recognises that completion of the first phase of the tram project presents a great opportunity to change this.
- 3.29 The project will facilitate the Council's plans to:
- improve the pedestrian experience in the core city centre area and increase space for pedestrians
 - improve access to the city centre
 - increase space for other uses (e.g. street cafes, entertainment, markets)
 - offer dedicated cycle provision in the area
 - reduce the detrimental impact of motor vehicles on the city centre environment
- 3.30 Out-with the city centre, the Strategy notes that Edinburgh's growth is focussed in three areas, West Edinburgh (including Edinburgh Park/Gyle and the Airport area), South East Edinburgh and the Waterfront. The Strategy concludes that to grow in a way that protects the city's environment, these areas need supporting transport investment focussed on public transport, walking and cycling.
- 3.31 The Strategy also notes that improved transport connections will drive the renewal of Edinburgh's waterfront. While much of the required urban infrastructure is already in place, improved connections to the city centre are needed to unlock the area's sustainable regeneration.
- 3.32 The completion of the tram to Newhaven thus is fully consistent with, and is key to the delivery of the Edinburgh Local Transport Strategy.
- 3.33 It should also be noted that the Edinburgh Economy Strategy states that the Edinburgh Local Transport Strategy will be updated to address the connectivity challenges associated with population growth and social and demographic changes across the region.

Transport 2030 Vision

- 3.34 The development of transport infrastructure will play a key role in shaping the pattern of future growth and development, and hence in delivering the spatial strategy and the long-term economic growth that this will support.
- 3.35 The Edinburgh Tram York Place to Newhaven project supports all the vision outcomes set out in the Council's transport strategy, Transport 2030 Vision, shown in Table 2.

Table 2: Transport 2030 Vision Outcomes

Vision Outcome	Tram impact
By 2030 Edinburgh's transport system will be environmentally friendly - reducing the impacts of transport, in particular playing its full part in reducing greenhouse gas emissions	Tram supports this outcome by encouraging modal shift to more sustainable transport modes.
By 2030 Edinburgh's transport system will be healthy - promoting Active Travel with streets	Tram supports this outcome by providing accessible public transport, public realm

Vision Outcome	Tram impact
appropriately designed for their functions, with an emphasis on encouraging walking, cycling and public transport use and a high quality public realm; improving local air quality.	improvements along the route, excellent walking and cycling provision between Picardy Place and Foot of the Walk, and improvements in local air quality through reduced emissions. Bicycles are carried on trams, opening up wider transport choices for cyclists.
By 2030 Edinburgh's transport system will be accessible and connected, supporting the economy and providing access to employment, amenities and services.	Tram supports this outcome by connecting the large population in the Victoria Quay and Leith areas to centres of employment in the city centre, Edinburgh Park and in South Gyle Business Park with a fast and frequent transport link.
By 2030 Edinburgh's transport system will be smart and efficient providing reliable journey times for people, goods and services.	Tram supports this outcome through delivery of reduced journey times and less journey time variability, and providing increased public transport capacity.
By 2030 Edinburgh's transport system will be part of a well planned, physically accessible, sustainable city that reduces dependency on car travel, with a public transport system and walking and cycling conditions to be proud of.	Tram supports this outcome by offering an attractive and accessible alternative to the private car, encouraging modal shift to public transport modes.
By 2030 Edinburgh's transport system will be safe, secure and comfortable.	Trams have an excellent safety record compared to other road vehicles. The tram offers a high level of security, through the presence of Ticketing Sales Assistants and on board and on street CCTV and passenger emergency help points. The fixed rail guideway offers significant levels of comfort compared to tired-vehicles.
By 2030 Edinburgh's transport system will be inclusive and integrated.	Tram supports this outcome by providing accessible public transport for people with no car access, and improving quality and availability of public transport information for elderly and visually impaired customers. High quality interchanges will be provided with bus at key locations along the route.
By 2030 Edinburgh's transport system will be customer focussed and innovative.	Studies have shown that people are more likely to transfer from cars to tram than to other modes of public transport.
By 2030 Edinburgh's transport system will be responsibly and effectively maintained.	The Final Business Case includes all short, medium and long-term maintenance and lifecycle costs. Tram maintenance is carried out under a competitively tendered contract with appropriate performance measures.

Sustainable Energy Action Plan 2015-2020

- 3.36 The Sustainable Energy Action Plan was established with the aim of reducing carbon emissions in Edinburgh by 42% by 2020, using emissions levels in 2005 as a baseline.

- 3.37 The Action Plan notes that the opening of the existing tram line has contributed positively to more sustainable choices of transport as well as reducing carbon emissions in the city.
- 3.38 The Action Plan contains five programmes of activity, one being sustainable transport. The key aim under the sustainable transport programme is to support sustainable transport and increase the use of cleaner, greener and alternative fuels. The project supports this key aim as the tram is emission free at the point of use and also accommodates sustainable transport through creation of cycling infrastructure alongside the project.

Strategy for Delivery 2017-2021

- 3.39 The project is consistent with Transport for Edinburgh's *Strategy for Delivery 2017 – 2021* to extend, adapt and develop an integrated public transport network that is reliable and convenient throughout the City Region throughout the day, and week.

Measuring the Strategic Benefits

- 3.40 A post project appraisal will be carried out as part of the STAG process to demonstrate the achievement of the Transport Planning Objectives established alongside the STAG Criteria. This review will include an appraisal of how the project has performed in terms of delivering the following benefits:
- Build out of strategic development areas
 - Population and employment growth on tram corridor
 - Accessibility to employment for socially disadvantaged areas
 - Journey time savings
 - Journey time reliability
 - Modal shift
 - Reduction in accidents
 - Cost efficiency (cost per passenger kilometre)
- 3.41 As many of these benefits will take time to be realised following the opening of the tram route to Newhaven, it is recommended that this review is carried out at least 24 months after the opening of the new route.

Conclusions

- 3.42 The development of transport infrastructure plays a key role in shaping the pattern of future growth and development, and hence in delivering the spatial strategy and the long-term economic growth that this will support.
- 3.43 The York Place to Newhaven project is fully consistent with, and supports the delivery of the key strategies that will shape the future development of Edinburgh, including:
- The Edinburgh City Region Strategic Development Plan
 - Edinburgh Local Development Plan
 - Edinburgh Economy Strategy
 - Edinburgh Local Transport Strategy 2014 to 2019
 - Transport 2030 Vision
 - Sustainable Energy Action Plan
 - TfE Strategy for Delivery 2017 to 2021

4 The Economic Case

Chapter summary

- The economic appraisal of the Edinburgh Tram York Place to Newhaven project has been revised to take account of updated planning assumptions, scheme design, costs and forecasts
- The forecasting framework and models have been updated to address findings of the independent audits undertaken of the 2015 options assessment business case and the 2017 updated Outline Business Case
- The project is forecast to generate an incremental demand of 7m passenger journeys in its opening year
- The project has a positive economic case, delivering over £1.40 of benefit for each £1 spent
- The reduction in the benefit to cost ratio since the updated Outline Business Case is predominantly as a result of changes to government appraisal guidance
- The benefit to cost ratio remains positive under all the sensitivity tests considered
- There are potentially significant wider benefits associated with continuing the tram line into North Edinburgh and supporting the overall level of economic growth of the city through enhancing the viability and attractiveness of major housing and employment sites identified in the Local Development Plan
- The tram can help support economic activity (jobs, development, and housing) at a greater level than would otherwise be the case

Introduction

- 4.1 This chapter updates the economic assessment carried out in 2017 for the updated Outline Business Case. The appraisal has been updated to reflect the revised project costs and to take account of updated demand forecasts that reflect the agreed scheme design.
- 4.2 This chapter focuses on the economic analysis (the benefit-cost ratio based on the present value of costs and benefits), but also includes a high-level assessment of wider appraisal criteria in line with Scottish Transport Appraisal Guidance (STAG).
- 4.3 The modelling and appraisal work has been carried out by JRC, a joint venture of Jacobs and Steer.

Assessment of modal options

- 4.4 In support of this Final Business Case a high-level options assessment has been carried out to validate the conclusions reached in the 2006 STAG 2 appraisal, which formed the basis for the Edinburgh Tram (Line One) Act 2006. This work included the assessment of viable modal options against assessment criteria and objectives derived from the original STAG appraisal in light of current policy.
- 4.5 The assessment concluded that the completion of the tram to Newhaven will provide a seamless, modern and accessible public transport option directly from the Airport. The tram option out-performed bus and Bus Rapid Transit against the following STAG objectives:
 - Supporting the local economy

- Sustainability
- Social benefits
- Safety and security
- Value for money
- Affordability
- Commercial and management

- 4.6 The tram already has powers and consents for the route to Newhaven and would be open in 2023 subject to the scheme being approved.
- 4.7 Tram would also provide the highest levels of segregation of all the options and as a result supports the STAG objectives and, by extension, the city's wider economic, social, sustainability and spatial planning outcomes better than the alternatives.
- 4.8 The assessment concluded that tram is the preferred modal choice for the route to Newhaven and modelling has been carried out on this basis.

Modelling inputs

- 4.9 The forecasts are based on the following set of modelling inputs, which have been agreed with the Project Board and Edinburgh Trams.

Table 3: Modelling inputs

Factor	Input	Source
Opening year	2023	Turner & Townsend
Peak service pattern in opening year	8 trams per hour between Edinburgh Airport and Newhaven, overlapping with 4 trams per hour between Haymarket and Newhaven.	Edinburgh Trams
Peak service pattern in future forecast year (2032)	8 trams per hour between Edinburgh Airport and Newhaven, overlapping with 8 trams per hour between Haymarket and Newhaven.	Edinburgh Trams
Tram journey times	Airport to York Place – 37 minutes York Place to Newhaven (peak and off-peak) – 17 minutes	Measured actuals and VISSIM model
Tram peak vehicle requirement	Opening year – 23 Future year – 25 Current fleet is 27 trams, so no additional trams are required.	Edinburgh Trams
Capital costs	Updated capital costs as shown in chapter 5.	Cost plan produced by Turner & Townsend
Operating and maintenance costs	Actual costs scaled up for additional services being operated as shown in chapter 5.	Edinburgh Trams and Council Finance
Life cycle costs	Updated life cycle costs as shown in chapter 5.	Turner & Townsend
Bus peak vehicle requirement	Reduction of 6 buses	Updated Outline Business Case

Factor	Input	Source
Future year network assumptions	<p>The modelled future year transport network includes:</p> <ul style="list-style-type: none"> • Edinburgh Gateway • Edinburgh-Glasgow Improvement Programme • Queensferry Crossing • City-wide 20mph zones 	City of Edinburgh Council

Forecasting approach

- 4.10 The JRC forecasting framework has been used to support the preparation of demand, revenue and benefit forecasts for tram since the mid-2000s. The models are updated and enhanced on a periodic basis to ensure the models are up-to-date and fit-for-purpose.
- 4.11 The modelling approach has been developed accordance with best practice and with modelling and appraisal guidance. The overall modelling framework, assumptions and results have been subject to independent audit at each stage of business case development, and the approach deemed fit-for-purpose and the results plausible and reasonable.
- 4.12 The models have been updated to support this Final Business Case, and these updates address specific points made as part of the independent audit undertaken. The updates include:
- Calibration to new bus patronage counts in the tram corridor
 - Calibration of highway demand to new count data in both the existing tram and Newhaven corridors
 - Validation of model to observed tram demand data for 2016 and 2017
 - Updating of tram journey times
 - Updating of bus journey times
 - Revised forecast years of 2023 and 2032 with updated planning data assumptions
- 4.13 An independent audit of the 2018 work concluded that the overall approach and forecasts were reasonable, and that the updates employed for Final Business Case from the 2017 updated Outline Business Case provide additional confidence in the model outputs.

Population and employment projections

- 4.14 Within Edinburgh, growth and development have been included in the model in line with the Council's development plans. These development assumptions have been reviewed as part of the Final Business Case, and updated as appropriate. Outside of Edinburgh, future year forecasts of background demand growth are based upon the latest available Transport Model for Scotland (TMfS) data. There is a high degree of consistency between TMfS and the Council's assumptions.
- 4.15 In Edinburgh as a whole, the number of household trips (trips taken from home to work, leisure, education etc.) is forecast to increase by over 35,000 (15%) from 2016 to the future forecast year of 2032. Over a quarter of this growth is predicted to occur in the Leith Docks and Western Harbour area.

- 4.16 There is significant employment growth forecast across Edinburgh. Edinburgh Park is forecast to expand significantly with 11,000 new jobs between 2016 and 2032. The city centre will also experience a significant increase in employment of 6,000 jobs over the same period.
- 4.17 The development of Leith Waterfront therefore has a strategically important role to play in mitigating the increase in in-commuting, by providing new dwellings on brownfield sites within the city with good public transport access to the city centre and Edinburgh Park. This role would be enhanced through the development of the York Place to Newhaven tram by improving public transport accessibility and helping to bring forward developments at a potentially faster rate and higher density than would otherwise be the case.

Demand, revenue and benefits forecasts

- 4.18 The modelled demand is presented for two forecast years – 2023 (the opening year), and a second forecast year of 2032. The annual forecasts are based on:
- The application of annualisation factors to grow modelled period demand to annual demand. The annualisation factors reflect the usage profile on the existing tram route
 - A straight-line interpolation between 2023 and 2032 to obtain annual ‘modelled’ demand
 - Adjustment to the modelled demand to reflect demand ramp-up on the line, representing the period in the early years when people get accustomed to the tram, and demand builds up to its potential level. Demand build-up is assumed to be 80% in year of opening, increasing to 90% in year 2 and 100% by year 3
 - Patronage growth beyond 2032 is assumed to be 1% to 2052. No demand growth is assumed beyond 2052 (i.e. demand over the second half of the 60-year appraisal period is assumed to be constant)
 - An assumed real increase in revenues over time at a rate of 1% per annum
- 4.19 The assumptions employed within the economic case are fully consistent with those underpinning the financial case.
- 4.20 The current and modelled annual demand is shown in table 4.

Table 4: Demand forecasts

	2023	2032
Existing system	8.7m	11.6m
System including York Place to Newhaven	15.7m	21.6m
Incremental demand	7.0m	10.0m

- 4.21 Annual forecast demand for the existing system is 8.7m for 2023. This compares with observed demand of 6.7m in 2017 and 7.4m in 2018.
- 4.22 With the York Place to Newhaven line, the overall demand almost doubles to 15.7m in 2023, an incremental annual demand of 7.0m trips.

Capital costs, operating costs, lifecycle costs and revenues

Capital costs

- 4.23 The capital costs are presented in chapter 5. These are converted into 2010 discounted cashflows (the price base in which guidance suggests appraisal be conducted in¹) through:
- Developing a cost profile based on the monthly construction spend schedule
 - Deflating the out-turn costs into 2010 prices using a GDP deflator
 - Discounting the costs for a 2010 discount year based on the standard appraisal discount rate of 3.5%
- 4.24 The cost estimates have been adjusted to include for an optimism bias level of 6% which has been applied in the economic appraisal. This level of optimism bias is in line with current webTAG guidance for tram (light rail) projects². The 6% rate is also consistent with current STAG (Rail) guidance.

Lifecycle costs

- 4.25 Lifecycle costs, being renewal and replacement of all system elements, have been estimated by Turner & Townsend.
- 4.26 Lifecycle costs are profiled over the 60-year economic appraisal period. All costs are converted to 2010 prices within the appraisal. A real increase (i.e. increase above inflation) in lifecycle costs of 1% per annum has been applied throughout the appraisal period.

Operating and maintenance costs

- 4.27 The appraisal includes the incremental operating and maintenance costs of operating the full network, over and above the costs of the existing system. Operating and maintenance costs for the York Place to Newhaven route have been modelled by the Council in consultation with Edinburgh Trams based on the costs of the existing tram system. The operational and service assumptions are as set out in table 3 above.
- 4.28 The incremental operating and maintenance costs over those for the existing tram system are set out in table 5. The calculations take account of all costs required to operate, manage and maintain the tram system.

¹ Appraisal guidance requires all discounted costs and benefits to be presented in 2010 prices and values, as this is the price base that the values of time (which value the benefits within the appraisal) are expressed in.

² <https://www.gov.uk/government/publications/webtag-tag-unit-a1-2-scheme-costs-july-2017>

Table 5: Incremental operating and maintenance costs

Service pattern	Incremental operating and maintenance cost (£m per annum, 2017 prices)
12 tph operating between Haymarket & Newhaven (2023 opening year assumptions)	5.75
16 tph operating between Haymarket & Newhaven (2032 second forecast year assumptions)	8.6

Summary

- 4.29 For the purposes of the economic appraisal, all costs are converted to 2010 prices. The undiscounted cost profile for the project over the appraisal period is shown in Figure 4. The capital costs, represented by the blue lines, are incurred up-front (to 2022), while the operating and maintenance costs (dark green) are incurred over the course of the 60-year appraisal and increase in real terms by about 1% per annum. Operating costs show a stepped increase in 2032, reflecting the assumed year in which the service level would increase from 12 to 16tph. Tram lifecycle costs (orange) are also incurred throughout the appraisal period, though the profile reflects the assumed point at which items (vehicles, track, systems) need renewing or replacing.

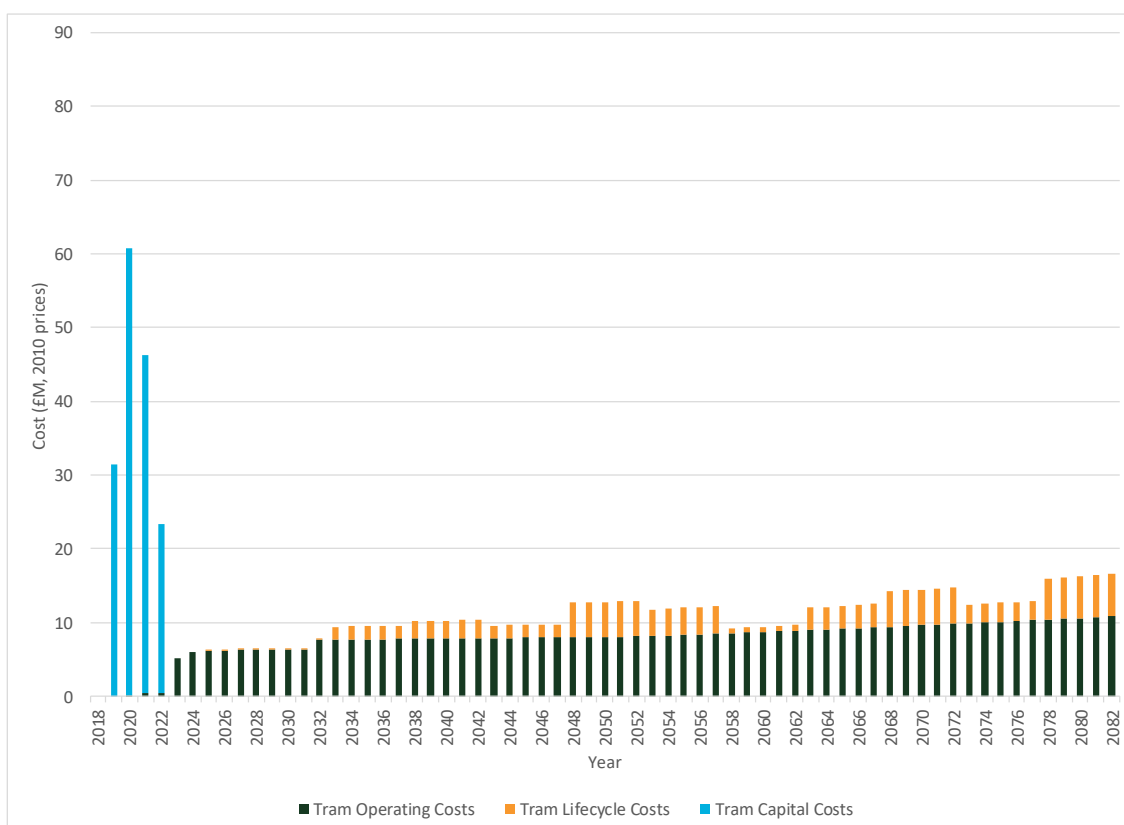


Figure 4: Undiscounted Tram Costs over 60-year appraisal period

Revenues

- 4.30 The forecast tram and bus fare box revenues are estimated based on the modelled tram demand (which also includes an assessment of the modes from which tram

demand is transferred), and average yields based on 2017 data provided by Edinburgh Trams. Public transport fares are assumed to increase by 1% per annum in real terms.

- 4.31 No additional revenues, other than the farebox revenue generated by the new line, are assumed.

Economic appraisal

- 4.32 The update of the economic appraisal for the project has been prepared in line with current Scottish Transport Appraisal Guidance (STAG)³. The appraisal considers the flows of monetised discounted costs and benefits over the appraisal period, and compares these to provide economic performance metrics including the benefit to cost ratio.
- 4.33 The monetised elements of the appraisal are only one part of the wider STAG criteria, there are additional benefits that need to be considered to support informed decision making. An assessment of the wider STAG benefits follows in later sections.
- 4.34 The key assumptions employed in the economic appraisal are shown in table 6.

Table 6: Economic appraisal assumptions

Factor	Assumption
Opening year	2023
Appraisal period	60 years (2023 to 2082)
Discount rate	3.5% per annum, reducing to 3% from 30 years after the current year

- 4.35 The Department for Transport's (DfT's) Transport User Benefits Analysis (TUBA) software has been used to calculate scheme benefits. These include WebTAG default assumptions on parameters such as the value of time.
- 4.36 The appraisal is presented in 2010 prices and discounted to 2010 (as per DfT guidance and included in TUBA). All other cost and revenues have been converted to 2010 prices.
- 4.37 The results of the economic appraisal are presented in table 7.

³ <https://www.transport.gov.scot/our-approach/industry-guidance/scottish-transport-analysis-guide-scot-tag/>

Table 7: Economic appraisal results

EDINBURGH TRAM YORK PLACE TO NEWHAVEN	
BENEFITS (£'000s)	
Public transport user benefits	£475,864
Highway user impacts	-£47,586
Private provider revenue impacts	-£32,556
Tax impacts	-£402
Total benefits	£395,320
COSTS AND FINANCIAL IMPACTS (£'000s)	
Capital costs	-£142,149
Net tram and bus operating and maintenance costs	-£137,262
Tram lifecycle costs	-£38,154
Net tram and bus revenues	£35,074
Total costs and financial impacts	-£282,491
ECONOMIC PERFORMANCE	
Net Present Value (NPV)	£112,829
Benefit to Cost Ratio (BCR)	1.40

- 4.38 The key finding of the economic appraisal is that the Edinburgh Tram York Place to Newhaven project would deliver a positive economic performance, delivering £1.40 of benefit for each £1 spent. This compares with the BCR in the updated Outline Business Case of 1.64:1.
- 4.39 The overall level of forecast benefits (in terms of time savings to passengers) are of a similar order to those that underpinned the updated Outline Business Case. Similarly, the net costs are also of a similar order, whereby the increase in capital costs (from the update Outline Business Case) has been offset by a reduction in forecast operating, maintenance and lifecycle costs.
- 4.40 The key change between the updated Outline Business Case and the Final Business Case is that the Department for Transport's guidance has been updated and that, as part of this update, the value of time used to monetise travel time savings has been reduced⁴. Moreover, the latest guidance also includes a reduction in the growth in the value of time over time, which is used to increase benefits broadly in line with forecast productivity growth. The combined effect of these changes is to reduce the benefits by around 12%. This change is the primary factor which explains the reduction in BCR within the Final Business Case. Indeed, without these changes to the guidance, the BCR would have remained at approximately 1.60:1 which is comparable with the updated Outline Business Case.

⁴ This reflects updated research. The value of time for commuting has increased, but those for business and leisure have reduced, and the net effect is a reduction in the order of 3%.

- 4.41 This is a point noted by Atkins when auditing the analysis underpinning the economic case. Atkins referenced the changes to guidance but also concluded that the underlying merit of the project has not changed since the updated Outline Business Case

“when reviewing the content of the Business Case, there is a temptation to look immediately and only at the BCR and to compare its value with earlier estimates. Although the size of the BCR has fallen since 2017, there are valid external factors which would explain the change, notably the changes to the DfTs prescribed value of time forecasts and the change in overall scheme costs. The underlying merit of the Project has not altered between the previous OBC in June 2017 and the current FBC which has been the focus of this review.”

Sensitivity tests

- 4.42 A number of sensitivity tests have been undertaken to test the robustness of the economic performance of the project under a range of scenarios. The sensitivity tests undertaken are:

- Highway impacts tests:
 - An ‘optimistic’ case where highway impacts are neutral (the central case assumes disbenefits are equivalent to 10% of the level of public transport benefits)
 - A ‘pessimistic’ case where disbenefits are equivalent to 20% of the level of public transport benefits
- Public transport benefits tests:
 - Upside: +20% in public transport benefits
 - Downside: -20% in public transport benefits
- Growth sensitivity test looking at the impact of future developments on Leith Waterfront not coming forward at the same rate or level as assumed
- Capital cost sensitivity based on 20% optimism bias
- Capital cost sensitivity based on Oxford Global Projects optimism bias at P80 (see chapter 5 for more details)
- No demand growth post 2032
- Journey time tests:
 - Upside: -10% journey time
 - Downside: +10% journey time

- 4.43 The outputs from the sensitivity tests are summarised in table 8.

Table 8: Sensitivity test results

Sensitivity Test	BCR
Central scenario	1.40
Highway impacts of zero (neutral)	1.57
Highway disbenefits at 20% of PT benefit	1.23
Public transport benefits +20%	1.74
Public transport benefits -20%	1.06

Sensitivity Test	BCR
Lower development growth	1.17
Higher capital costs 20% optimism bias	1.27
Higher capital costs Oxford Global Projects OB at P80	1.25
No demand growth post 2032	1.20
Journey time -10%	1.73
Journey time +10%	1.30

- 4.44 The BCR for the project remains positive (above 1:1) under all the sensitivity tests considered.

Wider economic benefits

- 4.45 Wider economic benefits are productivity benefits that are not captured within a traditional cost benefit analysis based on generalised time savings. This is because other markets impacted by a transport scheme (e.g. labour market, output market) are not operating under conditions of perfect competition. Wider Impacts are completely additional to standard transport user benefits.
- 4.46 The Department for Transport has published draft guidance on Wider Impacts⁵ which aims to quantify the potential economic impacts of transport improvements upon business and workers' productivity and the resulting increase in output.
- 4.47 The wider benefits applicable to Edinburgh Tram are agglomeration and labour supply - move to more productive jobs. Each of these is described below.

Agglomeration

- 4.48 Agglomeration benefits value the productivity benefits of firms being 'effectively' closer together. The concept of 'effective density' is a measure of the employment density of a place and the other places around it, scaled by the distances between them. There is a positive relationship between effective density and productivity. Some sectors and hence locations have higher agglomeration elasticities – meaning that a given improvement in 'effective density' results in a higher productivity benefit. Edinburgh supports a number of specialised clusters in areas such as financial and business services, legal services, technology and life sciences.
- 4.49 Transport investment can increase effective density in two ways:
- First, **by reducing transport costs** and thereby improving accessibility around and between jobs. This, in effect, brings firms closer together. This effect can be measured for all transport investment, and there is a direct linkage between the transport accessibility changes (from transport modelling) and the agglomeration effect

⁵ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/370532/webtag-tag-Reducing-unit-a2-1-wider-impacts.pdf

- Second, **where transport investment changes the scale or location of employment** in an area or between areas. In this case the change in the number of jobs in an area directly affects the 'effective density'

4.50 The Edinburgh Tram York Place to Newhaven project would reduce the transport costs between a number of key employment locations including:

- Around Leith Waterfront including the Scottish Government
- The city centre via five stops between Picardy Place and Haymarket
- Reduction in travel time via direct tram connection to major employment locations on the Phase 1 line, notably Edinburgh Park and Edinburgh Airport
- Reduction in travel times to a range of locations within the city and beyond, via interchange with rail at Waverley, Haymarket and Edinburgh Gateway, and bus (city centre)

4.51 The project also supports the change in scale and location of jobs through:

- Directly supporting the bringing forward of employment related development in the Leith Waterfront area
- Increasing the attractiveness of the employment locations in the city centre and Edinburgh Park by expanding the effective labour market catchment through reduced travel costs, and through helping bring forward major residential development in Leith Waterfront

4.52 The agglomeration benefits have not been quantified as part of this update of the business case. However, the inclusion of agglomeration benefits for public transport projects in large urban areas (UK outside London) typically adds in the range of 15% to 40% above conventional transport benefits.

Labour supply

4.53 The Edinburgh Tram York Place to Newhaven project connects major existing and planned employment destinations (city centre, Edinburgh Park) with the Leith corridor, which has among the highest population density in the city, and major planned areas for new residential developments along Leith Waterfront towards Newhaven.

4.54 Through this the tram will connect existing and new jobs with existing and new residents, ensuring that labour market accessibility is enhanced (businesses will find it easier to recruit, and workers have access to more jobs), and that the economic growth that this support will be delivered in a sustainable manner, through integrated transport and land use planning.

4.55 There will be locations that are not served by tram that will, as a result of the scheme, exhibit worse *comparative* accessibility, and this logically will result in some displacement or relocation of activity from elsewhere to the tram corridor, at least in the shorter term.

4.56 However, the purpose of the Edinburgh Tram York Place to Newhaven project is to support the overall level of economic growth of Edinburgh through enhancing the viability and attractiveness of major housing and employment sites identified in the spatial strategy. In this context, employment should not be viewed as 'zero-sum' (where tram only results in distributional effects). Rather, the tram project can help

support economic activity (jobs, development, and housing) at a greater level that would otherwise be the case.

Summary

- 4.57 JRC's assessment of wider economic benefits is presented in table 9, based on a qualitative assessment using a 7-point (+3 to -3) scale, consistent with that employed within STAG.

Table 9: Wider economic benefits assessment

Criteria	Assessment
Agglomeration	√√√
Improved labour supply	√√√

Outline STAG assessment

- 4.58 This section provides an outline assessment against the range of objectives set out in Scottish Transport Appraisal Guidance (STAG). The assessment is a high-level assessment based on informed judgement about likely potential impacts of the project.
- 4.59 A full STAG assessment was undertaken to support the case presented as part of acquiring powers under the Tram Act that forms the basis of securing powers to build the project. The nature of the scheme is largely unchanged and the strategic policy context within which the scheme has been developed has been re-informed by the statutory policy documents adopted since the enactment of the Tram Act.
- 4.60 For this report Steer has therefore updated, at a high-level, the assessment of how the scheme performs against STAG appraisal criteria. This provides a validation that the project remains consistent with, and supportive of, the wider spatial planning and policy objectives that it was originally developed to meet.

Performance against planning objectives

- 4.61 The policy context discussed in chapter 3 sets the context for the assessment of the Edinburgh Tram York Place to Newhaven project against planning objectives, presented in table 10.

Table 10: Assessment against planning objectives

Planning Objective	Assessment	Comment
Supporting the Spatial Strategy	√√√	The project has the strong potential to support the delivery of identified housing and employment opportunities.
Sustainable Economic Development	√√√	The spatial strategy is developed to support the overall growth of Edinburgh in a sustainable manner.

- 4.62 The project offers the potential to:
- Increase the attractiveness of major development sites, enhancing their overall viability and potentially bringing them forward at a faster rate than would otherwise be the case

- Support the nature and scale of development, by supporting higher density development with a lesser requirement for parking than would be the case without the tram

4.63 The project also supports the spatial development strategy and the wider economic objective of supporting the planned population and jobs growth within Edinburgh in a sustainable manner.

Environment

4.64 A detailed environmental impact statement was prepared for the securing of powers for the project. The EIS sets out the results of an appraisal of the environmental impacts and identifies appropriate mitigation measures that are included in the design and development.

4.65 The granting of powers implicitly suggests that there were no unacceptable environmental impacts for the tram to Newhaven.

Accidents and security

4.66 The Edinburgh Tram York Place to Newhaven project has the potential to reduce accidents through the transfer of car trips to tram. However, the Leith corridor already has a high public transport mode share so the absolute change in vehicle kilometres will be modest.

4.67 The tram offers a high level of security, in particular through the presence of Ticketing Services Assistants and on board and on street CCTV and passenger help points.

Transport economic efficiency

4.68 The assessment of transport economic efficiency is the economic appraisal presented above.

Economic activity and locational impact

Local economic impacts

4.69 Local economic impacts are concerned with which geographic locations and which sectors are likely to gain or lose as a result of the project. In geographic terms, the project will support existing businesses and expansion of activity in key employment locations, in particular the city centre and Edinburgh Park.

4.70 The growth in these locations will be driven by the expansion of higher-value service sector jobs which would probably only locate in the city centre or high-grade premises such as those in Edinburgh Park. It is therefore unlikely that other locations within Edinburgh would be material losers as a result of the project.

4.71 The Edinburgh Tram York Place to Newhaven project aims to support the delivery of planned jobs and housing growth. Without tram this growth would either be at a lesser scale, take longer to come forward or need to be accommodated in a less sustainable manner (i.e. growth would have to be supported by greater levels of in-commuting).

National Economic Impacts

4.72 Net impacts at the national level are unlikely to be significant. However, key sectors such as business and financial services and life sciences / technology are mobile and

internationalised, and enhancing the attractiveness of Edinburgh as a location to locate (through good transport, access to a large labour pool, and direct access to the Airport) will help maintain and enhance Edinburgh's competitive position as a place that high-value internationally mobile businesses want to locate and expand in.

Distributional impacts

- 4.73 The project serves a corridor of comparatively high unemployment and deprivation, as shown in Figure 5. The tram will provide improved accessibility to residents along the corridor to the range of job opportunities in the city centre and along the existing tram corridor (e.g. Edinburgh Park).

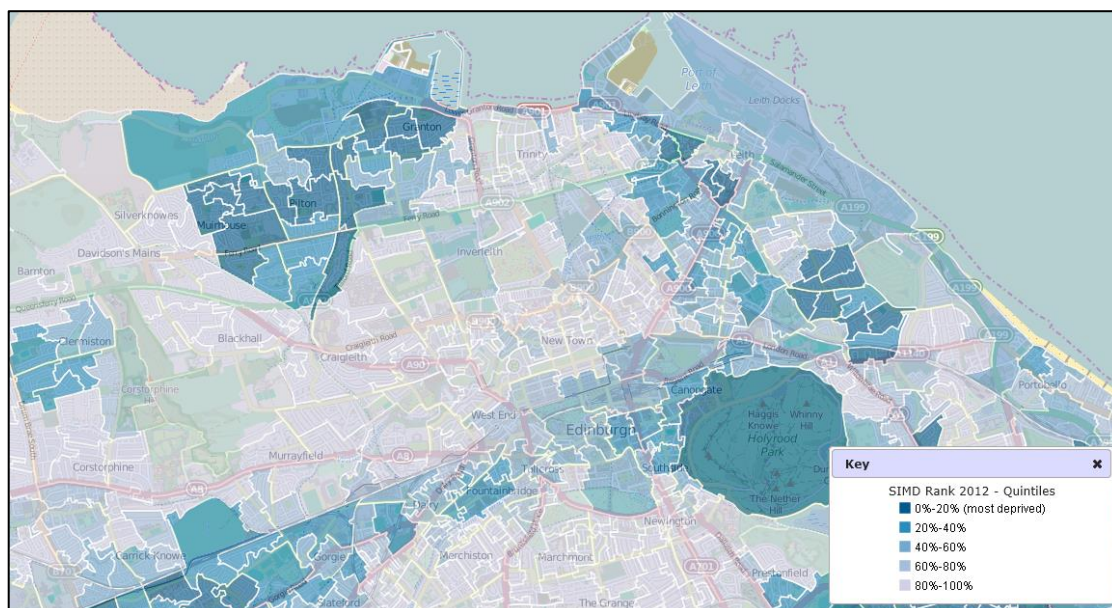


Figure 5: Index of Deprivation (from Scottish Index of Multiple Deprivation Interactive Map)

- 4.74 Steer's assessment of the Economic Activity Location Impact (EALI) is presented in table 11.

Table 11: EALI assessment

Criteria	Assessment
Local Economic Impacts	√√
National Economic Impacts	√
Distributional Impacts	√√

Integration

- 4.75 The Edinburgh Tram York Place to Newhaven project provides more direct journey opportunities avoiding interchange, as well as interchange opportunities at a range of destinations including the city centre (rail at Waverley and Haymarket, bus), Edinburgh Gateway and at Ingliston Park and Ride.
- 4.76 The project supports the city's spatial strategy and hence wider economic policy objectives. All options fully support the city's transport policy objectives.

4.77 JRC's assessment of integration is presented in table 12.

Table 12: Assessment of Integration Impacts

Criteria	Assessment
Transport Interchange	√√√
Land Use Transport Integration	√√√
Policy Integration	√√√

Accessibility and social inclusion

4.78 The Edinburgh Tram York Place to Newhaven project enhances accessibility and social inclusion.

4.79 In terms of community accessibility, the public transport network coverage and access to local facilities is reasonably good throughout the corridor, reflecting the good existing bus network coverage. Tram will improve this accessibility but will not transform any specific movement from being 'inaccessible' to 'accessible'.

4.80 The tram improves the comparative accessibility by public transport for a range of movements, in particular those from the northern end of the route, and from the whole route to a range of employment and other opportunities on the existing tram corridor.

4.81 JRC's assessment of accessibility and social inclusion is presented in table 13.

Table 13: Accessibility and social inclusion assessment

Criteria	Assessment
Community Accessibility	√
Comparative Accessibility	√√√

Measuring the Economic Benefits

4.82 A post-project review will be carried out to demonstrate the achievement of the economic benefits of the project. This review will include a full post-facto cost benefit analysis.

4.83 As the patronage on the route is expected to build up over time, it is recommended that this review is carried out at least 24 months after the opening of the new route, and may be done in conjunction with the review of strategic benefits.

Conclusions

4.84 The economic appraisal shows that the central case delivers a benefit to cost ratio of 1.40 to 1, and that the BCR would remain positive under a range of sensitivity tests undertaken. The reduction in this benefit to cost ratio since the updated Outline Business Case is predominantly as a result of changes to government guidance.

4.85 The outline STAG assessment demonstrates how the project contributes to a range of wider policy objectives and outcomes, in particular supporting the spatial planning and development strategies for the city, and improving transport accessibility in areas of comparative high deprivation.

5 The Financial Case

Chapter summary

- The tram line to Newhaven is affordable, on the basis that a £1.9m challenge can be funded from reserves. Reserves used would be replenished from profits in future years, with all reserves being repaid by 2027. Moreover, there are opportunities to reduce the requirement for reserves from efficiencies in tram maintenance and further maximisation of tram advertising income
- This conclusion is based on robust and prudent analysis of costs and revenues and assumes an extraordinary dividend from Lothian Buses of £20m over a 10 year horizon
- In the longer term, tram revenues can fund the extension and provide additional income to the Council
- However, in recognition of the work done by Oxford Global Projects, it is recommended that an additional £50m is set aside as contingency. This contingency allowance increases the £1.9m cashflow challenge to £14.8m requiring a series of measures to be implemented to fund or mitigate the risk
- All risk and contingency will be overseen by the Head of Finance and administered through the governance structure set out in chapter 7
- Analysis of opportunity costs has been carried out setting out the amount that could be available to spend on other projects if the capital investment were not made. This opportunity cost however needs to be viewed in the context of the monetary and wider economic benefits the project delivers
- Sensitivity testing has been undertaken on the base case showing the financial impact of changes to key assumptions and the impact on reserves

Introduction

- 5.1 In order to assess whether the Edinburgh Tram York Place to Newhaven project is affordable to the City of Edinburgh, costs and income have been assessed in terms of:
- financial impact of the project on tram business; and
 - affordability to the Council in the short, medium and long term
- 5.2 The detailed financial model produced for the 2017 updated Outline Business Case has been revised and updated to incorporate actual costs and revenue data provided by Edinburgh Trams based on performance in 2017. The Council has met regularly with Edinburgh Trams to ensure that any forecasts used are logical and backed up with robust evidence. The forecasts have also been corroborated by comparison with interim results for 2018.
- 5.3 Capital cost estimates have been updated as detailed elsewhere in this chapter and utilised in the financial model.
- 5.4 Steer (previously Steer Davies Gleave) were appointed to review and update patronage forecasts and this work was also carried out in conjunction with Edinburgh Trams. The output is consistent with current performance.
- 5.5 The financial model utilises the 2017 base actual costs and revenue data and projects these forward to 2054, taking account of the impact of constructing and operating the line to Newhaven. The model provides detailed annual cashflow forecasts for

Edinburgh Trams and the City of Edinburgh Council to assess the affordability of the investment in, and operation of, the completed tram line to Newhaven.

Project costs

Introduction

- 5.6 The cost estimates have been updated based on the outcome of the design consultation, the tendered prices, revised detailed quantitative cost and schedule risk assessments, support for business proposals and further work in relation to optimism bias.

Assumptions

- 5.7 Based on the experience of the original tram project, and the work done by the Council's advisory team, a number of assumptions have been made and agreed with the Project Board. Key assumptions include:
- Contract award will be in March 2019
 - The construction phase plan will be as set out in chapter 7, including traffic management arrangements which allow the opening up of large areas of the site to facilitate a one-dig approach and flexibility to deal with unforeseen underground obstructions
 - Utility works will be broadly in line with the desk top assessment underpinning the utility conflicts schedule described in chapter 7
 - No bridge replacements will be required
 - Road reconstruction and public realm improvements will be limited to those necessitated by the tram project and no allowance is made for additional general improvements
 - The supplementary projects to be delivered in parallel, as set out in chapter 7, are funded from the Place capital programme budget
 - No land acquisition costs will be incurred
 - The Council will procure an Owner Controlled Insurance Policy (OCIP) for the construction of the works
 - Inflation is based on current Building Cost Information Services All in Tender indices rate (BCIS) indices and is applied to elements of the prices that are not contractually fixed
 - The cost plan is based upon the design layouts finalised following the public consultation carried out during 2018

Programme

- 5.8 The capital cost estimate is based on the tendered programme, which includes the key dates shown in Table 14.

Table 14: Programme milestones

Milestone	Date
Council approval to award contract	March 2019
Completion of ECI period/Construction Commencement	Q4 2019
Construction complete	Q3 2022
Testing & Commissioning complete	Q1 2023
Services commencement	Q1 2023

Support for business

- 5.9 A package of measures has been developed in consultation with the business community and elected members to support business through the construction period. These include a range of practical measures to minimise disruption to businesses and customers as well as additional marketing and a continuity fund.

Risk quantification

- 5.10 The updated risk allowance includes assessments of the main sources of uncertainty to the project, including:
- Discrete cost risks
 - Estimate uncertainty
 - Cost of schedule delay
 - Unknown unknowns
- 5.11 The discrete cost risk estimate is based on a quantitative cost risk assessment (QCRA) of the project risk registers. Each risk in the risk register is assigned a probability of occurring and a range of estimated costs impacts, which are then modelled using a stochastic risk model to generate an estimate of the likely cost of risk at varying degrees of confidence. It is generally accepted best practice when adopting a quantitative risk analysis, to use the P80 risk estimate, i.e. the risk cost which the model predicts will not be exceeded 80% of the time.
- 5.12 Every cost plan is developed based on the best information available at the time and therefore there is always an element of uncertainty. For example, while utility diversion costs have been estimated based on detailed surveys, there is a risk that further utilities will be discovered when the works commence. The risk quantification process makes an allowance for this, along with all other uncertainties of which the Council is aware. This is discussed in more detail in chapter 7 including how risks will be managed throughout the life of the project.
- 5.13 In addition to the costs of individual risks occurring, the potential impact on programme and associated costs have also been considered. The cost of schedule delay is based on a quantitative schedule risk assessment (QSRA) of the programme risk register to estimate the delay cost of discrete risk events, and duration uncertainty. The QSRA provided a range of confidence levels for milestone completion dates. The P80 outputs were used to estimate the cost of delay for each stage of the project.
- 5.14 Despite undertaking a robust approach to developing and assessing the risk register, cost plan and programme it is possible that a currently unforeseen event could occur.

An allowance has been made for such unknowns by incorporating the standard deviation of the QCRA from the risk register.

Optimism bias

- 5.15 Academic research has shown that the cost of major projects is often underestimated due to unrealistic budgets influenced by project team optimism. This phenomenon is known as optimism bias. To counteract this, the project has considered government guidance, which has led to an additional 6% being added to the capital costs and risk allowance in the base case.
- 5.16 The project has also commissioned Professor Flyvbjerg and Dr Budzier from Oxford Global Projects at the University of Oxford to conduct a reference class forecast to estimate the cost and schedule risk of the project. As part of the Edinburgh Tram Inquiry into the original project, Prof. Flyvbjerg and Dr Budzier were requested, as experts, to review the original tram project's risk management process. Therefore, while the outcome of the Inquiry is not yet known, it was considered prudent to ask Professor Flyvbjerg and Dr Budzier to provide a reference class forecast as they recommended in their evidence to the Inquiry. The output from the Oxford Global Projects review is set out later in this chapter.

Results

- 5.17 The results of the updated cost estimate are summarised in Table 15.

Table 15: Project cost estimate

Element	Cost (£m)
Development costs to date (funded from reserves and previously approved)	£5.5
Capital costs to completion	£156.7
Support for Business (Council funded element)	£1.9
Risk	£31.9
Project Cost	196.0
Optimism Bias @ 6% ⁶	£11.3
Project Cost inclusive of Optimism Bias	£207.3

Lifecycle costs

- 5.18 Lifecycle costs have been calculated for both the original and extended lines. While both the costs are included within the financial case, only the costs relating to the extension are included within the economic case, which is consistent with best practice.
- 5.19 The lifecycle renewal assumptions are:
- Costs are based on 2018 price levels, with inflation applied for the financial case

⁶ Calculated based on total project cost excluding development costs to date and support for business

- Replacement periods are generally assumed to match the design lives in the employer's requirements. In some cases, such as structures, costs have been added for partial renewals within the design lives
- For the extended part of the line, base unit costs from the current capital cost estimate have been used with normal allowances for contractor's preliminaries and client on-costs for design and project management
- For the existing line, Edinburgh Trams have reviewed the asset base to develop a lifecycle schedule and cost plan
- Allowances are made for tram refurbishment within the lifecycle cost estimate
- Tram vehicle replacement is also included in the financial model from 2043

Revenue and cost assumptions

- 5.20 The updated tram financial model is based on a number of detailed assumptions. The most significant ones are set out below. Key assumptions have been agreed between the Council and Edinburgh Trams to ensure the robustness of the financial projections.

Revenues

- 5.21 The most significant revenue stream is from tram fares. This income stream is based on projected passenger numbers derived from the Steer transport modelling work described in chapter 4. This modelling shows significant growth in tram patronage due to forecast passenger increases at Edinburgh Airport and planned housing growth in the city.
- 5.22 Edinburgh Trams have provided data on current ticket yields and the proportion of passengers using different ticket types (cash single, airport cash single, Ridacard, concession travel cards, etc). This information is used alongside the passenger projections and planned fare increases to 2021 to calculate estimated fare revenue. Beyond this, average fares are assumed to rise annually by RPI + 1%.
- 5.23 Currently the Scottish Government contributes to free bus travel for the over 60s and the Council pays for concessionary travel on trams. The model assumes that these arrangements will continue, with concessionary revenue being calculated as a percentage of overall patronage and adjusted for the increase in the rate of inflation. The projected additional costs associated with increased concessionary travel are included in the project cashflows.
- 5.24 In addition to fare income, the projections include developers' contributions of £7.8m towards the construction of the extended tram line. This is based on contributions received or agreed to date as well as an estimate of future contributions based on assumed development along the tram corridor.
- 5.25 The financial model assumes annual net tram advertising income of approximately £0.8m from 2018. This is split in accordance with agreements currently in place between Edinburgh Trams, Transport for Edinburgh and Marketing Edinburgh.

Operating and maintenance costs

- 5.26 Edinburgh Trams have provided details of all current tram operating costs. Although the new operating agreement requires Edinburgh Trams to meet the full cost of maintenance, cost estimates have been taken from existing Council contracts with

maintenance providers. These costs have been uplifted by appropriate inflation indices.

- 5.27 Tram costs in the model are increased by cost drivers including track length, annual tram kilometrage, patronage and one-off increases. All cost drivers, in consultation with Edinburgh Trams, have been reviewed and agreed.

Taxation

- 5.28 Corporation tax has been modelled using existing tax rates and company structures. In the early years of the model, Edinburgh Trams is forecast to make a loss, so corporation tax will not apply in the short to medium term. However, under the group relief arrangements, Edinburgh Trams will receive payment for its tax losses from profitable companies elsewhere within the Council's tax group.
- 5.29 A high level analysis of VAT implications has been carried out and established that the vast majority of VAT payable by the Council and Edinburgh Trams will be recoverable.

Dividend policy and transfer payments

- 5.30 Under the new operating agreement, monies are transferred between Transport for Edinburgh and the Council by way of an asset fee. This enables the Council to fund life-cycle replacement as well as the capital financing costs for the project. In the short to medium-term, to meet working capital requirements, the Council will purchase ordinary B shares in Edinburgh Trams. These will be repaid in the longer term, after which Edinburgh Trams will have the ability to pay dividends to its shareholder.

Lothian Buses dividends

- 5.31 At its board meeting in December 2018, the board of Lothian approved an additional dividend of £1m, which is available to fund the project. In addition to this, a further £19m has been agreed in principle to be paid over a 10 year period. The agreement is subject to ongoing profitability and financial strength of the company and its ability to ensure ongoing cash flow and investment requirements as approved through the business planning cycle.

Capital costs and financing

Capital advance

- 5.32 In order to complete the tram line to Newhaven, the Council needs to fund total project costs of up to £207.3m as set out in the 'Project Costs' section of this chapter.
- 5.33 Within the financial model, the capital advances associated with the spend profile, net of developer contributions and revenue-funded costs, have been charged as interest only during the construction phase. Once the line is operational, debt servicing is charged over a 30 year repayment profile using an income based repayment approach. The interest associated with repaying the capital advances has been modelled at a marginal cost of borrowing rate of 4.1%. The repayment profile modelled complies with current regulations guiding local authority borrowing, lending and loans fund administration. The results are shown in table 16.

Table 16: Net capital funding and debt service requirement

Description	Cost £m
Total Project costs	207.3
Less: Development costs funded from reserves	(5.5)
Less: Support for Business funded from revenue	(1.9)
Less: Income from developers' contributions	(7.8)
Net capital funding requirement	192.1
Averaged annual debt service requirement	10.5 ⁷

Modelling results

Affordability and funding

In order to assess whether the Council can afford the tram project, the Council cash flows during the construction period and over the subsequent borrowing repayment period have been modelled. Figure 6 details the cumulative cash flows to the Council to 2033.

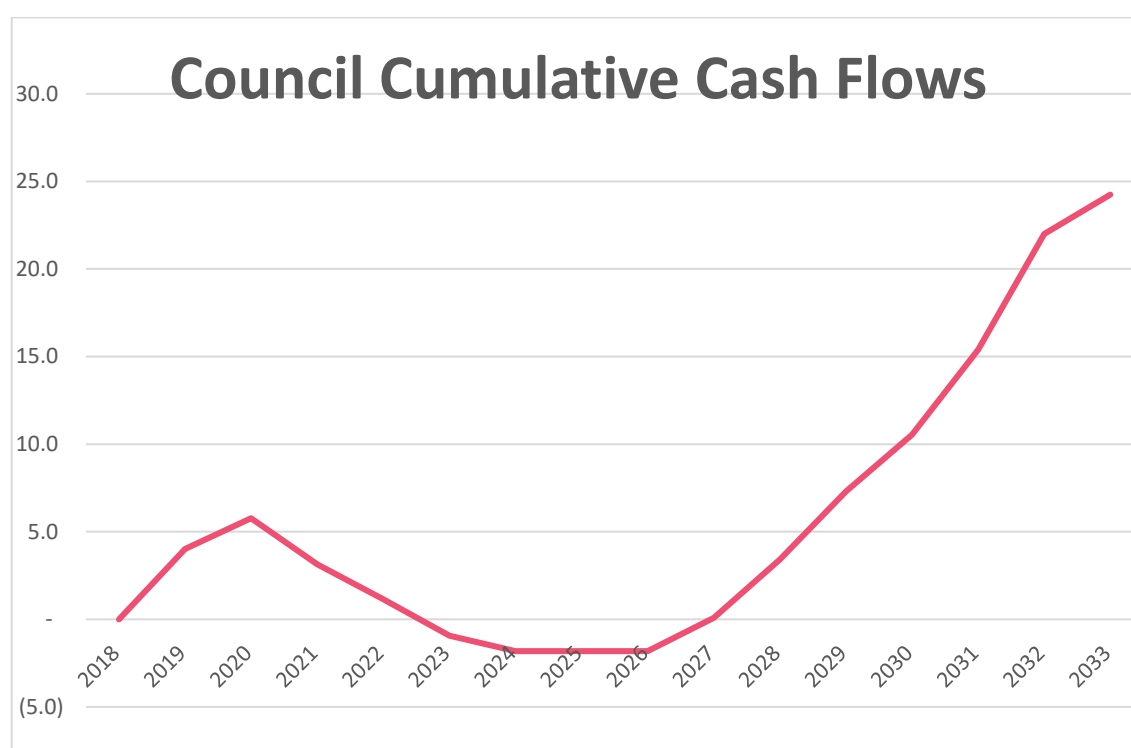


Figure 6: Council Cumulative Cash Flows

- 5.34 Under the income-based repayment profile, capital financing costs are repaid as interest only in the construction period, with principal and interest repayments for the 30 years following commencement of operations. However, the increased revenue generated from extending the tram line grows over a longer period, presenting a £1.9m challenge spread over financial years 2022-23 and 2023-24. This can be met from

⁷ This is based on the total debt service requirement divided by the construction period plus loan tenor

reserves which will be replenished from profits in future years, with all reserves being repaid by 2027. Moreover, there are opportunities to reduce the requirement for reserves from efficiencies in tram maintenance and further maximisation of tram advertising income.

Lothian Buses viability

- 5.35 It is recognised that the York Place to Newhaven tram line will have an impact on the Lothian business as a significant proportion of bus users on the proposed route are modelled in the business case to transfer to tram. In addition, based on real experience from the previous construction phase of the original tram line, the company will also see significant operational disruption, revenue loss and incur additional costs of operation during the construction phase. It is expected that the financial impacts will be mitigated with an ongoing proactive and collaborative approach.
- 5.36 The predicted counter balance is the future positive impact of the development of a fully integrated public transport system aimed at continuing the growth of the public transport market to the benefit of the city. Full consideration needs to be given to the full and proper integration of all public transport modes. Place making and design is crucial to ensure that all modes can co-exist together to deliver maximum benefits for the city.
- 5.37 The Council has discussed its proposals with the board of Lothian and both parties recognise the points above. The company continues to operate in a challenging commercial environment and the tram works will add to these challenges significantly. The company is confident that with the full support of the Council and delivery of measures it can continue to operate its business successfully as well as develop it for the future.
- 5.38 The Council will continue to work with Lothian closely in developing traffic management arrangements, including the implementation of bus priority measures to speed up journey times to minimise the impact on Lothian and its customers by keeping the city moving and placing the provision of public transport high on the agenda. Distinct and real actions will be taken to ensure an improvement to the free flow of public transport around the city. Increased priority will be given to bus with measures including a mutually agreed approach to bus lane operating hours, improved enforcement measures, the creation of new and additional priority measures and investment in infrastructure and real time information.

Opportunity cost

- 5.39 In making a decision on any major capital investment it is good practice to consider the opportunity costs, that being the amount that could be available to spend on other projects if the capital investment were not made.
- 5.40 As the project is funded almost entirely from future public transport revenues, the amount available to fund other priorities is limited to the Lothian Buses dividend and the surplus cashflows from the existing tram line. Cashflows from the line to Newhaven would not exist.

- 5.41 The dividend from Lothian Buses and the surplus cashflows from the existing tram line could be available to the Council to fund other priorities provided the profile of these sums matched an alternative investment.
- 5.42 Table 17 sets out the forecast annual sums available from public transport revenues.
- 5.43 The forecasts in table 17 assume that a £20m extraordinary dividend from Lothian Buses is paid in the absence of the tram to Newhaven project proceeding, and the performance of Edinburgh Trams is consistent with the projections in the financial model do-nothing scenario.

Table 17: Opportunity cost

Year	Tram surplus cashflows (£m)	Lothian Buses extraordinary dividend (£m)	Total (£m)
2018/19	1.1	1.0	2.1
2019/20	2.0	2.0	4.0
2020/21	1.3	2.0	3.3
2021/22	3.4	2.0	5.4
2022/23	3.7	2.0	5.7
2023/24	4.9	2.0	6.9
2024/25	6.0	2.0	8.0
2025/26	6.4	2.0	8.4
2026/27	3.0	2.0	5.0
2027/28	3.0	2.0	5.0
2028/29	3.1	1.0	4.1
TOTAL	37.9	20	57.9

- 5.44 This opportunity cost however needs to be viewed in the context of the monetary and wider economic benefits the project delivers as set out in chapter 4. As well as delivering in excess of £395m in benefits, the project contributes to a range of wider policy objectives and outcomes, in particular supporting the spatial planning and development strategies for the city, and improving transport accessibility in areas of comparative high deprivation. In the absence of the project, these benefits would not be realised.
- 5.45 The project supports the change in scale and location of jobs through:
- Directly supporting the bringing forward of employment related development in the Leith Waterfront area
 - Increasing the attractiveness of the employment locations in the city centre and Edinburgh Park by expanding the effective labour market catchment through reduced travel costs, and through helping bring forward major residential development in Leith Waterfront
- 5.46 While these benefits have not been quantified as part of this update of the business case, the inclusion of such benefits for public transport projects in large urban areas

(UK outside London) typically adds in the range of 15% to 40% above conventional transport benefits.

- 5.47 The project also connects major existing and planned employment destinations (city centre, Edinburgh Park) with the Leith corridor, which has among the highest population density in the city, and major planned areas for new residential developments along Leith Waterfront towards Newhaven.
- 5.48 As discussed in chapter 4, the development of Leith Waterfront has a strategically important role to play in mitigating the increase in in-commuting, by providing new dwellings on brownfield sites within the city with good public transport access to the city centre and Edinburgh Park. The project will improve public transport accessibility and help to bring forward developments at a potentially faster rate and higher density than would otherwise be the case.
- 5.49 Through this the tram will connect existing and new jobs with existing and new residents, ensuring that labour market accessibility is enhanced and that the economic growth that this supports will be delivered in a sustainable manner, though integrated transport and land use planning.
- 5.50 The project will create several hundred jobs during the construction phase, including jobs in the local economy. Once operational, the completed line will also create an additional 78 jobs rising to 92 by 2032.

Oxford Global Projects – Optimism bias using reference class forecasting

Reference class forecast report

- 5.51 As set out above the Council commissioned Professor Flyvbjerg and Dr Budzier from Oxford Global Projects at the University of Oxford to conduct a reference class forecast to estimate the cost and schedule risk of the project.
- 5.52 The work done by Oxford Global Projects provides a range of scenarios as to how risk and optimism bias may be applied. In broad terms the reference class report recognises that the higher the level of risk allowance the greater the certainty that the project will be delivered within budget. While it may be attractive to select a high overall risk contingency, the report also recognises that decision makers need to consider that any additional funding for risk provisions comes at decreasing marginal benefits.
- 5.53 Furthermore, the report states that managing risks is often seen to be a better use of resources than increasing contingencies. Risk management would include identification and reduction of project complexities; setting up an early warning system; and further enhancing the project's delivery capabilities and oversight. The report goes on to note that *“Actively addressing the risk would further increase the likelihood that the project will outperform previous completed projects”*.
- 5.54 The report presents a range of results, using reference class projects, and compares these with the risk allowance provided for in the base case set out above. The provision for risk within the base case is equivalent to a 39% chance of cost overrun, i.e. this level of risk provision has been exceeded by 39% of past projects while 61% of past projects stayed within the envelope of funding.

- 5.55 The report however highlights a variety of risks which are often a cause of cost overrun within the reference class. These are set out in table 18 below along with the steps taken by the project to address these specific risks.

Table 18: Common causes of cost overrun and steps taken by project

Common causes of cost overrun in light rail transport schemes	Steps taken by the project to address the risk
Low design maturity at full business case stage	Advanced stages of design; reference design already shared during bidding process
Scope increases	Alignment frozen, political commitment achieved to the current alignment
Unforeseen ground conditions: utilities	Part of utilities already diverted as part of the first tram project
Unforeseen ground conditions: soil strength	Geotechnical investigations
Procurement delays	Early contractor involvement; procurement concluded before Final Business Case approval

- 5.56 In the report it is recognised that the Council has already taken steps to de-risk the project and while the impact cannot be quantified, the report acknowledges that this provides evidence that the project might be less risky than the projects in the reference class.

Council response

- 5.57 However, the Council consider it prudent to take account of the work done by Oxford Global Projects, and in doing so, to present the impact of adopting the approach set out in their report in this Final Business Case.
- 5.58 If the base case is compared with the reference class projects in the report at a 20% chance of overrun, which mirrors the base case quantitative analysis at P80, then the project cost inclusive of optimism bias would be approximately £257.6m, this compares with the base case of £207.3m.
- 5.59 The impact of this increase on project cost inclusive of optimism bias would be to increase the £1.9m cashflow challenge to £14.8m with reserves being repaid by 2037.
- 5.60 While the base case is considered robust and has been derived from tendered prices, quantitative risk analysis and the application of optimism bias in line with government guidance, the Council can clearly not ignore the work done by Professor Flyvbjerg and Dr Budzier, given the evidence provided to the Edinburgh Tram Inquiry. The report recognises that the Council has already taken steps to de-risk the project but in the absence of that being quantifiable, it is considered appropriate to make contingency plans for the higher project cost of £257.6m.
- 5.61 In response to this the Council has investigated a number of options to address the increased cashflow challenge of £14.8m. Possible mitigation measures include forward borrowing to lower the cost of funding, a review of fare strategy for tram, and bringing forward operational efficiencies including potential savings on tram and infrastructure maintenance.

Way forward

- 5.62 Based on the findings of the Oxford Global Projects report and the Council response set out above, it is recommended that the project proceeds in line with the £207.3m base case and this is adopted as the project budget through to completion of the project.
- 5.63 However, it is further recommended that an allowance is made for an additional £50m as further contingency. This contingency will be overseen and managed by the Head of Finance and administered through the governance structure set out in chapter 7. In particular, the Finance & Risk sub-group shown in Figure 7 will be chaired by the Head of Finance with full responsibility for overseeing all risk allocation on the project.

Risks and sensitivity

Risks and opportunities

- 5.64 The detailed trams financial model is based on a large number of assumptions. There are risks in relying on any financial model, particularly one covering such a long period of time and with multimillion pound costs and income streams.
- 5.65 There is a risk that logical errors in the modelling result in misleading projections. To mitigate this risk, PriceWaterhouseCoopers performed a high level review of the model and its outputs at Outline Business Case stage. The review highlighted a small number of minor formula inconsistencies and errors that were rectified prior to running the model for this business case update. For the Final Business Case, Scott Moncrieff have performed a high level review of the logical integrity of the model and the evidence supporting the model inputs. In addition, the model has been internally reviewed using a commercially available model auditing package, to ensure its logical integrity.
- 5.66 As noted above, there is a risk that the tram construction works may impact on the ability of Lothian Buses to pay the modelled level of dividend due to the challenging commercial environment in which it operates. In order to mitigate this risk, the Council continues to work closely with Lothian Buses to minimise any negative impact on its operations.
- 5.67 There is also a risk that key assumptions regarding costs and income prove to be inaccurate. Some assumptions which could significantly change the financial impact of the project include:
- Passenger number estimates (the model assumes significant increases in tram use over the next 30 years)
 - Tram premium fares as a percentage of total tram cash fares
 - Marginal interest rate available to support this project
- 5.68 In response to this, sensitivity analysis has been carried out, against the base case, to determine the financial impacts to the Council should costs and incomes change. While there may also be changes that impact positively on project cashflows, these have not been modelled in this Final Business Case.

Sensitivity analysis

- 5.69 To improve confidence in modelling outputs, the following sensitivities have been tested:
- Changes in demand on the total extended line of minus 5%
 - Changes in airport demand of minus 15%
 - Change in marginal interest rate of plus 50 basis points
- 5.70 The analysis below shows that if the estimates of the number of passengers prove to be overly optimistic or if the marginal interest rate increases, then the Council will have to find additional resources to fund the project. None of these however exceed the £14.8m reserves requirement discussed above in relation to reference class forecasting.
- 5.71 Table 19 quantifies the revised requirement for reserves which would arise for each of the sensitivities when compared to the base case of £1.9m.

Table 19: Sensitivity test results

Sensitivities	Revised reserves requirement (£m)	Reserves repaid by (Year)	Comment
Demand – 5%	7.5	2035	This does not take account of mitigation measures which would include cost reduction through change to services in line with reduced demand
Airport demand - 15%	6.2	2029	This does not take account of mitigation measures which would include cost reduction through change to services in line with reduced demand
Increase in marginal interest rate of 50 basis points	5.1	2028	Manage risk through treasury management strategy

Conclusions

- 5.72 The tram line to Newhaven is affordable, on the basis that the £1.9m cashflow challenge can be funded from reserves. Reserves used would be replenished from profits in future years, with all reserves being repaid by 2027. Moreover, there are opportunities to reduce the requirement for reserves from efficiencies in tram maintenance and further maximisation of tram advertising income.
- 5.73 This conclusion is based on robust and prudent analysis of costs and revenues and assumes an extraordinary dividend from Lothian Buses of £20m over a 10 year horizon.
- 5.74 In the longer term, tram revenues can fund the extension and provide additional income to the Council.
- 5.75 However, in recognition of the work done by Oxford Global Projects, it is recommended that an allowance is made for an additional £50m as further contingency This

contingency allowance increases the £1.9m challenge to £14.8m requiring a series of measures to be implemented to fund or mitigate the risk.

- 5.76 All risk and contingency will be overseen by the Head of Finance and administered through the governance structure set out in chapter 7.
- 5.77 Analysis of opportunity costs has been carried out setting out the amount that could be available to spend on other projects if the capital investment were not made. This opportunity cost however needs to be viewed in the context of the monetary and wider economic benefits the project delivers.
- 5.78 Sensitivity testing has been undertaken on the base case showing the financial impact of changes to key assumptions and the impact on reserves.

6 The Commercial Case

Chapter summary

- This chapter builds on the work done in the updated Outline Business Case which provided detailed commentary on a range of procurement issues and concluded that:
 - The project is delivered under a design and build contract, incorporating tram infrastructure and tram control and communications systems
 - The maintenance of the York Place to Newhaven line should be procured separately
 - The appropriate form of contract for the main works should be the NEC4 Option C target price contract
 - There was likely to be little or no market appetite for taking full construction risk which would negate a PFI approach
- The procurement strategy was developed based on key procurement objectives and a consideration of the lessons learned on the first phase of tram and from other tram projects in the UK and internationally
- Analysis of the most appropriate contracting strategy for below ground obstructions, including utilities and archaeology, concluded during this stage of the project, and the Council has adopted a model that was used successfully on the first phase of tram, post mediation
- The Council has adopted an Early Contractor Involvement model for the project bringing together all key participants for a period of 6 months prior to any physical works being carried out. During this period a number of predefined tasks will be completed and all parties will work together to plan the works, investigate any value engineering opportunities and provide additional certainty around the project cost plan
- A comprehensive risk identification and assessment has been carried out, and allocation of risks under the contractual framework are set out in the chapter
- The Council has conducted two procurements for the main works and the below ground obstructions works. Both procurements have now concluded and the pricing and risk information contained in the successful tenders has been used to develop this Final Business Case

Introduction

- 6.1 The commercial case set out in the updated Outline Business Case identified the draft procurement and contracting strategy for the project, and outlined the proposed approaches to incentivising contractor performance, and to risk allocation.
- 6.2 Determining the appropriate procurement strategy involved an understanding of the procurement objectives; a consideration of the lessons learned on the first phase of tram and from other tram projects in the UK and internationally; and an appraisal of options available against the objectives and the lessons learned.
- 6.3 This appraisal of options and lessons learned were set out in the updated Outline Business Case.
- 6.4 With regards to lessons learned, the updated Outline Business Case noted that the project has retained a number of individuals who successfully delivered the Airport to

York Place project following mediation in 2011. In retaining this knowledge, the project is drawing on a number of lessons learned and these have been incorporated into the planning for the extension. These lessons include:

- The use of industry standard contracts to govern the project
- Rigorous project governance with highly qualified key personnel with experience of delivering light rail projects in the UK and abroad
- Setting up cross industry networks with other cities including Manchester, Birmingham and Dublin to ensure best practice is being adopted at each stage of project development
- Adopting traffic management plans that provide the contractor with expanded sites to ensure that works can continue in the event that problems are encountered during construction as well as adopting a strategy of only opening up roads once and completing all works prior to reinstatement - no double-dig
- Carrying out robust quantitative risk analysis and ensuring the contingencies set aside for unforeseen events
- Ensuring robust measures are incorporated into the construction contracts to ensure build quality, and a strong client team is present on site to monitor build quality
- Carrying out comprehensive formal consultation with the market to road test the overall delivery strategy for the project and encourage strong competition

6.5 The updated Outline Business Case provided detailed commentary on a range of procurement issues and concluded that:

- The project is delivered under a design and build contract, incorporating tram infrastructure and tram control and communications systems, referred to herein as the Infrastructure & Systems Contract (ISC)
- The maintenance of the York Place to Newhaven line should be procured separately
- The appropriate form of contract for the main works should be the NEC4 Option C target price contract
- There was likely to be little or no market appetite for taking full construction risk which would negate a PFI approach

6.6 The final strategy for dealing with below ground obstructions, including utility diversions and archaeology, was not included in the updated Outline Business Case although it was recognised that these works should be carried out in conjunction with the main infrastructure works, either by the ISC contractor or under a separate contract.

6.7 Further work on the systems procurement strategy was carried out for the updated Outline Business Case. This concluded that the infrastructure and systems would be procured as separate contracts, but with the procurement structured so that the Systems contractor becomes a nominated subcontractor to the ISC contractor. The Council however undertook to finalise negotiations with Siemens, prior to any contracts being signed.

6.8 This chapter builds on the conclusions from the updated Outline Business Case and discusses the outstanding procurement matters, risk apportionment and then provides a summary of the procurement processes conducted by the Council during 2018.

Outstanding procurement matters

Below ground obstructions including utility diversions and archaeology

- 6.9 Three options were considered in the updated Outline Business Case for below ground obstructions. The first was to include such works in the scope of the main design and build contract (the ISC); the second was to award a separate below ground obstructions design and build contract in advance of the ISC; and the third was to engage a specialist contractor, managed directly by the client team, to work ahead of the ISC contractor to identify and resolve below ground obstructions.
- 6.10 Work to finalise the procurement strategy for below ground obstructions including utility diversions and archaeology concluded at the end of 2017 and was agreed with the Project Board prior to tenders being released.
- 6.11 In finalising the strategy, the Council analysed all three options set out above against the following criteria:
- Lessons learned
 - Managing key project design interfaces
 - Cost certainty
 - Programme
 - Delivering value for money
- 6.12 Due to the level of cost and programme risk associated with below ground obstructions, and the premium that would be paid to the ISC contractor for this risk when it materialises, it was determined that the option to include the works in the ISC scope should be discounted. Based on previous market soundings there was also little market appetite for this approach.
- 6.13 By removing this unknown element from the ISC, it was concluded that the issue of below ground obstructions would be mitigated significantly for the ISC, making the project a more attractive proposition, which in addition would encourage greater competition.
- 6.14 The remaining options; (i) the award of a separate below ground obstructions design and build contract in advance of the ISC; or (ii) engage a specialist contractor, managed directly by the client team, to work ahead of the ISC contractor to identify and resolve below ground obstructions, were then considered and the residual risks assessed with mitigation measures developed for each risk.
- 6.15 The key differentiator between option (i) and option (ii) relates to scope definition and unknowns in the context of market appetite and the flexibility to control programme and cost to ensure best value to the Council while meeting the overall project programme.
- 6.16 Utility diversion works in particular suffer a high risk of delay due to the poor quality of records available on utility locations. Even with advance site investigations, there will inevitably be a volume of unknown services found.
- 6.17 As a result of this lack of scope definition, including the risk of unknowns and lack of flexibility to control programme and cost to suit the main works contract, it was concluded that option (i) should be discounted.

- 6.18 The decision was also supported by a tendering exercise carried out for Bernard Street enabling works in early 2017 where the tender was issued using a similar model to option (i) resulting in no tenders being received.
- 6.19 On this basis option (ii) was selected as the preferred model. This option was used on the first phase of tram, post mediation, and while the scope and costs changed during the contract, it is clear that the flexible strategy prevented delay to the main infrastructure contract and avoided significant claims. Option (ii) also supports a key objective of “no double dig” which is a key lesson from the first phase of tram.
- 6.20 The contract for below ground obstructions, referred to as the Swept Path Contract (SPC), will be administered using the NEC4 Option E form of contract.

Tram control and communication systems

- 6.21 Tram system owners face a common problem when building on to existing tram networks: how to procure the tram control and communication systems for the new route. The design and integration of these systems is the most technically complex part of the delivery of any tram project. The difficulties are compounded by the fact that many of these systems are of a proprietary nature, and thus can only be extended by the original equipment manufacturer.
- 6.22 Detailed work on the systems procurement strategy was carried out for the updated Outline Business Case which concluded:
- The infrastructure and systems would be procured as separate contracts, but with the procurement structured so that the systems contractor becomes a nominated or novated subcontractor to the ISC contractor. The ISC contractor would be responsible for the overall design, construction, commissioning and bringing into service of the project, including management of all design and programme interfaces, and for system integration and system assurance
 - The Council would continue to negotiate with the supplier of the existing systems, Siemens, to agree heads of terms under which they would act as a subcontractor for the delivery of the systems extension works. The heads of terms would include a detailed specification for the system works and Siemens' proposed prices or rates to undertake the works
- 6.23 Negotiations with Siemens have now concluded and contractual terms have been agreed. During the next stage of project delivery, early contractor involvement, Siemens will be contracting directly with the Council. Upon completion of the next stage, Siemens will then contract directly with the ISC contractor under a sub-contract agreement, the terms of which have already been agreed.

Early Contractor Involvement

- 6.24 The market consultation conducted in 2017 with potential suppliers for the ISC contract reaffirmed their preference for a two stage process. In recent times, tenderer's approach to risk has had a significant impact on the traditional single stage tendering process for projects with the majority of feedback from the market consultation promoting two-stage approach using Early Contractor Involvement (ECI).

- 6.25 ECI is a tried and tested method of procurement that has been recommended and endorsed by Cabinet office; the IUK Project Initiation Routemap and has been used successfully on many other major UK infrastructure projects & programmes.
- 6.26 The approach responds to the historic issues of unsatisfactory outcomes on major projects driven by behaviours of low cost tendering and significant post contract escalation and delays driven by adverse commercial behaviours misaligned to a client's objectives.
- 6.27 The ECI approach was therefore adopted by the Project Board prior to tenders being issued.
- 6.28 In broad terms the ECI stage of the project brings together the Council, the ISC contractor, Siemens, the SPC contractor and key stakeholders such as the utility providers, for a period of 6 months prior to any physical works being carried out. During the ECI period a number of predefined tasks will be completed and all parties will work together to plan the works, investigate any value engineering opportunities and provide additional certainty around the project cost plan.
- 6.29 Specifically, the tasks to be carried out during ECI are:
- Finalise the route wide tram infrastructure clearance zone (TICZ) setting out plan and cross sections to facilitate the design of the SPC works
 - In-situ testing at formation level
 - Development of formation protection measures to prevent degradation
 - Planning the re-use of existing materials from TICZ
 - Design to confirm OLE pole locations
 - Track slab bridging details at specific high-risk locations
 - Design of the South Leith Parish Church graveyard wall foundation
 - Detailed design of Traffic Management measures
 - Site Clearance Design
 - Development of a fully integrated Programme
 - Completion of the detailed Stakeholder Management Plan
 - Development of the project Document Management Plan
 - Development of the Building Information Modelling (BIM) Execution Plan
- 6.30 Upon completion of the ECI stage, the ISC and SPC contractors will be issued with a Notice to Proceed subject to the project remaining within the affordability envelope set by Council. In the unlikely event that the project does not remain within the affordability envelope, the Council reserves the right to terminate the contracts, with the parties only being reimbursed for the work carried out prior to any termination.

Risk apportionment

- 6.31 A comprehensive assessment of risks has been carried out, following the risk management process described in chapter 7.
- 6.32 The main risks associated with the delivery of the project are summarised in table 20 showing how each risk is apportioned between the Council and the ISC contractor. The table reflects the final contractual position reached following the procurement process. The table also provides notes where appropriate.

Table 20: Risk allocation

Risk	Council	ISC	Notes
Site access and possession			
Site possession	✓		
Off-site access and possession rights		✓	
Exercise of third party access rights to Site.	✓	✓	The Council retains risk for 3 rd party rights other than those disclosed in the tender documents
Protester action	✓		
Road closure and traffic management approvals	✓	✓	TRO approval to be sought by Council. Further approvals responsibility of ISC
Access to existing Tram System		✓	
Usability of existing free issue equipment		✓	
Site conditions			
Condition of existing structures	✓		
Archaeology	✓		
Contaminated ground	✓	✓	The Council retains risk for contamination other than that disclosed in the tender documents
Diversion of utilities	✓		
Necessary Consents			
Adequacy of Powers	✓		
Obtaining of all necessary consents	✓	✓	Council resources to ensure timely response to Prior Approval requests
Building fixing consents	✓	✓	The Council has undertaken to deliver specific consents. Additional consents are responsibility of the ISC
Design			
Ability of the Council Specification to meet Council business objectives	✓		
Inconsistency / ambiguity within Council Specification		✓	Obligation on bidders to review specifications at tender stage
Accuracy of "Relied Upon Information" relating to the Existing System	✓		
Development of design		✓	Previous design made available on an unwarranted basis

Risk	Council	ISC	Notes
Construction			
Build quality		✓	
Site security		✓	
Traffic management		✓	Advance TRO approval being sought
Exceptionally adverse weather conditions	✓		
Force majeure events	✓		
Public liaison	✓	✓	Collaborative approach being pursued
Damage to existing system		✓	
Disruption to operations		✓	
Third party claims	✓	✓	Owner Controlled Insurance Policy
Testing, commissioning and bringing into service			
Provision of trams and staff	✓		Edinburgh Trams
System integration		✓	
System performance		✓	
Safety Case	✓		Edinburgh Trams as Duty Holder

Procurement process

- 6.33 Based on the overarching strategy set out in the updated Outline Business Case and the subsequent analysis in relation to below ground obstructions, the Council has conducted two procurements. One for the ISC contractor and the other for SPC contractor.
- 6.34 In broad terms the scope of the ISC and SPC are as set out in table 21 below:

Table 21: Scope split

SPC Contract	ISC Contract
<ul style="list-style-type: none"> Excavate and prepare the tram infrastructure clearance zone (TICZ) to accommodate tram works Utility design/diversion removals of below ground conflicts within the TICZ Resolution of all Archaeology Installation of new manholes on the Scottish Water drainage network Clearance and protection of Overhead Line Equipment (OLE) pole foundation locations. 	<ul style="list-style-type: none"> Design and construction of all tram works including tram communication and control systems Specific works elements including: <ul style="list-style-type: none"> Track; OLE; Roadworks; Public Realm; Traffic signals; Street lighting; Substations; and Systems integration Testing & commissioning and bringing into operational service

- 6.35 Both procurements were conducted in full compliance with the Utilities Contracts (Scotland) Regulations 2016.
- 6.36 Prior to commencing the ISC procurement the project sought an independent review of the scope documentation which had been drafted by the Council's technical advisor, Atkins and the Council's Project & Commercial Management advisor, Turner & Townsend.
- 6.37 This independent review was carried out across the full suite of scope documentation which is made up of the main document and a number of appendices including the performance specifications. The independent reviewer carried out a peer review of the documentation and provided a tracked changes suite of documentation for consideration by the Council and its advisors. This took account of the scope coverage contained within the documentation and any gaps that existed; the scope definition and the clarity required to allow bidders to price the works; and the consistency of scope across the suite of documentation.
- 6.38 The contracts for both the ISC and the SPC are standard NEC forms of contract amended to suit project requirements by Ashurst, the Council's legal advisor for the project. Ashurst were instructed by the Council's legal team with input from the advisory team from Turner & Townsend and Anturas Consulting Limited. Further workshops were also held with personnel external to the project wherein the contract conditions were tested against set scenarios. The NEC contract is a form of contract widely used in infrastructure projects in the UK. It requires active management and promotes collaboration between the parties. The edition of contract being used is edition 4, which is the latest edition and includes provision for Early Contractor Involvement and Project Bank Account.
- 6.39 The two tenders were advertised on the Public Contracts Scotland portal and in the Official Journal of the EU on 27 October 2017.
- 6.40 Three companies applied to be prequalified to tender for the SPC. However, one of these did not meet the Council's prequalification criteria.
- 6.41 Invitations to tender were issued to the two prequalified bidders for the SPC works on 22 June 2018 and tenders were received from both bidders on 10 August 2018. These tenders were then evaluated in accordance with the evaluation criteria set out in the invitation to tender.
- 6.42 Seven consortia applied to be prequalified to tender for the ISC. Following an evaluation against the published prequalification criteria, four of the applicants were prequalified.
- 6.43 Invitations to tender were issued to the four prequalified bidders for the ISC works on 18 April. Two tenderers withdrew from the process during the tendering period. Tenders were received from the remaining two bidders on 7 September 2018. These tenders were then evaluated in accordance with the evaluation criteria set out in the invitation to tender.
- 6.44 Following the quality evaluation of the ISC tenders, the Council identified some areas for enhancement in both tenders and some areas requiring clarification. In response to this the Council took a decision to run a Best & Final Offer (BAFO) stage in the

procurement. This approach provided an opportunity for tenderers to improve their submissions and provide the Council with more economically advantageous tenders.

- 6.45 BAFO submissions were received on 16 November 2018 and evaluated in accordance with the evaluation criteria set out in the invitation to tender.
- 6.46 Both procurements have now concluded, subject to approval of the Finance and Resource Committee, and the pricing and risk information contained in the successful tenders has been used to develop this Final Business Case.

Conclusions

- 6.47 The updated Outline Business Case provided detailed commentary on a range of procurement issues and concluded that:
- The project is delivered under a design and build contract, incorporating tram infrastructure and tram control and communications systems
 - The maintenance of the York Place to Newhaven line should be procured separately
 - The appropriate form of contract for the main works should be the NEC4 Option C target price contract
 - There was likely to be little or no market appetite for taking full construction risk which would negate a PFI approach
- 6.48 The procurement strategy was developed based on key procurement objectives and a consideration of the lessons learned on the first phase of tram and from other tram projects in the UK and internationally.
- 6.49 Analysis of the most appropriate contracting strategy for below ground obstructions, including utilities and archaeology, was completed during this stage of the project and the Council has adopted a model that was used successfully on the first phase of tram, post mediation.
- 6.50 The Council has adopted an Early Contractor Involvement model for the project bringing together all key participants for a period of 6 months prior to any physical works being carried out. During this period a number of predefined tasks will be completed and all parties will work together to plan the works, investigate any value engineering opportunities and provide additional certainty around the project cost plan.
- 6.51 A comprehensive risk identification and assessment has been carried out, and allocation of risks under the contractual framework are set out in the chapter.
- 6.52 The Council has conducted two procurements for the main works and the below ground obstructions works. Both procurements have now concluded and the pricing and risk information contained in the successful tenders has been used to develop this Final Business Case.

7 The Management Case

Chapter summary

- Traffic management will be deployed which facilitates opening large sections of the work site at any one time and the project will not be subject to any city traffic embargoes
- A continuous approach to construction will be deployed wherever possible whereby the diversion of utilities will be carried out immediately prior to the installation of the tramway avoiding the need to excavate twice, thus minimising disruption, minimising cost, and speeding up the construction process
- A Support for Business scheme has been developed to maintain the vibrancy, desirability and accessibility of the streets affected by the project during construction
- Works will be carried out in accordance with the Code of Construction Practice
- The strategy for dealing with heritage items and archaeological remains has been agreed with the City Archaeologist
- To mitigate the impact on passenger services, it is proposed to decommission the York Place tramstop as part of the last construction activities and introduce temporary measures (including temporary crossover west of Elder Street) to allow services to run as far as St Andrew Square until the new line is operational
- A number of supplementary projects have been identified that support the finally developed road layouts between York Place and Newhaven. These projects will be funded from the Place capital programme budget and will be delivered in parallel with the tram project
- A programme has been developed based on the general principle of continuous working and adopting a traffic management plan which facilitates opening up large sections of the work site at any one time. Overall the project will take approximately 46 months from award of contract to open for revenue service
- Robust governance, change management, and risk management procedures are in place on the project that draw on lessons learned from the first phase of tram delivery, post mediation, and other major projects
- An outline Stakeholder and Communications Management Plan has been prepared for the project which adheres to the Scottish Government's Seven Standards of Community Engagement to ensure an equality of access for all
- A contractor insolvency mitigation plan has been developed for the project that sets out a number of financial, contractual and management measures that will be put in place to reduce the impact of this risk

Introduction

7.1 The management case sets out how the Council plan to deliver the project to ensure that the objectives in terms of cost, time and quality are achieved. The following topics are covered:

- Construction phase plan
- Programme
- Project management
- Risk and opportunity management
- Stakeholder management
- Post-project review

Construction phase plan

Introduction

- 7.2 Since the updated Outline Business Case, further design work has been carried out that has informed the tender documents issued to the market and therefore tender price returns which have fed into the costs and risk assessments in this Final Business Case.
- 7.3 A major element of the design development carried out during 2018 is the development of the road layouts and public realm for the project. These designs were initially developed ahead of a major public consultation activity which was undertaken between March 2018 and November 2018. This consultation has resulted in a road alignment and public realm design for the project that will form the basis of the detailed design and Traffic Regulation Orders (TROs).
- 7.4 In developing the designs and construction phase plan for the project, consideration has been given to the interface with existing and proposed development works along the route. This ensures permanent design layouts reflect the incorporation of these developments, and that construction interfaces can be managed.
- 7.5 The construction phase plan, initially developed as the construction delivery strategy in 2015, and updated during 2018, includes general principles which will be adopted and covers the following:
- Core principles
 - Traffic management including proposed enabling works
 - Utilities and other below ground assets including site investigation
 - City heritage
 - Tie in to the existing tramway
 - Supplementary projects
- 7.6 The recommendations of the construction phase plan are summarised below.

Core principles

- 7.7 Based on lessons learned from the construction of the first phase of tram, the strategy is underpinned by the following core principles:
- Traffic management will be deployed which facilitates opening large sections of the work site at any one time. This will require significant traffic management planning over a large geographic area to accommodate diversion routes and changes to junction operations
 - A continuous approach to construction will be deployed wherever possible whereby the diversion of utilities will be carried out immediately prior to the installation of the tramway avoiding the need to excavate twice, thus minimising disruption, minimising cost, and speeding up the construction process. This is consistent with the recommended procurement strategy set out in chapter 6
 - Recognising the impact this approach is likely to have on the local community, a Support for Business scheme has been developed to maintain the vibrancy, desirability and accessibility of the streets affected by the project during construction. Measures include logistics hubs, open for business campaign, on

street customer service officers, business skills development and a business continuity fund

- Works will be carried out in accordance with the Code of Construction Practice
- The project will not be subject to any city traffic embargoes

Traffic Management

- 7.8 The principle of adopting a traffic management plan which facilitates opening large sections of the work site at any one time was driven primarily by lessons learned from the construction of the existing route and experience in other cities both in the UK and Europe. The factors considered in arriving at this decision are summarised in table 22.

Table 22: Advantages & disadvantages of proposed traffic management approach

Advantages	Disadvantages
<ul style="list-style-type: none"> • Overall programme saving • Economies of scale through completing utility diversions in single phase • Savings on traffic management costs • Fewer traffic management changes allowing all road users to adapt to revised arrangements • Flexibility to solve site issues as they arise • More efficient track construction • More efficient testing of built infrastructure • Continuity of access and dedicated logistics support for business deliveries and collections • Better quality road surfacing with fewer transverse joints 	<ul style="list-style-type: none"> • Disruption over a wider area at any point in time • Impact of traffic diversions on a wider area • Additional road modifications to support diversion routes • Some reduction in public transport accessibility due to bus route diversions

- 7.9 To facilitate the works there is a need to provide significant traffic management. The methodology to be adopted to deliver the project utilises closure of substantial sections of road on Leith Walk and Constitution Street, with wider city traffic management required to facilitate these closures. These will be supplemented by provision for parking and loading, pedestrian crossings and logistics support for local businesses.
- 7.10 To implement the traffic management proposals, the project has considered the wider street network and associated enabling works which would mitigate the impact of the traffic management on the flow of traffic. This includes temporary traffic signals replacing the roundabout at the Easter Road / Duke Street junction, strengthening works to the Easter Road / Albion Road junction underbridge as well as kerb alignment works to Leith Walk allowing for the city bound traffic running lane. These enabling works will have a positive impact on traffic flow during the construction stage.
- 7.11 The project has liaised extensively with Lothian Buses on the proposed traffic management to provide a full understanding of the implications of the traffic management, allowing Lothian Buses to develop their bus diversion route plans accordingly. The proposed diversions have all been subject to joint inspections assessing geometry constraints, road condition, street furniture, adjacent foliage, temporary parking and loading restrictions, bus stop provision and any other impacts

on the bus user such as crossing facilities. These assessments have all been tabled through the Traffic Management Review Panel (TMRP). Once reviewed through the TMRP a detailed enabling works package will be commissioned. The majority of the proposed diversion routes have all been utilised previously by Lothian Buses.

- 7.12 From a traffic management perspective, the route has been split into four sections, with a different approach being adopted in each section, as set out in table 23. It should be noted that table 23 presents the sections geographically and not in the intended works sequencing.

Table 23: Traffic management proposals by route section

Route section	Proposals
York Place to London Road	<p>Carry out works in sub-phases to maintain traffic in both directions at all times:</p> <ul style="list-style-type: none"> • Picardy Place to Union Street • Union Street to London Road • York Place tie-in
London Road to Foot of the Walk	<p>Close 3 lanes of Leith Walk for approximately 18 months between London & Manderston Street (this includes appropriate timescales to carry out all required road works including switching traffic management to carry out works on the running lane).</p> <p>Introduce single direction running on Leith Walk city bound with Leith bound traffic diverted via either Easter Road or Bonnington Road. This will be supported with the provision of loading areas, logistics support and pedestrian crossings to minimise disruption on Leith Walk.</p> <p>Following the initial closure works will commence between Manderston St and Foot of the Walk for approximately 9 months. In this phase traffic is diverted via Easter Road, Manderston St to access the citybound direction of Leith Walk. The Leith bound traffic lane is maintained.</p>
Constitution Street to Tower Street	<p>Given the constraints in relation to road width, and the availability of diversionary routes, the strategy is to close the full width of the road in sections to allow the works to take place. Access to all business and residential premises will be maintained at all times.</p>
Forth Port to Newhaven	<p>Carry out works in phases to maintain access to the operational dock and local residents at all times:</p> <ul style="list-style-type: none"> • Newhaven to Melrose Drive • Melrose Drive • Ocean Terminal West Side to Melrose Drive • Ocean Terminal West to Ocean Terminal East • Ocean Terminal East to Rennie's Isle • Rennie's Isle to Tower Place • Tower Place to Stevedore Place East • Stevedore Place East to Casino Access Road • Casino Access Road to Constitution Place

- 7.13 This approach has been tested using the Council's traffic model. The final traffic management proposals will be developed in detail by the ISC contractor and will be subject to scrutiny by a Traffic Management Review Panel chaired by Council officials and including representatives of the emergency services and public transport

operators. Elected members will be consulted through the All Party Oversight Group as detailed proposals are developed.

- 7.14 The construction duration used to develop this Final Business Case is based on the traffic management assumptions set out herein and confirmed by the tender responses from the market.

Utilities and other below ground assets including site investigation

- 7.15 A major part of the works involved in building a tram system is the clearing of obstructions from the tram construction path, including all required utility diversions. While a significant number of utility diversions have been carried out by contractors engaged on the first phase of tram, it is clear that residual issues will need to be resolved.
- 7.16 A desktop utility assessment has therefore been carried out to identify utilities, basements, archaeological works, monuments, obstructions and other underground assets that may impact the tram works. A schedule was prepared for the updated Outline Business Case detailing the likely conflicts and the action required to mitigate them.
- 7.17 The desktop exercise identified in excess of 1,200 potential conflicts with utilities and other below ground assets along the route. An impact assessment of the conflicts was carried out with over 75% being considered medium to high impact (those which affect main tram infrastructure construction). As well as those conflicts identified, there are likely to be further conflicts that are currently unknown and will only become apparent when the excavation works occur.
- 7.18 Given the need to provide good quality, comprehensive ground investigation information to bidders, an assessment based on the outputs of the desktop exercise, was carried out and identified additional areas that should be investigated further through site investigation in the pre-contract stage of the project.
- 7.19 These additional site investigations were completed and the results fed in to the cost and risk assessments in this Final Business Case.
- 7.20 The Council has engaged with all major utility companies to provide them with a full understanding of the project route, the construction methodology and how the project plans to engage with them both during the early design stage through to the construction stage of the project. This early engagement has also allowed both the Council and the utility companies to get a better understanding of the number and location of potential conflicts on the route for further consideration during the design stage of the project.

City heritage

- 7.21 There are a number of heritage items that have been considered when developing the construction phase plan, including archaeological areas of interest, listed buildings and monuments.
- 7.22 The strategy for dealing with archaeological remains has been agreed with the City Archaeologist and is set out in table 24.

Table 24: Strategy for dealing with city heritage items

Archaeology		
Area	Description	Strategy
York Place to Foot of the Walk	Some archaeological remains	Maintain an archaeological watching brief during the works and record features of interest
Foot of the Walk to Constitution Place	Significant level of archaeological interest, including graveyard	Include an allowance in the programme for resolution of archaeology. Carry out heritage works at the Constitution Street church, including wall stabilisation and exhumation and reinterment of bodies currently lying under roadway
Constitution Place to Newhaven	Varying sections of archaeological interest including 1817 dock structure at Ocean Terminal and archaeological findings between Queen Charlotte Street and Baltic Street	Maintain an archaeological watching brief during the works and record features of interest Carry out heritage works at the 1817 dock structure and between Queen Charlotte Street and Baltic Street

- 7.23 There are a number of listed buildings and structures that will be encountered during the works. These have been categorised as buildings or structures needing improvement works; protection works or no work. All costs associated with the improvement or protection works are included in the capital cost plan.
- 7.24 There are two monuments within public realm spaces which conflict with the tram construction path. These are:
- Queen Victoria statue at the Foot of the Walk
 - Robert Burns statue at Bernard Street
- 7.25 Both of these monuments have been assessed in relation to their current location, condition and revised road alignments to determine how it will be dealt with. The Queen Victoria statue can be protected during construction, the Robert Burns statue will need to be permanently relocated close to its existing location. Appropriate permissions for the relocation of the statue will be sought.
- 7.26 Along with the above, the project will reinstate the London Road Clock and Leith Walk Pigeons within the Elm Row public realm design.

Tie-in to the existing tramway

- 7.27 The project includes the demolition of the existing temporary tramstop at York Place. The platform of this stop sits on the line of the future inbound track of the proposed line. This stop will thus have to be shut for a period of time to construct the tie-in of the existing track to the new line.
- 7.28 To mitigate the impact on passenger services, it is proposed to decommission the York Place tramstop as part of the last construction activities and introduce temporary measures (including temporary crossover west of Elder Street) to allow services to run as far as St Andrew Square until the new line is operational.

Supplementary projects

- 7.29 In developing the road layout and public realm for the scheme, a number of supplementary projects have been identified that support the finally developed road layouts between York Place and Newhaven. As discussed in chapter 5, these projects will be funded from the Place capital programme budget and will be delivered in parallel with the tram project. These are summarised below:

Table 25: Supplementary Projects

Supplementary Projects		
Project Title	Description	Reason for development
Foot of the Walk to Ocean Terminal Active Travel	Introduction of cycleway provision between Foot of Leith Walk and Ocean Terminal	Lack of cycling infrastructure on main tram route due to constrained streetscape and road widths
Duncan Place Calming	Calming & restrictions on Duncan Place	Due to the traffic restriction at the South end of Constitution Street, measures put in place to avoid 'rat' running along Duncan Place
Brunswick Road Access	Vehicular access to Brunswick Road from Leith Walk restricted	Due to the closure of Montgomery St at Leith Walk and the banned right turn at London Road onto Leith Walk to mitigate traffic displacement to Brunswick Road
Easter Road/Duke Street Junction	Removal of roundabout and introduction of signalised junction	To accommodate temporary traffic management on Leith Walk and mitigate vehicular delays post completion

Programme

- 7.30 A programme has been developed based on the general principle of continuous working and adopting a traffic management plan which facilitates opening up large sections of the work site at any one time. The programme is based on:
- Actual observed timescales on the first phase of tram post mediation in relation to utilities and underground obstructions
 - The programme submitted as part of the ISC tender
- 7.31 Overall the project will take approximately 46 months from award of contract to open for revenue service as shown in table 26.
- 7.32 This duration includes for early contractor involvement, design, construction, testing and commissioning. This duration is within industry norms for a tram project of this scale and complexity.

Table 26: Pre-contract award programme

Milestone	Date
Contract Award	March 2019
Early Contractor Involvement Stage Complete	September 2019
Construction Complete	August 2022
Testing & Commissioning	January 2023
Open for Revenue Service	February 2023

Project Execution Plan

- 7.33 A comprehensive Project Execution Plan (PEP) has been prepared for the project. This is a living document which continues to be updated as the project progresses from one stage to the next. The project team is currently updating the PEP to reflect the project moving from business case stage to construction. Each update of the PEP is approved by the Project Board.
- 7.34 The PEP defines the project objectives and the strategy for the management of the project and the procedures for its successful implementation and completion in line with those objectives.
- 7.35 The PEP sets out the processes to be followed for a range of project disciplines, including:
- Overall project governance and organisation
 - Project communications management
 - Cost management
 - Programme management
 - Risk management
 - Quality management
 - Change management
 - Design management
 - Health and safety management
 - Environmental management
 - Stakeholder management
 - Contractor Insolvency
 - Document control
- 7.36 The project governance and organisation, change management, risk management and stakeholder management approaches are elaborated on below. Further details are also provided on the project's contractor insolvency strategy.

Project governance & organisation

- 7.37 A key lesson learned from the first phase of tram delivery related to the project governance and contract management structures. Following mediation, revised governance structures were put in place that served the project well through to passenger service. It was therefore considered essential that similar arrangements be put in place from the outset of this project. The key principles underpinning the project governance structure are:

- Strong leadership from the top of the Council, key stakeholders and the contractors selected to carry out the works
- Strong political support and regular reporting by officers on risks, issues and costs
- Clearly defined roles and responsibilities within the Council with clear reporting lines
- Clear management information used to report through all project levels
- Professional project management support to the project

- 7.38 Responsibility within the Council for the project resides with the Senior Responsible Officer (SRO) who leads the project senior management team. Core decisions are taken within the project, by the Project Board or by the Council's Corporate Leadership Team, as appropriate. A separate Finance and Risk Sub-Group, chaired by the Head of Finance, is also being established to provide detailed challenge and oversight. This sub-group will also oversee project risk contingencies.
- 7.39 Political oversight resides with the All Party Oversight Group with reporting to Council committees as required.
- 7.40 The managed delivery unit is, in the main, made up of the Council's advisory team and will be led by the Project Director. It will be contracted to successfully manage all aspects of the project through to completion. The Project Director and SRO will both have membership of the Project Board and will be responsible for reporting progress on all aspects of project delivery.
- 7.41 This is top level governance reflected below in Figure 7.

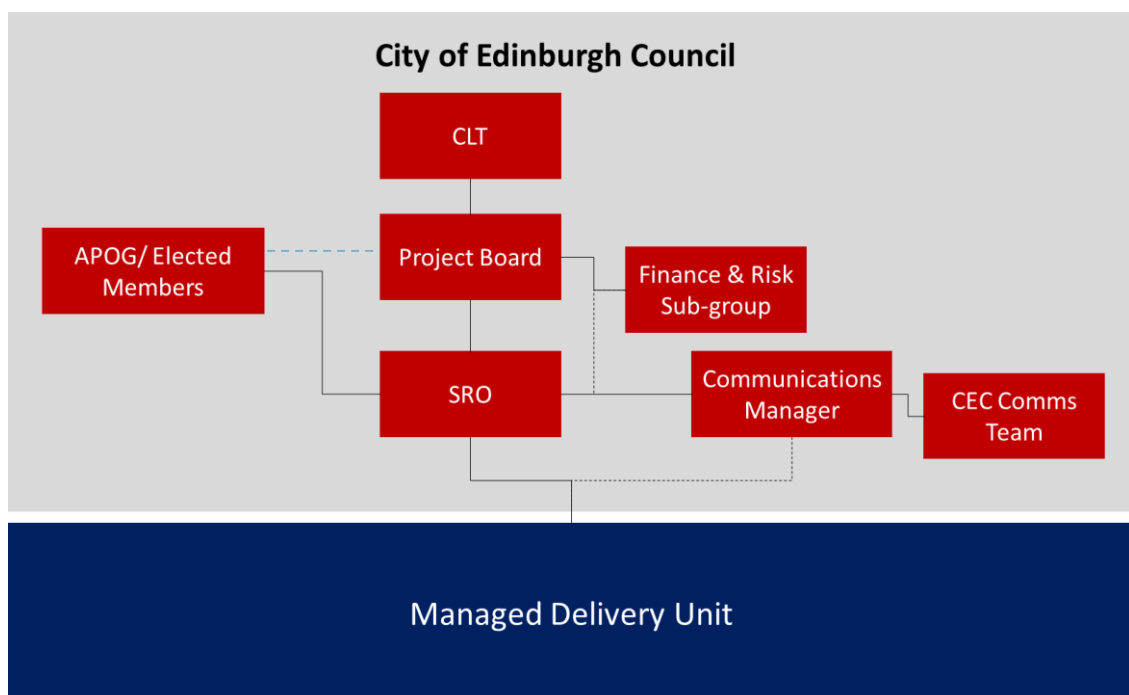


Figure 7: Top level governance

- 7.42 The Project Board also retains the services of an Independent Advisor and this will continue for the duration of the project.

Change management

- 7.43 A robust change management process is being implemented which recognises that good change control relies upon accurate identification and assessment of proposed changes at the earliest possible stage.
- 7.44 To support this change management process, the project is establishing the Finance & Risk Sub-Group to the Project Board as set out above. This approach was successfully implemented on the Forth Replacement Crossing. The purpose of that sub-group will be to:
- ensure rigour in risk mitigation measures
 - allow detailed review of close out of risks as the project progresses
 - allow for a detailed review of any call on the project contingencies prior to consideration by the Project Board

Risk and opportunity management

- 7.45 The risk management process adopted for the project represents common best practice for identifying and understanding the range of risks faced by the project and setting out actions to manage them. It consists of the following iterative steps:
- **Identification** – new risks are identified and incorporated into a risk register
 - **Analysis & evaluation** – each risk is assessed in terms of likelihood and impact
 - **Treatment** – actions identified and implemented to actively manage risk
 - **Review** – on-going monitoring progression of risks over the life of the project
- 7.46 This is supplemented by the ongoing monitoring, review, management, reporting, communication and improvement of the risk process and its deliverables against the project objectives throughout the life of the project. This assists with establishing and maintaining the process, creating a risk management culture, assigning accountability, allocation of risk and allows for risk activity and reporting arrangements to adapt to emerging changes in the project.
- 7.47 Comprehensive risk registers have been developed for each of the work packages identified in the procurement strategy, as well as an overarching programme risk register. A process is in place for escalating risks to the programme risk register when appropriate.
- 7.48 The risk registers provide full details in relation to the description, classification, assessment, and mitigation of all risks to the project. The registers remain as live documents, subject to regular amendment as new risks are documented and current risks are managed out. Individual risks will be regularly reviewed with the risk owners and the project team and updated as required. This process will provide an ongoing assessment of the risks in the light of project development and the impact of control actions taken.
- 7.49 In order to maintain continuous review and communication, the project is subject to a schedule of risk activities and reporting as shown in table 27

Table 27: Risk reporting

Activity	Report Frequency
Risk Register Reviews	Monthly
Risk Register QCRA's	Quarterly or following significant change
Risk Dashboard report	Monthly
QSRA	Quarterly or following significant change

- 7.50 The results of the monthly risk review, QRA update and any other risk activity in the month are summarised in a monthly risk dashboard report. This summarises details of the top risks to the project and provides an overview of the current estimated risk exposure.

Stakeholder management

- 7.51 An outline Stakeholder and Communications Management Plan has been prepared for the project which describes the processes for ensuring an effective strategy for the management of stakeholders on the project. It details how the project will identify and manage all stakeholders impacted by the works, engage with them and optimise their experience of the project and empower them in the local decision making process. The plan adheres to the Scottish Government's Seven Standards of Community Engagement to ensure an equality of access for all.
- 7.52 The activities within the stakeholder management process include:
- **Identification** of stakeholder organisations and key decision makers
 - **Analysis** of the stakeholders to understand their needs and position in relation to the project
 - **Strategy & planning** to identify the most effective means of communicating with different stakeholders in order to minimise risk and maximise opportunity
 - **Implementation, engagement and review** including the establishment of different engagement channels, production of stakeholder specific communications materials, and the implementation of reporting and reviewing procedures
 - **Evaluation** following review in order to identify positive engagement, minimise disputes where necessary and amend methods of communication
 - **Recording and monitoring** stakeholder requirements throughout the lifecycle, assigning tangible actions and deadlines for completion with the aim of maximising overall stakeholder satisfaction.
- 7.53 The objectives of the communications strategy are:
- to provide residents and businesses with relevant, timely and up to date information about the project
 - to provide residents and businesses with accessible inbound communications channels to ensure their concerns are given appropriate consideration in developing the timing and phasing of the project
 - to highlight the benefits of the tram project to the communities it serves and to the city as a whole
 - to ensure, where possible, any conflict is avoided through open and transparent communication

Contractor insolvency mitigation

- 7.54 Following recent high profile contractor failures, and due to the risk inherent in the construction industry, a number of measures have been investigated to protect the Council in the event of contractor failure.
- 7.55 Despite all necessary checks being carried out prior to entering into a contract, it is impossible to fully mitigate against the consequences of contractor failure, even taking account of any risk contingency. There are however a number of financial, contractual and management measures that will be put in place to reduce the impact of this risk. These include:
- Regular financial checks at 6 monthly intervals
 - Performance bonds to be paid out to the Council in the event of contractor failure
 - Parent Company Guarantees
 - Joint & Several Liability provisions within the ISC contract
 - Collateral warranties for key subcontractors
 - Insurance provision to include for delay in start-up
 - The use of a Project Bank Account enabling the Council to pay subcontractors directly
- 7.56 In addition to the contractual protections, the project team needs to be in a position to mobilise quickly in order to directly manage contracts while re-procuring a replacement contractor and managing stakeholder expectations. The proposed client team will be substantial, with extensive experience in delivering large scale infrastructure projects including key individuals from the recovery phase of the Airport to York Place tram project. The experienced client team will have the ability to take a hands-on approach to delivery of the project and take control of key subcontractors when required.
- 7.57 Through the contracting strategy adopted the Council would also have either an SPC contractor or the ISC contractor on site. In such a circumstance the Council would utilise the remaining contractor to make the site is safe, maintain safe and operational traffic management and continue works where possible to mitigate delays.

Conclusions

- 7.58 Based on lessons learned from the construction of the first phase of tram, the project delivery strategy is underpinned by the following core principles:
- Traffic management will be deployed which facilitates opening large sections of the work site at any one time and the project will not be subject to any city traffic embargoes
 - A continuous approach to construction will be deployed wherever possible whereby the diversion of utilities will be carried out immediately prior to the installation of the tramway avoiding the need to excavate twice, thus minimising disruption, minimising cost, and speeding up the construction process
 - A Support for Business scheme has been developed to maintain the vibrancy, desirability and accessibility of the streets affected by the project during construction
 - Works will be carried out in accordance with the Code of Construction Practice
- 7.59 The strategy for dealing with heritage items and archaeological remains has been agreed with the City Archaeologist.

- 7.60 To mitigate the impact on passenger services, it is proposed to decommission the York Place tramstop as part of the last construction activities and introduce temporary measures (including temporary crossover west of Elder Street) to allow services to run as far as St Andrew Square until the new line is operational.
- 7.61 A number of supplementary projects have been identified that support the finally developed road layouts between York Place and Newhaven. These projects will be funded from the Place capital programme budget and will be delivered in parallel with the tram project.
- 7.62 A programme has been developed based on the general principle of continuous working and adopting a traffic management plan which facilitates opening up large sections of the work site at any one time. Overall the project will take approximately 46 months from award of contract to open for revenue service. This duration is within industry norms for a tram project of this scale and complexity.
- 7.63 Robust governance, change management, and risk management procedures are in place on the project that draw on lessons learned from the first phase of tram delivery, post mediation, and other major projects.
- 7.64 An outline Stakeholder and Communications Management Plan has been prepared for the project which describes the processes for ensuring an effective strategy for the management of stakeholders on the project. It details how the project will identify and manage all stakeholders impacted by the works, engage with them and optimise their experience of the project and empower them in the local decision making process. The plan adheres to the Scottish Government's Seven Standards of Community Engagement to ensure an equality of access for all.
- 7.65 A contractor insolvency mitigation plan has been developed for the project that sets out a number of financial, contractual and management measures that will be put in place to reduce the impact of this risk.