East Lothian Local Development Plan

Transport Appraisal – DPMTAG Final Report

On behalf of **East Lothian Council**

East Lothian Council

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v1.8	16/06/17	Draft Report for client comment	DE	AB	KL
v1.9	21/06/17	Draft following client comments	DE	AB	KL
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V2.5	11/08/17	Draft following TS\ELC Meeting	DE	AB	KL
V3.0a	27/11/17	Final Report (DCF changes)	DE / ES	AB	KL
V4.0a	11/05/18	Update following Examination (Land Use changes)	LB	KL	KL
V4.0b	16/05/18	Update to Bankton Costs	LB	KL	KL

Contents

Figures

Tables

Appendices

1 Introduction

1.1 Background

1.1.1 East Lothian Council (ELC) is preparing its Local Development Plan (LDP) following the approval of the Strategic Development Plan (SDP) for Edinburgh and South East Scotland.

1.1.2 ELC commissioned Peter Brett Associates LLP and SYSTRA (previously SIAS) to undertake a Transport Appraisal of the implications of housing and economic land allocations on the transport network to support the preparation of the Proposed LDP ready for publication and formal representation.

1.1.3 This Report describes the LDP Transport Appraisal, which has been carried out in accordance with Transport Scotland's Development Planning and Management Transport Appraisal Guidance (DPMTAG) methodology. DPMTAG follows the principles set out in Scottish Transport Appraisal Guidance (STAG) which provides relevant guidance and technical methodologies for carrying out Transport Appraisal in Scotland. There has also been liaison with Transport Scotland throughout this Appraisal to agree the approach and discuss outcomes at various stages in the process.

1.1.4 The LDP Transport Appraisal has been undertaken to assess the predicted transport impacts of the LDP and the identification of a package of infrastructure interventions and a delivery mechanism to support it. This Appraisal follows on from previous work undertaken using strategic transport modelling to assist in the preparation of the Main Issues Report (MIR).

1.1.5 Following completion and submission of the LDP for approval, Scottish Ministers undertook an examination of the proposed LDP. An outcome from the examination was a number of amendments to the plan. Commentary on the changes and resultant impacts to DPMTAG appraisal are included in the Addendum at the end of this report

1.2 Development Planning and Management Transport Appraisal Guidance (DPMTAG)

1.2.1 The DPMTAG methodology details the Transport Appraisal process and aligns it with the Development Plan (DP) stages. The DPMTAG stages are summarised as follows:

- **Stage 1** is a *baseline assessment* of current and forecast performance of the strategic transport network, which feeds into the early engagement stage of the DP;
- **Stage 2** aligns with the *preparation of the Main Issues Report*, where the first step is to set out transport planning objectives in the context of the plan vision. This is followed by the identification of existing and future transport and accessibility issues resulting from land use changes. This is followed by the generation and sifting of Transport Options for Appraisal. The final step is the Appraisal of identified interventions by considering their contribution to the stated objectives; and
- **Stage 3** aligns with the *preparation of the Proposed Plan*, where the East Lothian LDP is now defined. This provides an opportunity to reconsider the Transport Options and refresh the Transport Appraisal, following MIR consultation, as well as initial consideration of deliverability in terms of feasibility, affordability and public acceptability.

1.2.2 Figure 1.1 presents the status of the East Lothian LDP at DPMTAG Stage 3, highlighting the opportunity to revisit the generation, sifting and appraisal of the transport options following the MIR public consultation.

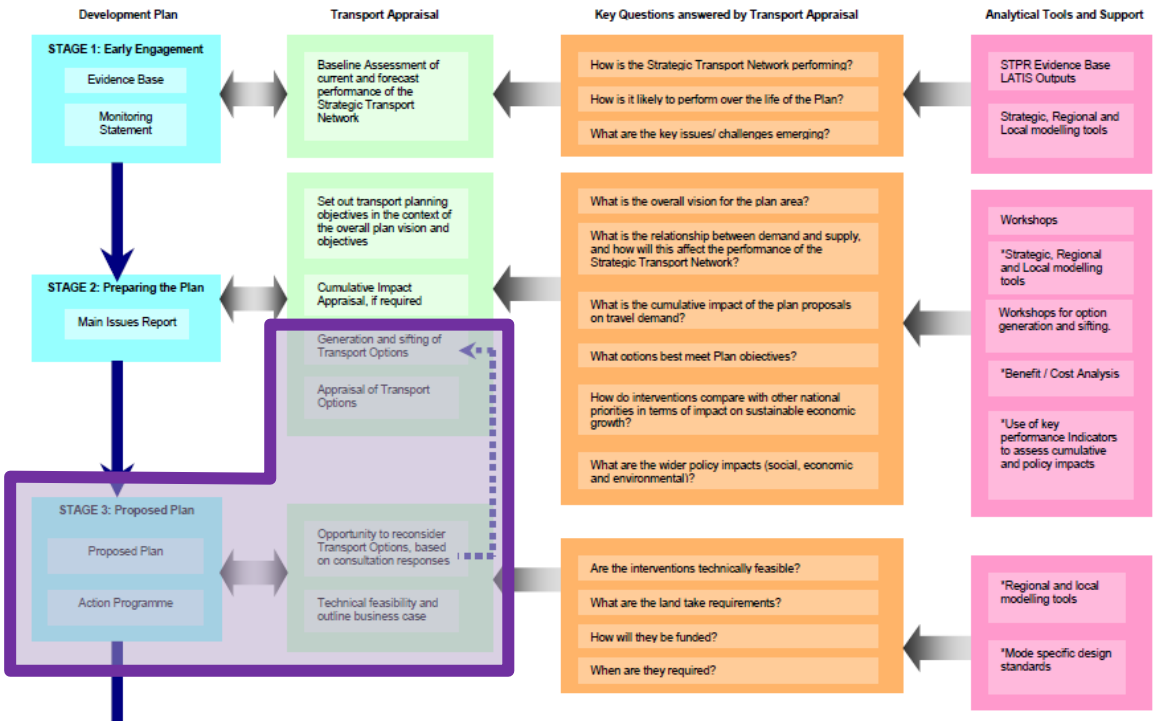


Figure 1.1: DPMTAG Stages and East Lothian LDP Appraisal Requirements

1.2.3 The level of Transport Appraisal that is required by Transport Scotland to take an informed view on the impact of proposed developments should be proportionate to the size and type of development plan and the nature of the transport options being considered.

2 Approach

2.1 Overview

2.1.1 To be compliant with DPMTAG, and reflecting that the East Lothian Local Development Plan (ELLDP) fits in with the SESplan SDP, a Level 3 Appraisal is required to support the Proposed Plan. This implies the use of modelling tools and preliminary feasibility and design work to identify an adequate technical solution and realistic alternative options necessary to support the ELLDP.

2.2 Transport Modelling Approach

2.2.1 The previous transport assessment for the Main Issues Report made use of an enhanced (with respect to network detail in the East Lothian area) version of the 2007 SEStran Regional Model (SRM) to consider transport network performance.

2.2.2 At the same time as the ELLDP Proposed Plan Appraisal was commenced, a 2012 based version of SRM (SRM12) was being finalised by Transport Scotland for use in the SESplan Cross-boundary Appraisal. SRM12 considers SESplan-wide transport impacts of the SDP land allocations. Following discussions with ELC and Transport Scotland, it was agreed that SRM12 could be made available and used for the ELLDP Appraisal.

2.2.3 The SRM12 model is a strategic model, with a focus on key transport movements (trunk road and principal public transport corridors) within its simulation area. In order to provide more robust predictions of ELLDP impact in and around the more urban areas of East Lothian (Musselburgh and Tranent), a detailed traffic microsimulation model was developed and applied to support the strategic modelling.

SEStran Regional Model

2.2.4 The SEStran Regional Model 2012 (SRM12) was used to inform the Appraisal of the implications of housing and economic land allocations on the transport network.

2.2.5 SRM12 is a multi-modal transport model, developed by Transport Scotland, which covers the SESplan area, and contains the following key modelled components:

- Trip ends – trip generation is derived from the Transport Economic Land Use Model of Scotland (TELMoS) land-use data;
- Demand model – represents key traveller choices of: mode choice, destination choice and Park & Ride;
- Road model covering route choice (assignment) for car drivers and heavy & light goods vehicles; and
- Public transport (PT) model covering route choice (assignment) for public transport passengers.

2.2.6 Appendix A provides an overview of the SRM and details the model application for the ELLDP Appraisal.

Musselburgh and Tranent Traffic Model

2.2.7 The *Musselburgh and Tranent Traffic Base Model Report* (SIAS, June 2016) describes the development of the Musselburgh and Tranent Traffic Model (MTTM).

2.2.8 The *Musselburgh and Tranent Local Development Plan Microsimulation Modelling Report* (SYSTRA, May 2017) described the application of the MTTM for the purpose of the ELLDP Appraisal.

2.2.9 The MTTM is a S-Paramics micro-simulation traffic model covering the Musselburgh and Tranent area, as illustrated in Figure 2.1.

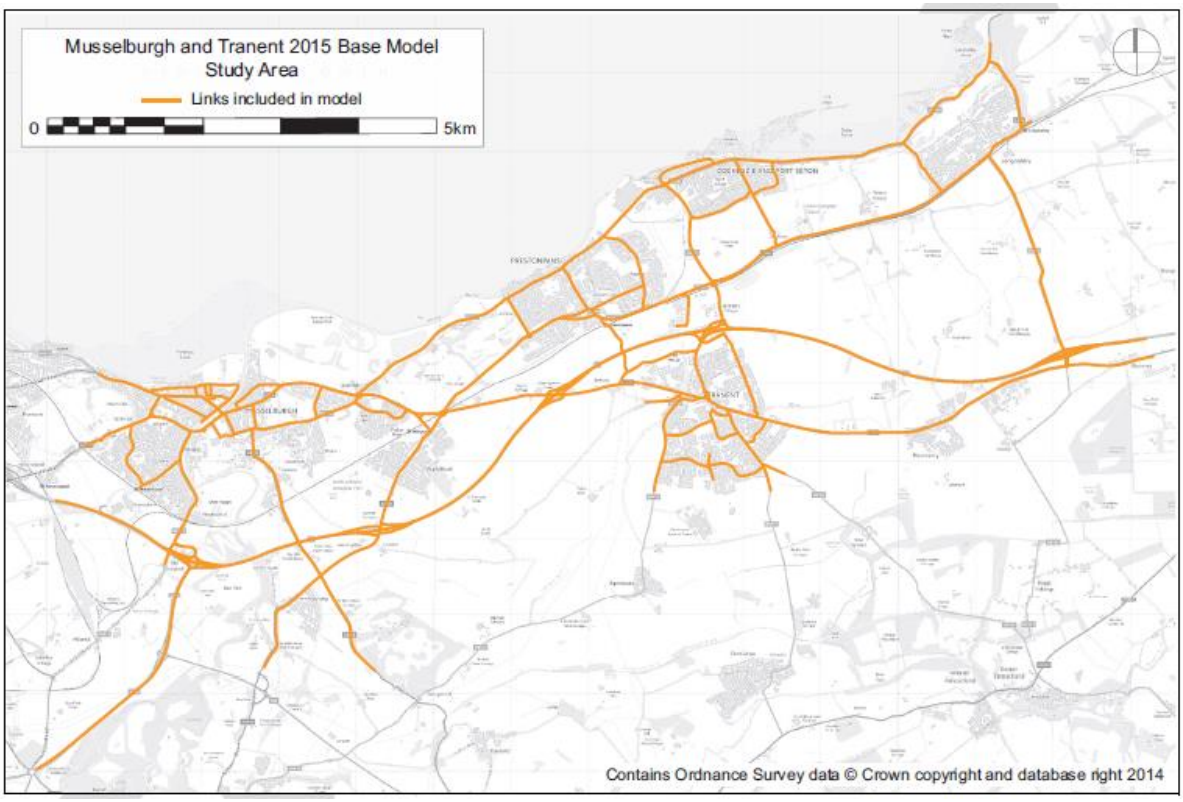


Figure 2.1 Musselburgh and Tranent Traffic Model Coverage

2.2.10 Base year traffic demand matrices were developed using a combination of:

- observed data (including readily available data and data specifically collected for model development);
- SRM12 sub-area traffic flows; and
- a process of calibration including matrix estimation based on WebTAG and DMRB guidance.

2.2.11 Following review of the model calibration and validation, the Base model was considered appropriate for the purpose of supporting the appraisal of the ELLDP.

Data and Supporting Information

2.2.12 Various data and information was used as part of the Appraisal and Assessment as follows:

Transport Survey Data

2.2.13 Data collection was undertaken as part of the traffic model development. This is described in the *Musselburgh and Tranent Traffic Base Model Report* (SIAS, June 2016). In summary, the following data was collected:

- traffic junction turning counts;

- queue length surveys;
- car journey time surveys;
- bus dwell time surveys; and
- pedestrian crossing activity.

Planning Data

2.2.14 ELC planners provided information on the land-use developments which form part of the ELLDP land-use scenarios and this is described in Section 4.

Network Data

2.2.15 Junction layout parameters were measured from CAD background mapping. Signal stages, phasing and intergreens were provided by ELC. School patrol crossing locations and their corresponding operational times were provided by ELC.

2.2.16 Traveline Scotland, the National Public Transport Access Nodes (NaPTAN) dataset and Google Maps were used to collate public transport bus data required for the traffic model development and to check against public transport representation within SRM12.

2.3 Definition of Transport Planning Objectives and Key Performance Indicators

2.3.1 The performance of transport options against the established Transport Planning Objectives (TPOs) is an important aspect of the Appraisal, with definition of corresponding Key Performance Indicators (KPIs). *Information Note 1 - Definition of Transport Planning Objectives and Key Performance Indicators* (PBA, November 2015) sets out the TPOs and Key Performance Indicators (KPIs) to be considered throughout the Transport Appraisal.

2.3.2 As described in DPMTAG, TPOs should express the transport outcomes sought for the plan and describe how potential transport problems could be alleviated. Specifically, the TPOs have been set within the context of the overall vision and objectives for the plan, which are described in the East Lothian LDP Main Issues Report.

2.3.3 In setting TPOs, consideration was also given to relevant Government, national, regional and local policies and objectives. However, the TPOs should not duplicate Government objectives, unless there is a specific aspect the LDP focusses on, as these form a criterion within DPMTAG and will be covered appropriately in the Appraisal without the definition of a separate TPO.

2.3.4 In line with DPMTAG requirements and the STAG concept of proportionality, the LDP Appraisal is largely qualitative. The requirement for specific quantitative KPI metrics will be limited and mostly relate to the application of the SRM12 and the MTTM.

2.3.5 The TPOs and corresponding KPIs for the ELLDP Transport Appraisal were agreed as follows:

- **TPO1**: to deliver development that is well-served by a range of transport modes, particularly public transport and active travel opportunities;
  - KPI: Travel Demand and Modal Share (relating to LTS Indicator 1)

    SRM12 metrics:

    - Trip productions and attractions by mode (i.e. car and public transport) for each model zone and aggregated to sectors covering key areas;
    - PT mode share;
    - Passenger boarding and alighting volumes at rail stations; and
    - Park & Ride site occupancies.

Target:

- Reduce levels of car use and increase use of PT and sustainable modes relative to defined baseline.

- **TPO2**: to locate new development to reduce the need to travel
  - KPI: Traffic Levels and Public Transport Usage (relating to LTS Indicators 3 and 9)

    SRM12 metrics:

    - Vehicle distance (kilometres), and inferred person kilometres, on key corridors in area (A1, A198, A199) and aggregated to sectors covering key areas; and
    - Passenger kilometres on key corridors in area (A1, A198, A199, East Coast Rail Main Line, North Berwick Branch Line) and aggregated to sectors covering key areas.

    Target:

    - Reduce traffic levels relative to defined baseline and not increase overall combined car and PT person kilometres on the transport network.

- **TPO3:** to mitigate the impacts of new development on transport infrastructure and maintain appropriate network performance
  - KPI: Network Performance

    SRM12 metrics:

    - Average vehicle speeds on key corridors and sectors on strategic road network;
    - Ratio of (traffic) flow to capacity (RFC) at key junctions on strategic road network;
    - Rail crowding levels; and
    - Car and bus journey times to Edinburgh city centre.

    Musselburgh and Tranent Traffic Model metrics:

    - Vehicle journey time and speeds on key routes in Musselburgh and Tranent; and
    - Queues at key junctions in Musselburgh and Tranent.

    Target:

    - maintain or increase road speeds and reduce delays relative to defined baseline;
    - maintain or reduce RFCs;
    - manage or reduce rail crowding; and
    - maintain or reduce car and bus journey times.

3 Impact Assessment and Mitigation Option Generation

3.1 Demand Forecasting and Network Assessment

3.1.1 SRM12 was used to inform the ELLDP Transport Appraisal of the implications of housing and economic land allocations on the transport network.

3.2 Land-Use Scenarios

3.2.1 *Information Note 2 – Definition of Appraisal Forecasts* (PBA, May 2016) provides a definition of a set of land-use assumptions which form the basis of the LDP Appraisal. This is summarised below.

3.2.2 The Appraisal focussed on land-use and transport interventions that are directly relevant to the supply and demand for travel to, from and within East Lothian. Following the circulation of the Information Note to ELC and Transport Scotland, agreement on the modelling approach was reached prior to assessing the traffic impacts of the ELLDP scenarios.

3.2.3 Two core model scenarios were prepared to represent the LDP in a forecast year of 2024 (the available forecast year from SRM12) as follows:

- **Without LDP** land-use development scenario. This includes completed and committed development up to 2024 only; and
- **With LDP** land-use development scenario. This 2024 scenario is representative of the 'without LDP' scenario plus the addition of a build-out of all identified ELLDP development sites (i.e. those up to and including 2038).

Overview of the Approach to Modelling Land-Use Changes

3.2.4 The SESplan Cross-boundary Appraisal forecast land-use scenarios were used as the basis of the ELLDP forecasts. This includes a recent consideration of developments across the entire SESplan area.

3.2.5 East Lothian land-use forecasts were updated with ELLDP forecast assumptions provided by ELC Planners as follows:

- Household forecasts based on housing developments in terms of residential units;
- Forecast population figures were estimated based on the Transport Economic Land Use Model of Scotland (TELMoS) household size for East Lothian at SRM12 zonal level; and
- In liaison with ELC, assumptions were applied to estimate the number of jobs based on employment sites and anticipated usage and employment densities.

3.2.6 General assumptions regarding housing development, population and employment in the rest of the SESplan area (and beyond) remain as per the SRM12 cross-boundary land-use scenario.

3.2.7 Table 3.1 provides a summary of the forecast number of households, associated population projections, and number of jobs within the ELLDP scenario for the ELC local authority area.

Table 3.1 ELLDP Summary – Modelled Land-use

Location	2012 Base Year	2024 Without LDP (versus 2012 Base)			2024 With LDP (versus 2012 Base)		
Households	42,984	49,482	+6,498	+15%	57,313	+14,329	+33%
Population	98,180	102,364	+4,185	+4%	115,454	+17,274	+18%
Jobs	23,317	29,102	+5,785	+25%	36,862	+13,545	+58%

3.2.8 The land-use figures have been allocated to SRM12 zones based on the development locations. Where developments are geographically split across more than one zone, the land-use split has been estimated based on the site boundary and consideration of the anticipated loading of trips on the transport network.

3.3 Transport Infrastructure

3.3.1 *Information Note 2 – Definition of Appraisal Forecasts* (PBA, May 2016) provides a definition of a set of transport assumptions which form the basis of the LDP Appraisal, detailing the main changes to the road and public networks which are assumed to have been introduced following the model base year, 2012.

3.3.2 The following **road schemes,** constructed after the 2012 base year**,** are included within the 2024 SRM12 road network:

- M8 Heartlands – extra junction on the M8 (opened 2013); and
- Forth Replacement Crossing – connecting to M90 and M9 Spur.

3.3.3 The following constructed (post 2012) or committed **public transport schemes** are assumed within the 2024 SRM public transport model:

- North Berwick Rail Line Capacity Enhancements – increased capacity on rail services to/from North Berwick with introduction of 6-car sets rolling stock;
- East Coast Mainline Timetable Changes – changes to service frequencies and stopping patterns (implemented 2013);
- Edinburgh Tram – new tramline between Edinburgh city centre and Edinburgh airport (opened 2014);
- Borders Railway – rail line between Tweedbank & Edinburgh. 2tph throughout the day with Park & Ride provision at each rail station (opened 2015);
- Edinburgh Gateway Station – new station at Gogar served by Fife Circles and connection with Edinburgh TRAM (opened 2016); and
- Edinburgh-Glasgow Improvement Project (EGIP) Phase 1 – increased capacity, 5 to 8-minute journey time reduction between Edinburgh and Glasgow. Journey time improvements on various services to Stirling, Aberdeen, Bathgate and Falkirk.

3.3.4 It should also be noted that East Linton Rail Halt now has a status of being a committed scheme, but was not included in the modelling undertaken. The impact of this is likely to be a transfer from bus to rail and a slight reduction of more strategic car movements from the East Linton area, with a slight increase in local car use to East Linton station

3.4 Model Forecasts

3.4.1 Appendix A details the ELLDP forecast year transport assessment and describes the forecast travel demand associated with the land-use and infrastructure forecast year scenarios. In summary, the following model scenarios have been prepared:

2024 Without LDP

- **Land-Use and Travel Demand** – 2012 base year land-use, plus constructed and committed future housing and employment land allocations.
- **Infrastructure** – validated 2012 network plus committed infrastructure.

2024 With LDP

- **Land-Use and Travel Demand** – 2012 base year land-use, plus constructed and committed, plus build-out of all identified LDP housing and employment land allocations.
- **Infrastructure** – validated 2012 network plus committed infrastructure.

2024 With LDP Including Mitigation

- **Land-Use and Travel Demand** – 2012 base year land-use, plus constructed and committed, plus build-out of all identified LDP housing and employment land allocations.
- **Infrastructure** – ELLDP transport mitigation identified as part of this assessment.

3.4.2 SRM12 outputs indicated that the number of car and public transport trips is forecast to increase in most areas within East Lothian, which is in line with the land-use forecasts, particularly the population projections which drive the travel demand forecasting procedures in SRM12.

3.4.3 Inspection of the road and public transport model networks shows a corresponding increase in vehicle movements and public transport passengers that correlates with the increase in travel demand.

3.5 Network Review and Identification of Issues

3.5.1 Appendix A describes the impact of ELLDP forecast travel demand on the transport network without mitigation and this is summarised below.

3.5.2 As expected, the predicted increase in travel demand associated with ELLDP development results in negative impacts on road and public transport in terms of network performance, increased congestion, increased delays to buses and general traffic and increased passenger crowding on the rail network.

3.5.3 As noted previously, a combination of SRM12 and MTTM were used to inform both strategic and local transport impacts (respectively).

3.5.4 The modelling highlighted that the following network locations may have capacity and performance impacts related to the additional trips generated by the introduction of LDP development:

- Road Network
  - A1 QMU Interchange;
  - A1 Old Craighall Interchange;
  - A1 Salters Road;
  - A1 Dolphingstone;
  - A1 Bankton Interchange;
  - A198 at Blindwells;
  - Musselburgh Town; and
  - Tranent Town.
- Rail Network
  - Crowding on North Berwick Line service at Musselburgh and Wallyford.

3.6 Mitigation Option Generation

3.6.1 Following the identification of anticipated network impacts, a review of potential mitigation interventions was undertaken to identify a package of measures that support the ELLDP and alleviate transport impacts. The mitigation assessment is summarised below with further detail of the supporting SRM12 transport modelling provided in Appendix A.

Long-List of Interventions

3.6.2 Prior to the availability of the transport models, a list of potential mitigation interventions was independently prepared (by ELC, PBA and SYSTRA), based on knowledge of the transport system within East Lothian and anticipated ELLDP impacts. This list was then refined following the application and analysis of SRM12 and MTTM model runs.

3.6.3 The list of potential mitigation interventions is presented in Table 3.2 below, in terms of observed network impacts. Each item is scored as follows:

- ✘ No significant impacts of concern within SRM12;
- 🔑 Impacts that required more detailed (MTTM and\or local junction) modelling beyond that of SRM12 to confirm intervention requirements
- ✓ Issue considered in SRM12 with required intervention

3.6.4 The active travel mitigation interventions were considered to have a positive mitigation impact given the forecast increase in car trips associated with the ELLDP and the potential for enhanced active travel provision to help reduce this.

Table 3.2 List of Mitigation Assessment

Mitigation Option	Inclusion in LDP
Musselburgh Town Centre Road Network	🔑
A1 QMU All-Ways Interchange	✓
A1 Wallyford (Salters Road) Interchange	🔑
A1 Dolphingstone Interchange	🔑
A1 Old Craighall Interchange (Signal Control of Roundabout)	✓
Longer Trains & Platforms at Musselburgh and Wallyford Rail Stations	✓
A1 Bankton Interchange	🔑
A198 Junction	✖ 🔑
A198 Enhance Meadowmill Roundabout	✖ 🔑
Longer Trains & Platforms at Prestonpans Rail Station, Longniddry Rail Station, and Drem Rail Station	✓
Longniddry Rail Station Car Park and Drem Rail Station Car Park	✓
New Rail Station north of Blindwells and ECML Overbridge	✓
Tranent Town Centre Road Network	🔑
Ashgrove Underpass, Dunbar*	✖
Segregated Active Travel Corridor	✓

* Ashgrove Underpass was not modelling in SRM12 or MTTM. This is an ELC led option to support improved active travel access to proposed development.

3.6.5 Table 3.2 indicates that SRM12 results did not identify a requirement for mitigation on the A198 adjacent to the Blindwells development based on the SRM12 assessment alone. The road network in this area was working at or near capacity. To better understand the network performance at a detailed level, further work was undertaken using specific junction analysis and the MTTM. This work indicated that mitigation would be required in this area, hence the derivation of mitigation solutions for the A198 between Meadowmill and Bankton Interchange and Meadowmill roundabout.

3.6.6 The Blindwells development is anticipated to include around 1,600 new dwellings within this LDP. When deriving mitigation, it is also prudent to consider the potential impact of a 'full build-out' of Blindwells which may be delivered beyond the lifespan of this plan. This would deliver a total of 6,000 new dwellings, which are being proposed as safe-guarded sites in the ELLDP. It is anticipated that this higher level of development will require further mitigation at Bankton junction with possible requirement for enhancement of the A198 and Meadowmill Roundabout as well. Therefore, ELC are including these potential interventions as part of the safeguarded Blindwells development site.

3.7 Short-List of Interventions and Mitigation Package

3.7.1 Following the assessment and sifting of the list of proposed mitigation, further modelling was undertaken to confirm and conceptually define the interventions to a stage suitable for inclusion in the ELLDP. As described above, where SRM12 does not provide sufficient information, more

detailed local traffic modelling was undertaken using the MTTM and\or local specific junction modelling.

3.7.2 For each intervention, consideration was given to the impacts on the transport network and the associated ELLDP development allocations. This defined a recommended package of interventions that aim to address the cumulative impact of the ELLDP and this is presented in Table 3.3.

Table 3.3 ELLDP Recommended Interventions

Intervention	Description
PROP T15: **Old Craighall A1(T)** Junction Improvements	Signal control of A1 off-slip and A720 approaches with local widening. See **Error! Reference source not found.** for conceptual layout.
PROP T17: **Dolphingstone\A1(T)** Interchange Improvements	Local widening and optimisation of signal control staging, phasing and timings. See **Error! Reference source not found.** for conceptual layout.
PROP T17: **Salters Road\A1(T)** Interchange Improvements	Local widening on Salters Road and optimisation of signal control staging, phasing and timings. See **Error! Reference source not found.** for conceptual layout.
PROP T17: **Bankton Interchange\A1(T)** Interchange Improvements and **A198** Junction	Signal control of northern roundabout with local widening. Redesign of southern roundabout with local widening. See **Error! Reference source not found.** and 3.5 for conceptual layout.
PROP T17: **Meadowmill Roundabout** Junction Improvements	Redesign of roundabout and local widening. See **Error! Reference source not found.** for conceptual layout.
PROP T9 + PROP T10: **Rail Station Package**	Station platform lengthening at Musselburgh, Wallyford, Prestonpans, Longniddry and Drem rail stations. This would accommodate longer, 8-car, trains. (Cost excludes ScotRail rolling stock changes). Also car park extensions at Longniddry and Drem Stations.
PROP T21: **Musselburgh Town Centre Improvements**	Local junction improvements at various locations including introduction of signal control. See **Error! Reference source not found.** for indicative proposals.
PROP T27 & T28: **Tranent Town Centre Improvements**	One-way system in town centre. See **Error! Reference source not found.** for indicative proposals.
PROP T3: **Active Travel Corridor**	Segregated walk and cycle route extending from Musselburgh to Dunbar via Blindwells and Haddington. See **Error! Reference source not found.** for indicative alignment.
A1 QMU All-Ways Interchange	Addition of westbound on and off slips. This intervention will be allocated to specific development allocations in the Proposed Plan and will not be included in the wider ELLDP package where developer contributions will be sought (see Section 4.8).
Ashgrove Underpass, Dunbar	New walk and cycle link under railway line linking community facilities & developments. This intervention will be allocated to specific development allocations in the Proposed Plan

	and will not be included in the wider ELLDP package where developer contributions will be sought (see Section 4.8).

3.7.3 Review of the SRM12 and MTTM forecast road networks indicated a very fine balance of route choice in the Wallyford area (routing between Edinburgh and Strawberry Corner via the A1 Dolphingstone Interchange or A1 Salters Interchange) between both modelling approaches. This influences the determination on whether ELLDP mitigation is required at the A1 intersections at Salters Road and/or Dolphingstone. The SRM12 modelling, presented in Appendix A, identified a requirement for mitigation at Salters Road. The MTTM modelling, presented in Appendix B, identified a requirement for mitigation at Dolphingstone. Based on increased traffic stress levels, mitigation is included at both locations to ensure the ELLDP is deliverable.

3.7.4 A new rail station was appraised within SRM12 and analysis of predicted rail passenger trips making use of the station indicated that this would predominantly be used by residents and employees of the Blindwells development site, thus helping reduce potential car-based trips; a principle objective of the Transport Appraisal. However, it should also be noted that the delivery of this intervention would be dependent on the support of Transport Scotland, Network Rail and/or ScotRail. Therefore, it has been included as aspirational within the ELLDP, with the new station intervention allocated to the Blindwells site. Given this aspirational status, this intervention has not been included in the mitigation package that is appraised in Chapter 4.

Figure 3.1 Old Craighall Junction Improvements Indicative Layout

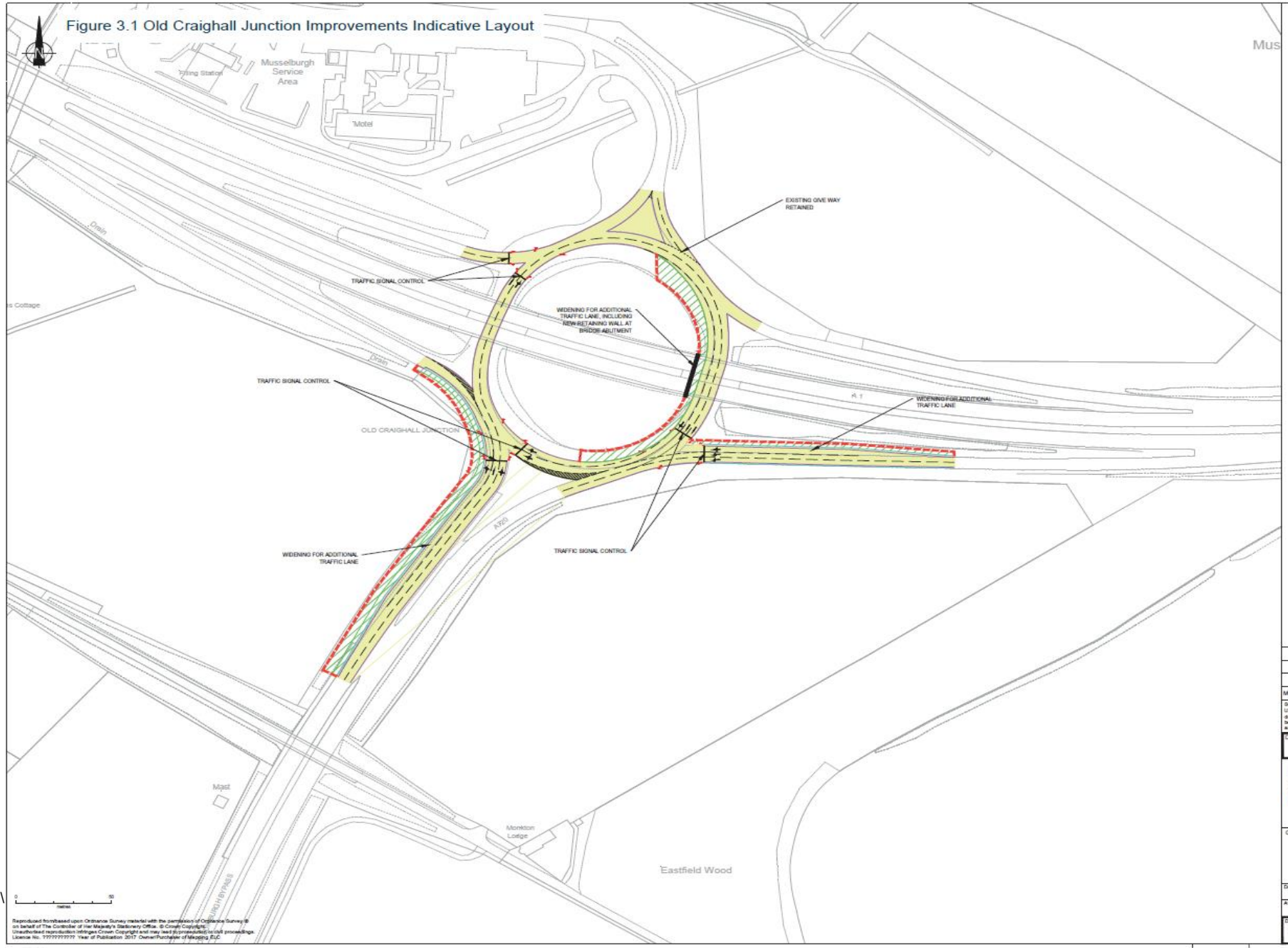


Figure 3.2 A1 Interchange Improvements (Dolphingstone Interchange) Indicative Layout

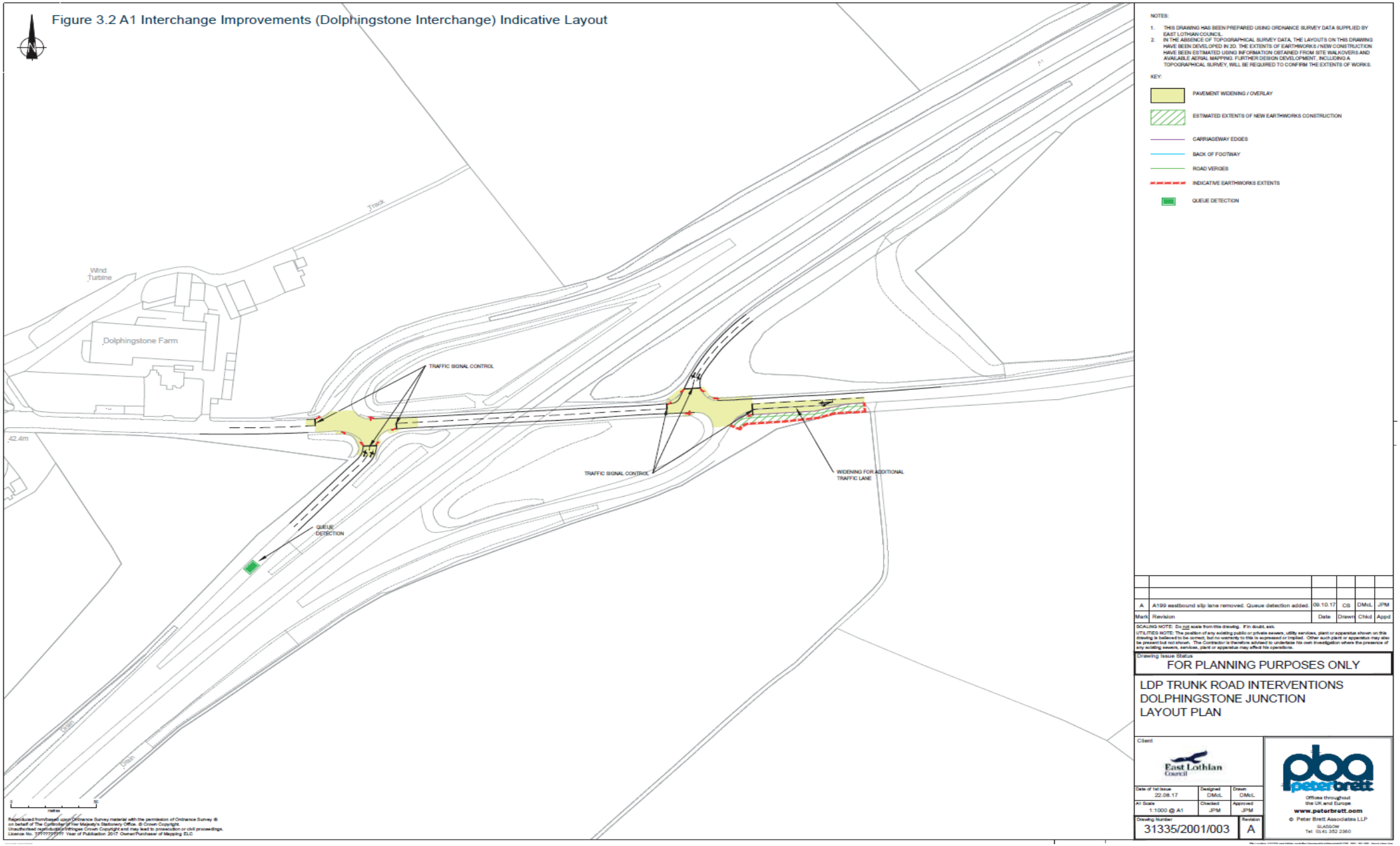


Figure 3.3 A1 Interchange Improvements (Salters Road Interchange) Indicative Layout

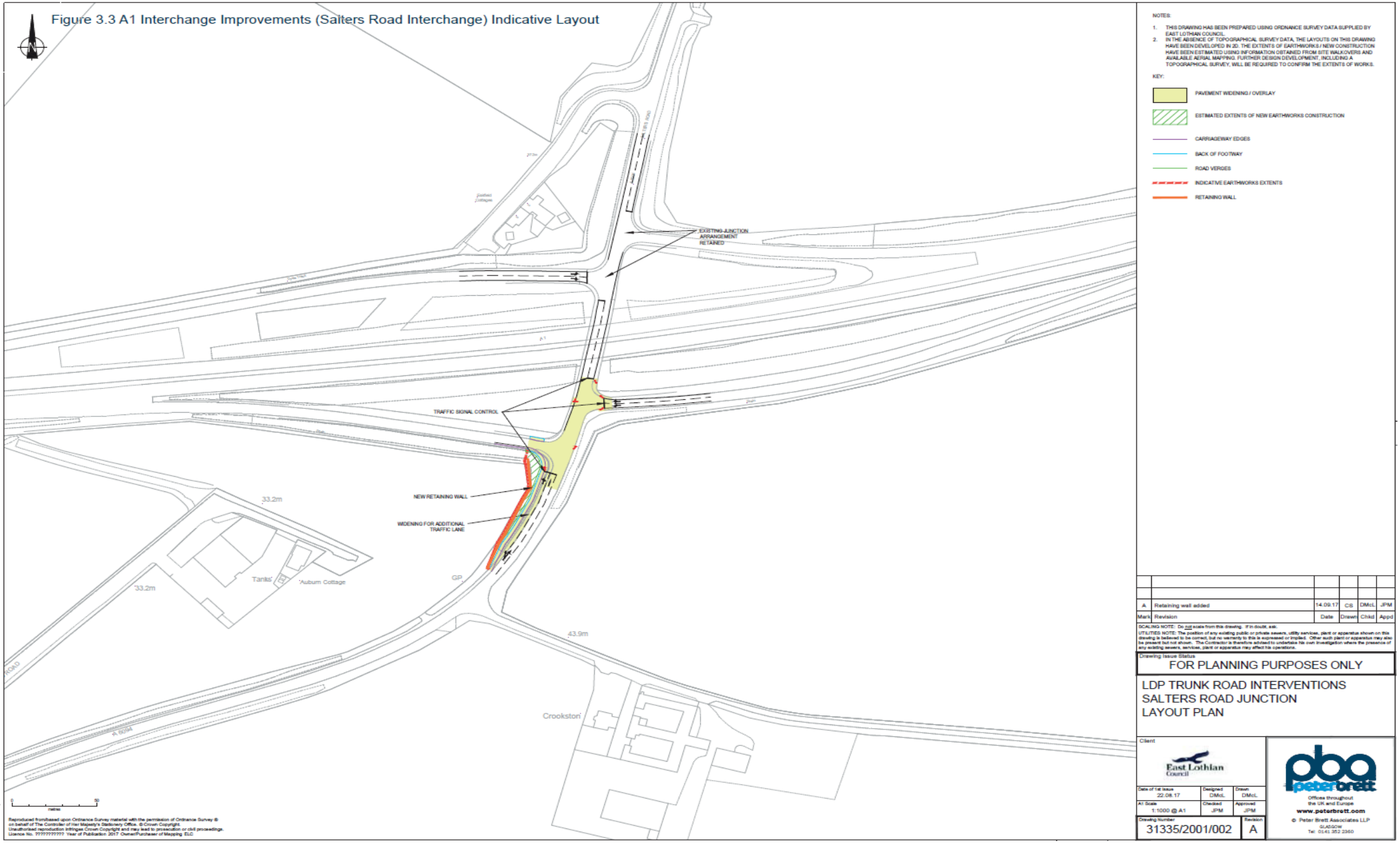
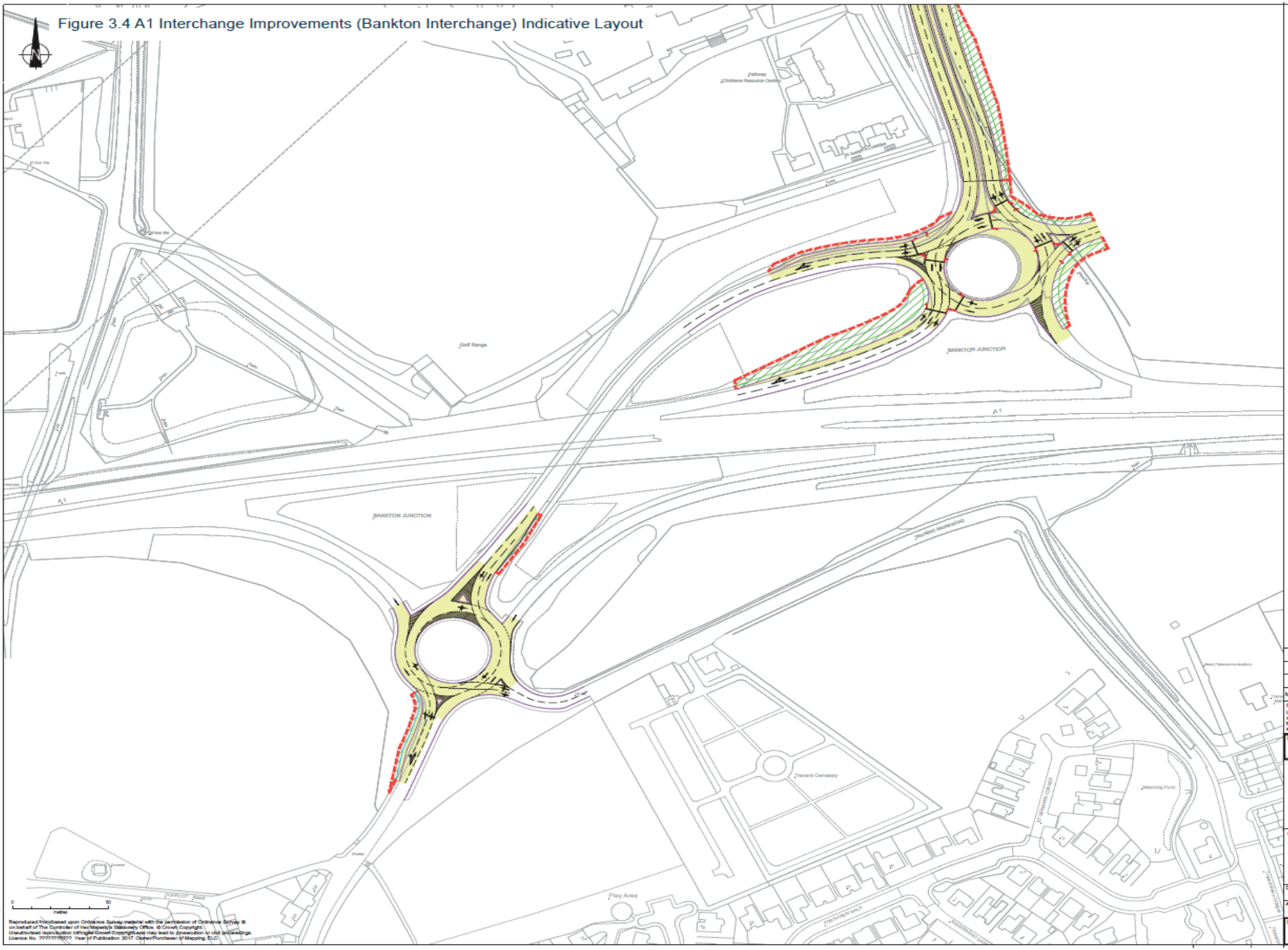


Figure 3.4 A1 Interchange Improvements (Bankton Interchange) Indicative Layout



NOTES:

1. THIS DRAWING HAS BEEN PREPARED USING ORDNANCE SURVEY DATA SUPPLIED BY EAST LOTHIAN COUNCIL.
2. IN THE ABSENCE OF TOPOGRAPHICAL SURVEY DATA, THE LAYOUTS ON THIS DRAWING HAVE BEEN DEVELOPED IN 2D. THE EXTENTS OF EARTHWORKS / NEW CONSTRUCTION HAVE BEEN ESTIMATED USING INFORMATION OBTAINED FROM SITE WALKOVERS AND AVAILABLE AERIAL MAPPING. FURTHER DESIGN DEVELOPMENT, INCLUDING A TOPOGRAPHICAL SURVEY, WILL BE REQUIRED TO CONFIRM THE EXTENTS OF WORKS.

KEY:

- PAVEMENT WIDENING / OVERLAY
- ESTIMATED EXTENTS OF NEW EARTHWORKS CONSTRUCTION
- CARRIAGEWAY EDGES
- BACK OF FOOTWAY
- ROAD VERGES
- INDICATIVE EARTHWORKS EXTENTS

Mark	Revision	Date	Drawn	Chkd	Appd

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Drawing Issue Status
FOR PLANNING PURPOSES ONLY

LDP TRUNK ROAD INTERVENTIONS
BANKTON JUNCTION
LAYOUT PLAN

Client: East Lothian Council

Date of 1st Issue	Designed	Drawn
22.08.17	DMcL	DMcL
A1 Scale	Checked	Approved
1:1000 @ A1	JPM	JPM

Drawing Number: 31335/2001/004
Revision: -

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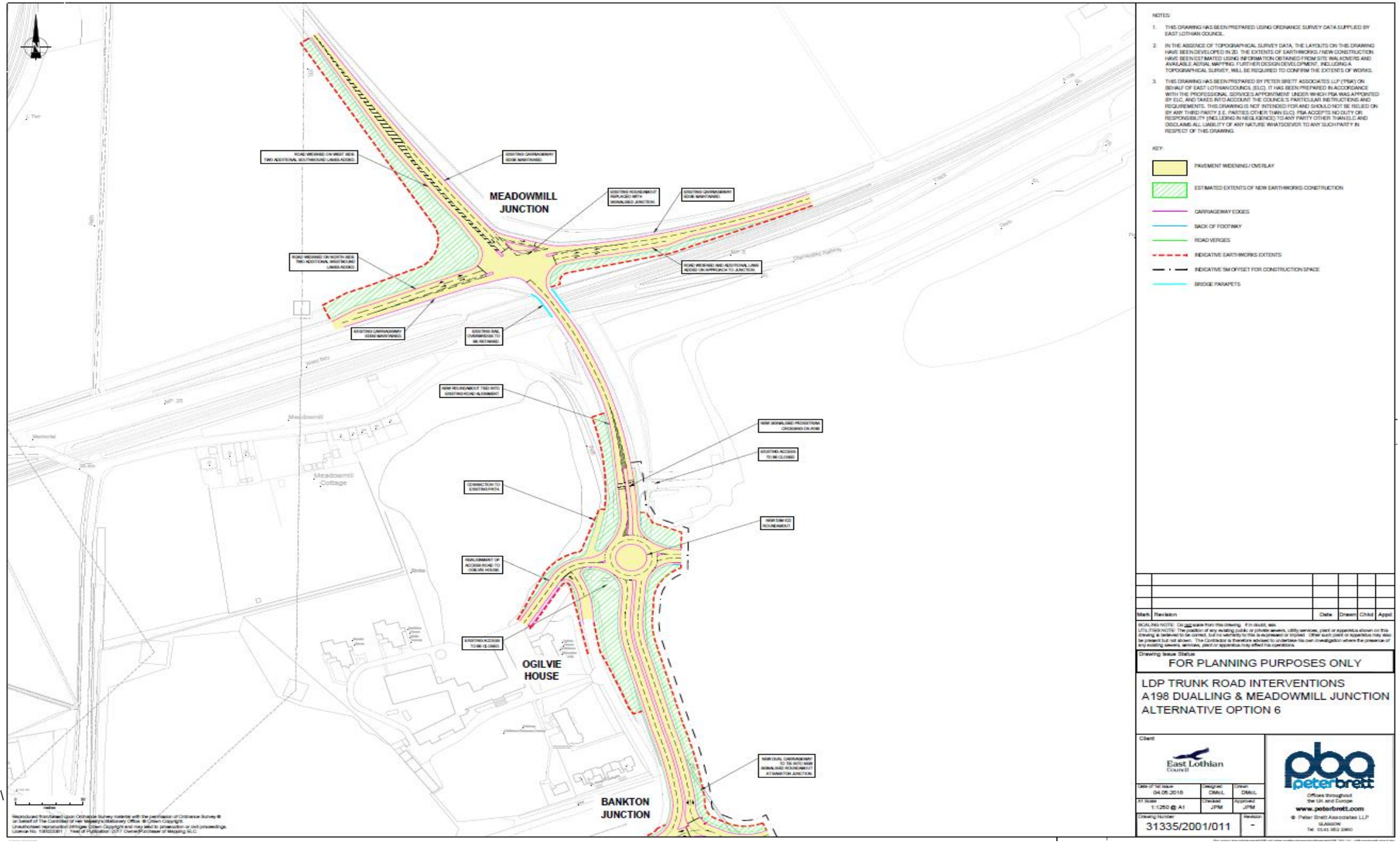
MEADOWMILL JUNCTION
OGILVIE HOUSE
BANKTON JUNCTION
Meadowmill Cottage
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KEY:
PAVEMENT WIDENING / OVERLAY
ESTIMATED EXTENTS OF NEW EARTHWORKS CONSTRUCTION
CARRIAGEWAY EDGES
BACK OF FOOTWAY
ROAD VERGES
INDICATIVE EARTHWORKS EXTENTS
INDICATIVE 5M OFFSET FOR CONSTRUCTION SPACE
BRIDGE PARAPETS
Mark Revision Date Drawn Chkd Appd
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LDP TRUNK ROAD INTERVENTIONS
A198 DUALLING & MEADOWMILL JUNCTION
ALTERNATIVE OPTION 6
Client
East Lothian Council
Date of 1st Issue 04.05.2018
Designed DMcL
Drawn DMcL
At Scale 1:1250 @ A1
Checked JPM
Approved JPM
Drawing Number 31335/2001/011
Revision -
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Figure 3.6 Musselburgh Town Centre – Indicative Proposals

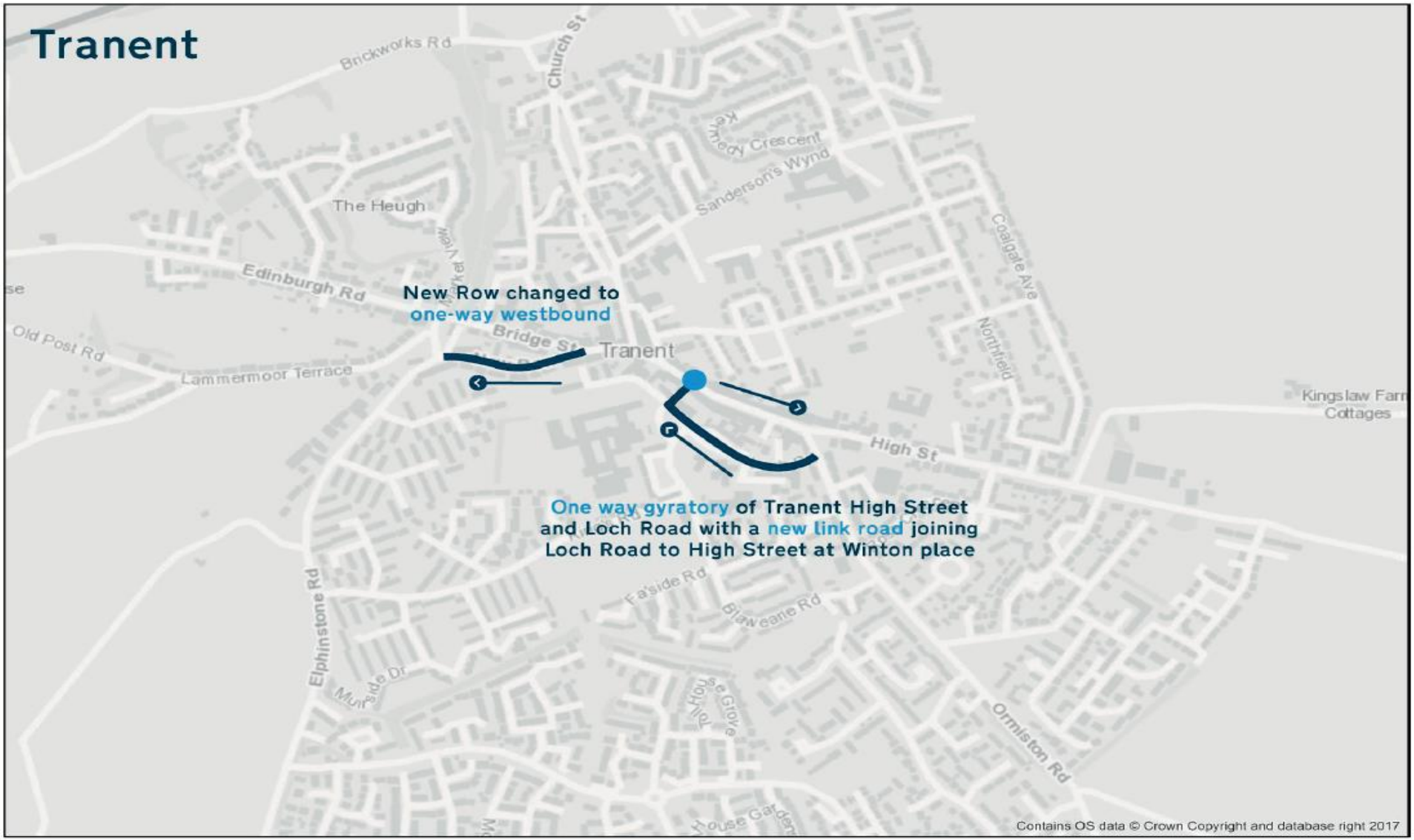

Figure 3.7 Tranent Town Centre – Indicative Proposals

Figure 3.8 **Active Travel Corridor – Indicative Alignment**

4 Appraisal of ELLDP Transport Mitigation

4.1 Appraisal Concept

4.1.1 The purpose of the appraisal is to objectively and consistently measure the potential for transport options to mitigate the impacts of the ELLDP. This Chapter provides the appraisal notes relating to the completion of a STAG Part 1 for DPMTAG assessment of the mitigation scenario options that have been identified.

4.1.2 Although the appraisal has primarily been completed on a qualitative basis, it is supported by SRM12 and MTTM modelling outputs. Appendix A describes the SRM12 modelling that was undertaken, including outputs that inform the Appraisal. Appendix B describes the modelling that was undertaken using the MTTM to inform the Appraisal.

4.1.3 In line with STAG best practice, the appraisal has concentrated on the defined Transport Planning Objectives (TPOs) and the five Government Objectives as well as considerations relating to feasibility, affordability and public acceptance. The Government Objective assessment includes appraisal against the topics of Environment, Safety, Economy, Accessibility and Social Inclusion, and Integration.

4.1.4 The appraisal of the scenario options was completed using a seven-point-scale assessment, considering the relative size and scale of impacts as outlined below:

- Major benefit (represented by ✓✓✓): these are benefits or positive impacts which, depending on the scale of cost or severity of impact, the practitioner should take into consideration when assessing an option's eligibility.
- Moderate benefit (represented by ✓✓): the option is anticipated to have a moderate benefit or positive impact. Moderate benefits and impacts are those which taken in isolation may not determine an option's eligibility, but taken together do so.
- Minor benefit (represented by ✓): the option is anticipated to have only a small benefit or positive impact. Minor benefits or impacts are those which are worth noting, but the practitioner considers are not likely to contribute materially to determining whether an option is taken forward.
- No benefit or impact (represented by =): the option is anticipated to have no or negligible benefit or negative impact.
- Minor cost or negative impact (represented by ✗): the option is anticipated to have only a minor disbenefit or negative impact. Minor disbenefits or impacts are those which are worth noting, but the practitioner considers are not likely to contribute materially to determining whether an option is taken forward.
- Moderate cost or negative impact (represented by ✗✗): the option is anticipated to have a moderate disbenefit or negative impact. Moderate disbenefits/negative impacts are those which taken in isolation may not determine an option's eligibility, but taken together could do so.
- Major cost or negative impacts (represented by ✗✗✗): these are disbenefits or negative impacts which, depending on the scale of cost or severity of impact, the practitioner should take into consideration when assessing an option's eligibility.

4.2 Transport Planning Objectives

4.2.1 This section of the document assesses how well the package of mitigation interventions meets the defined transport planning objectives for the ELLDP, which are detailed in Section 2.3.

TPO1

To deliver development that is well-served by a range of transport modes, particularly public transport and active travel opportunities

4.2.2 In order to assess TPO1, data was extracted from SRM12, and is presented in Section A.3 in Appendix A. Based on the SRM12 outputs, Table 4.1 summarises the Key Performance Indicators (KPIs) for TPO1.

Table 4.1 TPO1 – Performance against KPIs

Model	KPI	Target	Impact	Summary
SRM12	Trip productions and attractions by mode and zone, over 12-hour period	Reduce levels of car use and increase use of PT and sustainable modes relative to defined baseline.	The mitigation interventions do not significantly impact on modelled trip productions or attractions and do not reduce overall travel demand. It should be noted that the SRM12 does not include the impact of the Active Travel Corridor, which is expected to reduce the demand for local motorised trips.	=
SRM12	PT mode share, over 12-hour period		The mitigation is predicted to increase overall public transport mode share, but by a minor amount.	✓
SRM12	Passenger boarding and alighting volumes on Edinburgh North Berwick line		Moderate increase in rail boarding and alighting, with growths in the order of 15-20%. However, given the minor mode shift to PT this is mostly abstraction from bus so could only be considered a minor positive impact	✓
SRM12	Park & Ride site occupancies		No significant change	=

4.2.3 Overall, TPO1 is assessed as having an overall **minor positive** (✓) impact.

TPO2

To locate new development to reduce the need to travel

4.2.4 In order to assess TPO2, data was extracted from SRM12, and is presented in Section A.3 in Appendix A. Based on the SRM outputs, Table 4.2, summarises the Key Performance Indicators (KPIs) for TPO2.

Table 4.2 TPO2 – Performance against KPIs

Model	KPI	Target	Impact	Summary
SRM12	Vehicle distance on key corridors and sectors	Reduce traffic levels relative to defined baseline and not increase overall combined car and PT person kilometres on the transport network.	Traffic re-routes to A1 from A199 and A198, reducing traffic on urban and rural single carriageway roads. However, the modelled mitigation interventions do not reduce overall travel demand. It should be noted that the SRM12 does not include the impact of the Active Travel Corridor, which is expected to reduce the demand for local motorised trips off-setting predicted increases.	=
SRM12	Passenger distance on key corridors and sectors		SRM12 predicts an increase in rail passenger mileage with the mitigation interventions. However, this is mostly abstraction from bus.	=

4.2.5 Overall, TPO2 is assessed as having a **neutral** (=) impact.

TPO3

To mitigate the impacts of new development on transport infrastructure and maintain appropriate network performance

4.2.6 In order to assess TPO3, data was extracted from SRM12 and MTTM and is presented in Section A.3 in Appendix A and Section B.3 in Appendix B respectively. This is summarised in

4.2.7 Table 4.3, which summarises the Key Performance Indicators (KPIs) for TPO3.

Table 4.3 TPO3 – Performance against KPIs

Model	KPI	Target	Impact	Summary
SRM12	Average vehicle speeds on key corridors and sectors in area	maintain or increase road speeds and reduce delays relative to defined baseline	A small increase in 12-hour average speed is predicted as a result of introducing mitigation interventions. This indicates a minor positive impact in terms of reducing delays.	✓
SRM12	Ratio of (traffic) flow to capacity (RFC)	maintain or reduce RFCs	Moderate reduction in RFCs at Old Craighall, Salters Road and Bankton.	✓✓
SRM12	Rail crowding levels – North Berwick to Musselburgh	manage or reduce rail crowding	Minor improvements to peak rail crowding on peak services where increased demand takes up additional provided capacity.	✓

SRM12	Car and bus journey times to/from Edinburgh city centre	maintain or reduce car and bus journey times	Small increase in road journey time between East Lothian sectors and Central Edinburgh.	✗
MTTM	Vehicle journey time, and speeds on key routes	maintain or increase road speeds and reduce delays relative to defined baseline	Moderate reduction in vehicle journey time and increase in vehicle speed on A199.	✓
MTTM	Queues at key junctions		A mixture of increases and decreases in junction queues and corresponding delay.	=

A.1.1 In general, SRM12 and MTTM predict that the network is likely to operate satisfactorily in the 'With ELLDP Including Mitigation' scenario. While there are some locations predicted to experience additional congestion or delays, this is not unexpected given the general increase in travel demand associated with the level of ELLDP development. A sector analysis showing the change in average vehicle speed by sector, with the introduction of the ELLDP and the mitigation measures is presented in Table A.7 and Table A.20 in Appendix A. This indicates a reduction in average vehicle speed with the introduction of the ELLDP due to increased congestion from the increased demand on the network, particularly in the areas of Musselburgh, Wallyford, Tranent and Prestonpans. The introduction of the mitigation measures alleviates some of this congestion, however, not below the level of the vehicle speeds without the ELLDP.

4.2.8 Given the focus on sustainable travel in terms of the ELLDP objectives and the predicted acceptable network performance, it is considered that further enhancements to the road network would not be merited.

4.2.9 Overall, TPO3 is assessed as having a **minor positive** (✓) impact.

4.2.10 Table 4.4 provides a summary of the appraisal of the ELLDP Transport Mitigation against the defined Transport Planning Objectives (TPOs) based on the KPIs assessment presented above.

Table 4.4 Overview of TPOs Appraisal

TPO	Impact	Summary
TPO1: to deliver development that is well-served by a range of transport modes, particularly public transport and active travel opportunities	The mitigation is expected to overall increase public transport share, but by a minor amount. In addition, the Active Travel Corridor is expected to reduce the demand for local motorised trips.	✓
TPO2: to locate new development to reduce the need to travel	The mitigation is expected to have an overall negligible impact where the Active Travel Corridor is expected to reduce forecast increases in travel demand.	=
TPO3: to mitigate the impacts of new development on transport infrastructure and maintain appropriate network performance	In general, the SRM and local traffic modelling indicates that the network is predicted to operate satisfactorily and that the mitigation interventions have a minor positive impact.	✓

4.3 Environment

4.3.1 For the environmental appraisal, at the Part 1 Appraisal stage, a qualitative assessment is made which considers the relative size and scale of option impacts. In this Appraisal, we have provided a broad assessment using the seven-point scale assessment, considering the following environmental sub-criteria:

- Noise and vibration;
- Global air quality - carbon dioxide (CO2);
- Local air quality - particulates (PM10) and nitrogen dioxide (NO2);
- Water quality, drainage and flood defence;
- Geology;
- Biodiversity and habitats;
- Landscape;
- Visual amenity;
- Agriculture and soils; and
- Cultural heritage.

4.3.2 This represents an overview which can be used to highlight the need for more detailed investigation and appraisal in the future.

4.3.3 Total network emissions in terms of CO2, Nitrous Oxide and PM10 have been estimated using the MTTM and these are presented in Section B.6 in Appendix B.

4.3.4 Table 4.5 provides an overview of the appraisal of anticipated environmental impacts of the mitigation interventions.

Table 4.5 Environmental Appraisal

Sub-Criteria	Likely Impact of Mitigation	Summary
Noise and vibration	The mitigation results in a reduction in vehicle traffic within urban areas.	✓
Global air quality - carbon dioxide (CO2);	The SRM12 modelling indicates that the mitigation interventions are predicted to increase overall vehicle distance, which is likely to result in increased CO2 emissions.	x
Local air quality - particulates (PM10) and nitrogen dioxide (NO2);	The mitigation interventions are expected to result in a reduction in vehicle traffic within urban areas, with re-routing of traffic onto the A1. This is expected to provide a benefit in terms of improved air quality in urban areas. AIRE analysis of model outputs indicates specific benefits to the Musselburgh High St AQMA (see Table B.9 in Appendix B)	✓
Water quality, drainage and flood defence	No specific impacts anticipated	=
Geology	No specific impacts anticipated	=
Landscape	The schemes are not expected to have an effect on landscape as most of the mitigation interventions are alterations to existing infrastructure.	=

Visual Amenity	The schemes are not expected to have an effect on visual amenity, as most of the mitigation interventions are alterations to existing infrastructure. The new grade separated junction at Queen Margaret University may have a small visual impact though this would be in the context of significant development in the immediate area.	=
Agriculture and soils	Widening of roads at Old Craighall and Bankton and the new grade separated junction at Queen Margaret University would result in a small loss of agricultural land.	×
Cultural Heritage	There are some small potential cultural heritage impacts at the Old Craighall and Bankton junctions and along the route of the Active Travel Corridor, however, these are likely to be mitigated against with only minor negative impacts. The Old Craighall junction is within the site of the Battle of Pinkie Cleugh. In addition, there are several historical earthworks at the site of the Old Craighall roundabout (Historic Environment Record: MEL213). The Bankton Grade Separated junction is at the site of the Battle of Prestonpans. There is a historic colliery (Canmore ID: 101301) at the western arm of the northern Bankton roundabout, which would be expanded as part of the mitigation interventions. The Segregated Active Travel Corridor also passes a number of historical buildings, as well as passing in the vicinity of historical collieries, field boundaries and historical earthworks.	×

4.3.5 The net environmental impact of the scheme is a **minor negative** (×) impact.

4.4 Safety

4.4.1 The safety objective includes appraisal against two sub-criteria as follows:

- **Accidents** - identifying which, if any, user groups may be affected and develop projections of what will be the likely impact of each option; and
- **Security** - considering whether each option has any material impact for users.

4.4.2 For this Appraisal, only accidents occurring on the road network are considered, as per STAG guidance. SRM12 model outputs, as reported in Appendix A, were used to consider the impact of changes in vehicle flows on the road network and how this is anticipated to affect accidents.

4.4.3 SRM12 predicts that the proposed mitigation interventions result in a marginal overall increase in vehicle distance, which may indicate an increase in road accidents. However, re-routing of traffic on to the A1 dual carriageway, with anticipated lower accident rates, away from local urban and rural roads, such as the A199 and A198, is predicted to **reduce** the overall number of accidents. The signalisation of roundabouts at Bankton and Old Craighall is also expected to provide a safety benefit, as evidence suggests that fewer accidents occur at signalised roundabouts compared to non-signalised roundabouts. Overall, Safety is assessed as being overall a **minor positive benefit** (✓).

4.4.4 There are no security impacts predicted from the proposed mitigation interventions and, hence, Security is assessed as being **neutral** (=).

4.5 Economy

4.5.1 The economy objective covers three sub-criteria:

- **Transport Economic Efficiency (TEE)** - covers the benefits ordinarily captured by standard cost-benefit analysis – the transport impacts of an option
- **Wider Economic Benefits (WEBs)** – relate to the notion of potential transport impacts on agglomeration and the relationship between agglomeration and productivity. This is not included in initial Part 1 Appraisal and practitioners should note that it is likely that Appraisal of this sub-criterion should only be completed in Part 2 Appraisal;
- **Economic Activity and Location Impacts (EALIs)** - allows the impact of an option to be expressed in terms of their net effects on the local and/or national economy

4.5.2 Table 4.6 provides an overview of the appraisal of anticipated economic impacts of the mitigation interventions.

Table 4.6 TEE Appraisal

Sub-Criteria	Likely Impact of Mitigation	Summary
Travel Time Savings	The mitigation interventions are expected provide a minor overall reduction in travel times	✓
User Charges	No expected Impact	=
Vehicle Operating Costs	The small increase in overall vehicle distance predicted by SRM12, suggest a small increase in overall vehicle operating costs	×
Quality benefits to transport users:	No expected impact	=
Reliability benefits to transport users:	SRM12 predicts reductions in queuing at major junctions and in rail crowding. This is expected to improve journey time reliability	✓
Investment costs	No expected impact	=
Operating and maintenance costs	An increase in the number of carriages may increase maintenance costs for train operating companies	×
Revenues	The increase in rail passengers, predicted by SRM12, is expected to increase fare revenue for train operating companies	✓
Grant and subsidy payment	No expected impact	=

4.5.3 Overall, Transport Economic Efficiency is assessed as having a **minor positive benefit** (✓).

4.5.4 In line with a STAG Part 1 Appraisal, WEBs are not considered here.

4.5.5 In terms of Economic Activity and Location Impacts (EALI), increased road and rail capacity will improve access to sites in East Lothian. This may improve employment access and increase investment within East Lothian. In particular, expanding the grade separated junction at Queen Margaret University may improve access to jobs and education. Overall, EALI is assessed as having a minor benefit (✓)

4.6 Accessibility and Social Inclusion

4.6.1 The Accessibility and Social Inclusion Criterion covers two sub-criteria:

- **Community Accessibility** - includes consideration of the public transport network coverage and local accessibility – essentially opportunities to walk or cycle to services or facilities.
- **Comparative Accessibility** – includes consideration of people groups and the needs of any socially excluded groups, and geographic consideration of locations relative to proposed interventions

4.6.2 In terms of Community Accessibility, the proposed improvements to rail stations are expected to enhance access by public transport to jobs, education and services via alternative modes, although this is expected to be a relatively minor impact relating to the relief of crowding. The proposed Segregated Active Travel Corridor should improve travel accessibility for pedestrians and cyclists to local facilities as well as public transport services for a large number of existing communities and adjacent residential developments. Overall, Community Accessibility is overall assessed as having a **moderate positive benefit** (✓✓).

4.6.3 In terms of Comparative Accessibility, the mitigation benefits are spread across a variety of user groups including road and rail users where proposed interventions on the strategic network are expected to benefit locations across East Lothian. The Segregated Active Travel Corridor and rail station improvements are expected to benefit all users, particularly groups who do not have access to private vehicles, such as low income groups or seniors. Overall, Comparative Accessibility is overall assessed as having a **moderate positive benefit** (✓✓)

4.7 Integration

4.7.1 The Integration Criterion covers three sub-criteria:

- **Transport Integration** – relates to the degree to which the mitigation interventions fit with other transport infrastructure and services;
- **Transport and Land-Use Integration** – relates to the fit between the option and land-use plans and land-use/transport planning guidance
- **Policy Integration** – relates to the appropriateness of the option in light of wider policies including those of both Central and Local Government

4.7.2 Table 4.7 provides an overview of the appraisal of anticipated integration impacts of the mitigation interventions.

Table 4.7 Integration Appraisal

Sub-Criteria	Likely Impact of Mitigation	Summary
Transport Integration	The level of transport integration is unlikely to be impacted by the proposed mitigation interventions.	=
Transport and Land-Use Integration	The proposed mitigation interventions include schemes specifically designed to support sustainable transport access from new developments, such as the Dunbar to Musselburgh Segregated Active Travel Corridor. This is in accordance with established planning policy and should promote sustainability and reduce the overall need to travel by motorised modes.	✓✓

Policy Integration	National and local policy supports a shift from car to public transport and active travel. The mitigation interventions include improved provision for rail and active travel, but also measures which make car measures. Thus, although the mitigation facilitates the policy goal of facilitating improved accessibility and economic growth, it may have a negative effect in terms of environmental objectives for promoting greener transport and improving air quality.	=

4.8 Feasibility, Affordability and Public Acceptability

4.8.1 At a STAG Part 1 appraisal stage, feasibility, affordability, and public acceptability are considered on a qualitative basis as follows:

- Feasibility – a preliminary assessment of the feasibility of construction or implementation and operation (if relevant) of an option and the status of its technology (e.g. proven, prototype, in development, etc.) as well as any cost, timescale or deliverability risks associated with the construction or operation of the option, including consideration of the need for any departure from design standards that may be required.
- Affordability – the scale of the financing burden on the promoting authority and other possible funding organisations and the risks associated with these should be considered together with the level of risk associated with an option's ongoing operating or maintenance costs and its likely operating revenues (if applicable).
- Public Acceptability – the likely public response at this initial appraisal phase.

4.8.2 For this Appraisal, we have assessed these criteria over three levels: minor, moderate or major considerations. Scorings of moderate or major considerations should not necessarily lead to a rejection of these options, however, further analysis of these issues will need to be explored if options are taken forward.

Feasibility

4.8.3 An initial consideration of deliverability in terms of the feasibility of the interventions has been completed. This has identified where further work on the conceptual interventions is required to deliver them. However, no significant impacts were identified at this stage. Overall the ELLDP transport interventions are judged to have a **minor feasibility impact**.

Affordability

4.8.4 High-level costings have been estimated at this stage until more detailed feasibility assessment is undertaken and the potential for schemes to be taken forward has been fully investigated. Table 4.8 shows the indicative high-level cost estimates for the short-list of interventions.

Table 4.8 ELLDP Intervention Cost Estimates

Intervention	Indicative Cost
PROP T15: **Old Craighall A1(T)** Junction Improvements	£995,000
PROP T17: **Salters Road\A1(T)** Interchange Improvements	£272,000
PROP T17: **Dolphingstone\A1(T)** Interchange Improvements	£256,000

PROP T17: **Bankton Interchange\A1(T)** Interchange Improvements and **A198** Junction	£848,767
PROP T17: **Meadowmill Roundabout** Junction Improvements	£747,000
PROP T9 + PROP T10: **Rail Station Package**	£4,369,000
PROP T21: **Musselburgh Town Centre Improvements**	£283,000
PROP T27 & T28: **Tranent Town Centre Improvements**	£449,000
PROP T3: **Active Travel Corridor**	£23,400,000
Total	**£31,619,767**

Note: PROP T9 + PROP T10: Rail Station Package includes estimated costs associated with the lengthening of platforms to cater for 8-car train sets from 6-car train sets. It is considered that the increase of platforms to cater for 6-car train sets is a committed scheme and would carry an additional estimated cost (to that quoted here) of £638,000. It also includes car park extensions at Longniddry and Drem stations but excludes ScotRail rolling stock changes and schemes allocated to specific development allocations.

4.8.5 The following points should be noted in relation to the cost estimates:

- Cost estimates have been prepared to a 2016 cost base where cost rates have been obtained from 'SPON's Civil Engineering and Highway Works Price Book 2016';
- Where appropriate cost rates are not available in SPON's, they have been sourced from relevant experience that is representative of the present competitive market;
- An estimated indicative allowance has been included for future design and investigation works, which varies between 5% and 15% of total construction costs, depending on the scale and complexity of the proposals;
- The estimates do not include any costs associated with land purchase, remediation of contaminated land, unstable ground conditions, diversion of utilities, statutory and non-statutory approvals, and contract management; and
- The indicative costs exclude Optimism Bias. When proposals are taken forward to feasibility stage of scheme development, which corresponds to 'STAG Stage 1: Programme Entry' (STAG Technical Database, Section 13), an Optimism Bias of 44% would be applied.

Developer Contributions

4.8.6 A critical aspect of the Proposed Plan in terms of deliverability is the definition of a funding mechanism that links land-use development to the associated transport options. This is required to demonstrate that development related capacity constraints on the transport network can be alleviated and associated interventions funded, specifically in terms of developer contributions. For this, ELC have prepared a developer contribution mechanism with defined contribution zones and the apportionment of developer obligations based on SRM12 travel demand data. The purpose of contribution zones is to facilitate a way of addressing cumulative impact equitably across different sites and time periods.

4.8.7 Contribution zones were identified for each intervention included in the recommended package, where each intervention was identified as a requirement to address the impacts of more than one development. Any net impacts were quantified as a direct result of the development proposed and are mitigated based on nil net detriment. Such an approach is consistent with government guidance and commensurate in scale and kind with the proposed development.

4.8.8 Contribution zones were based on logical and likely travel patterns of usage of the road and public transport networks verified largely by a high-level assessment of likely travel movements identified using SRM. The zones seek to apportion obligations relative to the costs within that zone and the relative impact (location) of new development.

4.8.9 This approach ensures that strategic growth set out within the ELLDP is provided for and smaller allocations for housing and employment uses are accommodated in a proportionate manner. The principle of this methodology is accepted within transport planning in so far as the closer a development is to a 'congestion hot spot' the greater the impact and need for mitigation. Accordingly, transport contribution zones were configured to reflect infrastructure need and to reflect anticipated additional total transport pressures from new development.

'Windfall' Sites

4.8.10 It is not possible to identify all circumstances in which a developer contribution may be required to provide an intervention in the Transport Appraisal assessment process. Further assessments may be necessary to identify mitigations during the Development Management process. This will explicitly consider 'windfall' development and the availability or ability to provide additional capacity for windfall proposals in addition to that required for LDP sites. This will be assessed on a case by case basis. Such proposals will not be supported if they would undermine LDP sites. Similarly, if windfall proposals are dependent on the provision of infrastructure capacity from uncommitted projects, a lack of certainty over the timing for provision of such capacity may make windfall proposals unacceptable in planning terms.

Impact

4.8.11 Overall, the mitigation interventions are judged to have a **major affordability impact** where significant funding will be required to deliver the identified schemes. Developer contributions will provide approximately 38.3% of the funding for these schemes, approximately £12,624,130 out of the total £32,956,000 cost for ELLDP schemes (excluding schemes allocated to specific development allocations). The shortfall will require to be sourced from ELC budgets, central Government, and/or other funding sources such as the emerging City Deal for South East Scotland. This will need to be clarified in order to deliver the ELLDP. There are no significant expected on-going costs beyond the initial delivery of the interventions, and these should be affordable within existing budgets.

4.8.12 It is important to note that some aspects of the proposed mitigation will be funded and delivered by ELC as the cumulative delivery of the LDP emerges, as follows:

- PROP T17: **Dolphingstone\A1(T)** Interchange Improvements;
- PROP T17: **Bankton Interchange\A1(T)** Interchange Improvements and **A198** Junction; and
- PROP T17: **Meadowmill Roundabout** Junction Improvements; and

Public Acceptability

4.8.13 No major public acceptability issues have been highlighted for the mitigation interventions. The mitigation measures involve widening at existing junctions and improvements to an existing railway line, rather than wholly new roads and junctions. There may be minor acceptability issues for residents living nearby to the sites, as the mitigation interventions and associated development will attract increasing through traffic near to their homes. Overall the ELLDP transport interventions are judged to have a **minor public acceptability impact**.

4.9 Appraisal Overview

4.9.1 Table 4.9 provides a summary of the DPMTAG (following STAG Part 1) appraisal described above.

Table 4.9 Overview of Appraisal

Criteria	Sub-Criteria	Mitigation Impact
Transport Planning Objectives	TPO1: to deliver development that is well-served by a range of transport modes, particularly public transport and active travel opportunities	✓
	TPO2: to locate new development to reduce the need to travel	=
	TPO3: to mitigate the impacts of new development on transport infrastructure and maintain appropriate network performance	✓
Environment	Noise and vibration	✓
	Global air quality - carbon dioxide (CO2);	×
	Local air quality - particulates (PM10) and nitrogen dioxide (NO2);	✓
	Water quality, drainage and flood defence	=
	Geology	=
	Landscape	=
	Visual Amenity	=
	Agriculture and soils	×
	Cultural Heritage	×
	Noise and vibration	✓
Safety	Accidents	✓
	Security	✓
Economy	Transport Economic Efficiency	✓
	Economic Activity and Location Impacts	✓
Accessibility	Community Accessibility	✓✓
	Comparative Accessibility	✓✓
Integration	Transport	=
	Transport & Land-use	✓✓
	Policy	=
Feasibility, Affordability and Public Acceptance	Feasibility	**Minor**
	Affordability	**Major**
	Acceptability	**Minor**

4.9.2 This indicates an overall **minor to moderate positive impact** is expected from the proposed ELLDP mitigation interventions. Affordability is considered to be a major impact where clarification is required on the funding sources for the mitigation interventions where developer contribution will only make up part of the required delivery costs.

5 Conclusions

5.1 Summary

5.1.1 This Report has detailed the appraisal of the emerging ELLDP Transport Options, which has been undertaken following the steps laid out in Transport Scotland's Development Planning and Management Transport Appraisal Guidance (DPMTAG).

5.1.2 A 2024 'Do Minimum' scenario without the ELLDP land allocations was prepared and modelled. Analysis of this model run indicated that significant pressures are predicted on the transport network before the ELLDP developments are included.

5.1.3 Based on an appraisal of the ELLDP developments and various mitigation scenario options, a package of Transport Intervention has been defined which will adequately support the delivery of the ELLDP and its objectives.

Appendix A Application of SEStran Regional Model

A.1 Overview

A.1.1 The 2012 SEStran Regional Model (SRM12) was used to inform the Appraisal of the implications of housing and economic land allocations on the transport network.

A.1.2 The SRM12 version applied is that provided from the SESplan Cross Boundary Study (CBS) Team. Some amendments were made to both network representation and the representation of the development plan scenario for East Lothian Council (ELC) to ensure that the proposed plan is suitably represented.

A.1.3 The network assessment presented in this report, undertaken using the SRM12, provides sufficient information to identify an initial list of required mitigation interventions. The application of the Musselburgh and Tranent Traffic Model (MTTM) and local junction modelling was also undertaken as part of the mitigation assessment, in particular to look at the operation of the local road network in more detail, which was not possible using the more strategic SRM12.

SRM12 Model Dimensions

A.1.4 Forecast traffic demand matrices were prepared based on SRM12 traffic forecasts for defined scenarios.

A.1.5 The SRM12 version applied is that provided from the SESplan Cross Boundary Study (CBS) Team.

A.1.6 A review of SRM12 was undertaken based on initial application and model outputs to check the suitability of the model to be used to support the ELLDP Appraisal and Assessment. Reflecting the strategic nature of the model and its intended purpose, this identified some weaknesses in terms of the relative coarseness of the zone system and road network in East Lothian. In discussion with ELC and Transport Scotland, it was considered that SRM provides sufficient information for the network assessment and to identify an initial list of required mitigation interventions supplemented later by further detail in the local traffic models.

A.1.7 Some amendments were made to both network representation and the representation of the development plan scenario for East Lothian Council to ensure that the Proposed Plan is suitably represented at the strategic level. Otherwise no changes were made to SRM12 for the ELLDP modelling assessment.

A.1.8 The SRM12 is representative of average weekday travel movements within which the following time periods are modelled:

- Average weekday (AM) morning peak: 07:00-10:00;
- Average weekday (IP) inter peak: 10:00-16:00; and
- Average weekday (PM) evening peak: 16:00-19:00.

A.1.9 Individual factors are applied by mode and period to create an ‘average’ peak hour within each peak period.

A.1.10 The model has a 2012 Base year, and a single 2024 forecast year, which has been used to represent all future year scenarios.

A.1.11 The road assignment model includes five assigned vehicle types and journey purposes as follows:

- Car In-Work;
- Car Non-Work Commuter;
- Car Non-Work Other;
- LGV; and
- HGV.

A.1.12 The PT assignment model includes three assigned PT purposes as follows:

- PT In-Work;
- PT Non-Work Commute; and
- PT Non-Work Other.

Sector System

A.1.13 For the purposes of analysing the LDP scenarios, a matrix sector system was prepared as illustrated in Figure A.1 and presented in Table A.1. A sector system combines a number of zones together for the purpose of reporting. This sector system represents East Lothian via eight sectors and aggregates the other local authorities within the SRM12 modelled area. In addition to these, the external trips (all movements to\from outwith the SRM12 area) have been included in a single sector. It should be noted that, due to the scale of the development, the Blindwells development site has been defined as an individual sector.

Figure A.1 SRM12 Zone Sector System

Table A.1 Sector System

Sector	Sector Name		Sector	Sector Name
1	East Lothian Rural		10	City of Edinburgh
2	Musselburgh & Wallyford		11	Falkirk
3	Tranent		12	Fife
4	Prestonpans & Port Seton		13	Midlothian
5	Haddington		14	Perth & Kinross
6	North Berwick		15	Borders
7	Dunbar		16	Stirling
8	Blindwells		17	West Lothian
9	Clackmannanshire		18	External

Key Corridors

A.1.14 The following key *corridors* were defined in the SRM12 for the ELLDP Appraisal:

- A199: From Haddington to Portobello;
- A1: From Haddington to Queen Margaret University;
- A198: From North Berwick to Tranent; and
- Rail: From west of Musselburgh station to North Berwick and east of Dunbar.

A.1.15 The location of these key corridors is shown in Figure A.2.

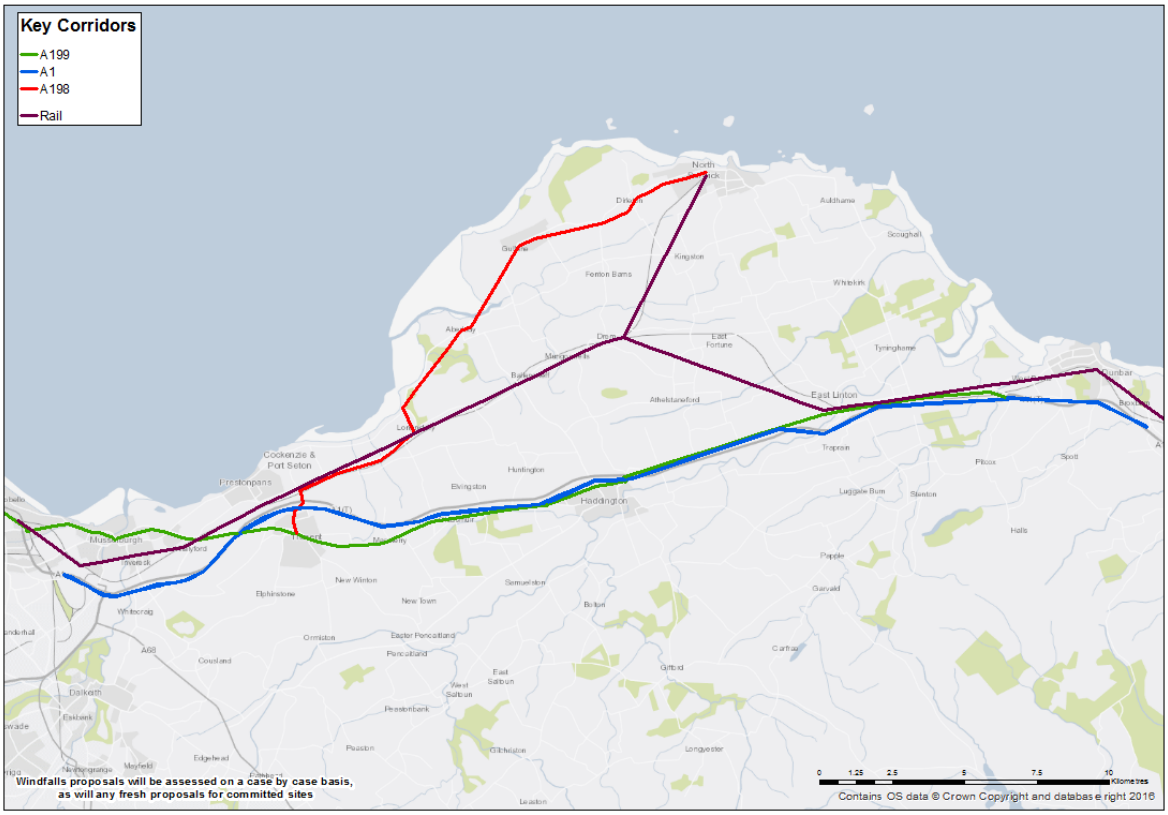

Figure A.2 SRM Key Corridors

SRM12 Observations for ELLDP

A.1.16 The initial application of SRM12 for the ELLDP demonstrated intuitive responses of acceptable degrees of magnitude at the strategic level. However, there were instances in the model outputs where delays and capacity issues were found at locations where this would not be expected. These included (for example):

- "Dummy" nodes – (Nodal points on the road network to improve the visual representation of the links) capacity constraints at dummy nodes resulting in higher V/C (volume / capacity) values than preceding and following road network segments; and
- Diverges – delays and capacity issues at dual carriageway diverges, due to shared lane capacity reductions.

A.1.17 These issues were reviewed and were not considered to impact on the key model comparisons between ELLDP scenarios.

A.2 Travel Demand Forecasts

A.2.1 This section describes the forecast travel demand and network impacts predicted from the SRM.

SRM12 Trip Rates

A.2.2 The SRM has an implied set of trip rates within all zones, and as such trip making relating to new development is broadly in line with the respective zones into which they are allocated. However, on analysing the outputs of the initial LDP scenario, it was apparent that the absolute level of trips generated and attracted was not of the order which would be expected from some of the developments. This could be partly explained by the application of future year household densities from TELMoS, which may underestimate ELLDP population growth at some locations.

A.2.3 Given these concerns with respect to the inferred trip rates, it was considered prudent to adjust the forecast travel demand to ensure greater consistency between both the MTTM and SRM12. The MTTM demonstrated a generally higher level of travel demand than that of SRM12 as development demand was based predominantly on TRICS trip rates. The adjustments resulted in SRM12 forecasts being more in-line with TRICS levels of trip making than 'default' SRM12 forecasting.

A.2.4 Adjusted forecast demand was prepared in SRM12, based on the following rules:

i. If a trip is to or from an Internal Non-Urban Zone, then the MTTM demand was used.

ii. If the trip is to or from an External Zone and neither to or from an Internal Non-Urban Zone, the SRM12 demand growth was used.

iii. If a trip is both to and from Internal Urban Zones, then an average of the SRM and MTTM demand growth is used.

A.2.5 Adjustment factors were applied to create 2024 SRM12 demand forecasts. This was considered a more likely reflection of the transport network impacts and these scenarios form the basis for the SRM12 model outputs presented in this Report.

Trip Productions and Attractions

A.2.6 The forecast number of car and public transport trips in terms of total productions and attractions by sector is presented in Table A.2 and Table A.3 respectively, presented as a 12-hour total. Inspection of these tables reveals an increase in trips in the majority of areas within East Lothian, which is in line with the land-use forecasts, particularly the population projections which drive the travel demand forecasting procedures in SRM12.

Table A.2 Summary 12-hour Trip Productions

Sector	2012 Base	2024 Without LDP (versus 2012 Base)			2024 With LDP (versus 2024 Without LDP)		
East Lothian Rural	12,000	11,700	-300	-3%	13,100	1,400	12%
Musselburgh & Wallyford	44,600	57,500	12,900	29%	71,900	14,400	25%
Tranent	16,800	18,900	2,100	13%	26,100	7,200	38%
Prestonpans	21,100	23,500	2,400	11%	27,700	4,200	18%
Haddington	14,000	14,400	400	3%	15,900	1,500	10%
North Berwick	16,300	15,200	-1,100	-7%	16,600	1,400	9%
Dunbar	10,800	13,600	2,800	26%	16,100	2,500	18%
Blindwells	100	100	0	0%	3,700	3,600	3600%
ELC Total	135,700	154,900	19,200	14%	191,100	36,200	23%

Table A.3 Summary 12-hour Trip Attractions

Sector	2012 Base	2024 Without LDP (versus 2012 Base)			2024 With LDP (versus 2024 Without LDP)		
East Lothian Rural	12,400	12,100	-300	-2%	13,600	1,500	12%
Musselburgh & Wallyford	44,400	57,000	12,600	28%	72,500	15,500	27%
Tranent	17,000	19,200	2,200	13%	26,800	7,600	40%
Prestonpans	21,600	24,000	2,400	11%	28,500	4,500	19%
Haddington	14,100	14,600	500	4%	16,300	1,700	12%
North Berwick	16,400	15,300	-1,100	-7%	16,700	1,400	9%
Dunbar	10,900	13,600	2,700	25%	16,100	2,500	18%
Blindwells	100	100	0	0%	4,300	4,200	4200%
ELC Total	136,900	155,900	19,000	14%	194,800	38,900	25%

A.2.7 Figure A.3 shows the modelled public transport mode share, expressed as a percentage for each defined sector, for each scenario. It should be noted that this excludes non-motorised modes, which are not modelled in SRM12. This shows a reduction in public transport mode share in most areas comparing the 2024 Without LDP scenario with the 2012 Base. This can be as a result of a combination of increasing car ownership, the availability of PT services at development sites and\or capacity restraint on the rail network that may limit future growth in rail travel demand, which is considered in the following Section of this Note. Comparing the 2024 With LDP scenario versus the 2024 Without LDP scenario indicates smaller differences with Musselburgh and Wallyford indicating a more notable drop in PT mode share of around 1 percentage point, which is where rail service crowding is greatest.

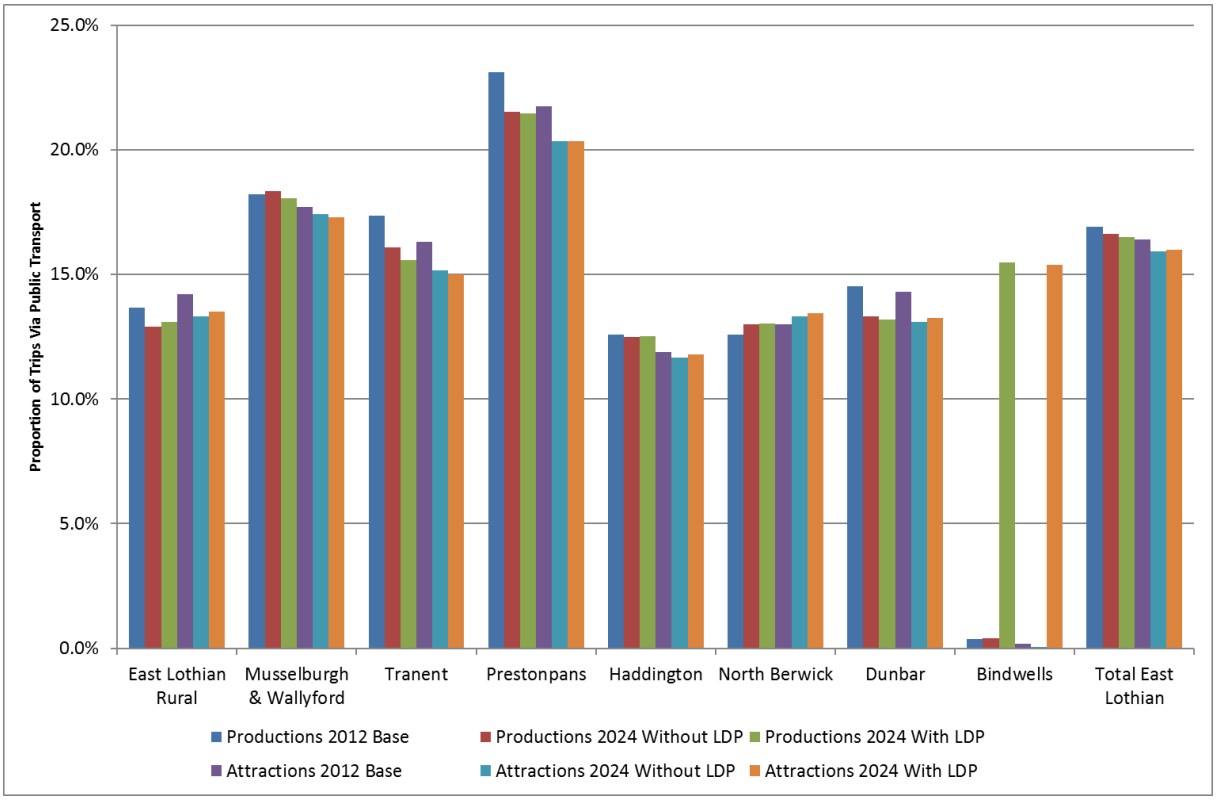

Figure A.3 Public Transport Mode Share

Travel Demand on Network

A.2.8 Total vehicle distance, in kilometres, in each sector area for each scenario is presented in Table A.4 for the AM peak hour. This shows an increase in vehicle distance that correlates with the increase in travel demand associated with ELLDP development sites.

Table A.4 Vehicle Distance (AM Peak Hour, Kilometres)

Sector	2012 Base	2024 Without LDP (versus 2012 Base)			2024 With LDP (versus 2024 Without LDP)		
Musselburgh & Wallyford	38,200	48,300	10,100	+26%	55,500	7,200	+15%
Tranent	15,900	21,200	5,300	+33%	29,000	7,800	+37%
Prestonpans	32,000	37,700	5,700	+18%	41,200	3,500	+9%
Haddington	23,800	33,000	9,200	+39%	38,700	5,700	+17%
North Berwick	8,500	9,400	900	+11%	9,900	500	+5%
Dunbar	11,200	17,900	6,700	+60%	19,500	1,600	+9%
Blindwells	5,300	5,900	600	+11%	5,900	0	0
East Lothian Rural	34,100	41,700	7,600	+22%	45,600	3,900	+9%
ELC Total	134,900	173,400	38,500	+29%	199,700	26,300	+15%

A.2.9 Total public transport based distance, in kilometres, for each scenario is shown in Table A.5 for the AM peak hour. This shows an increase in passenger distance that correlates with the increase in travel demand associated with ELLDP development sites.

Table A.5 Passenger Distance (AM Peak Hour, Kilometres)

Sector	2012 Base	2024 Without LDP (versus 2012 Base)			2024 With LDP (versus 2024 Without LDP)		
Musselburgh & Wallyford	24,600	29,800	5,200	+21%	33,300	3,500	+12%
Tranent	2,500	2,900	400	+16%	3,600	700	+24%
Prestonpans	39,700	47,300	7,600	+19%	50,600	3,300	+7%
Haddington	2,100	3,600	1,500	+71%	4,000	400	+11%
North Berwick	1,900	2,300	400	+21%	2,300	0	0
Dunbar	2,000	55,300	53,300	+2665%	55,800	500	+1%
Blindwells	200	200	0	0	200	0	0
East Lothian Rural	4,000	21,900	17,900	+448%	22,600	700	+3%
ELC Total	73,000	141,400	68,400	+94%	149,800	8,400	+6%

ELLDP Network Impacts and Mitigation Requirements

A.2.10 This Section describes the impact of the change in travel demand associated with the ELLDP on the modelled transport network and consideration of potential interventions to mitigate impacts.

A.2.11 Table A.6 presents the change in vehicle journey time by sector during the AM peak. This indicates that there is a considerable increase in total vehicle journey time with the introduction of the LDP, due to increased demand and increased congestion.

Table A.6 Total Vehicle Journey Time by Sector (AM Peak Hour, Minutes)

Sector	2012 Base	2024 Without LDP (versus 2012 Base)			2024 With LDP (versus 2024 Without LDP)		
Musselburgh & Wallyford	24,600	29,800	5,200	+21%	33,300	3,500	+12%
Tranent	2,500	2,900	400	+16%	3,600	700	+24%
Prestonpans	39,700	47,300	7,600	+19%	50,600	3,300	+7%
Haddington	2,100	3,600	1,500	+71%	4,000	400	+11%
North Berwick	1,900	2,300	400	+21%	2,300	0	0
Dunbar	88,800	104,000	15,200	+17%	104,800	800	+1%
Blindwells	200	200	0	0	200	0	0
East Lothian Rural	4,000	4,400	400	+10%	4,800	400	+9%
ELC Total	159,800	190,100	30,300	+19%	198,800	8,700	+5%

A.2.12 By dividing total vehicle distance by total vehicle journey time, the average speed can be calculated by sector. This is presented, for the AM peak, in Table A.7. This indicates that there are reductions in vehicle speed during the AM peak period with the introduction of the LDP, due to increased congestion due to increased demand on the network.

Table A.7 Average Vehicle Speed by Sector (AM Peak Hour, Kilometres per Hour)

Sector	2012 Base	2024 Without LDP (versus 2012 Base)			2024 With LDP (versus 2024 Without LDP)		
Musselburgh & Wallyford	58.5	48.5	-10.0	-17%	37.2	-11.3	-23%
Tranent	68.5	67.9	-0.6	-1%	63.2	-4.6	-7%
Prestonpans	74.1	68.8	-5.3	-7%	60.7	-8.1	-12%
Haddington	88.0	86.9	-1.1	-1%	85.7	-1.1	-1%
North Berwick	55.0	54.0	-0.9	-2%	52.3	-1.7	-3%
Dunbar	79.2	79.1	-0.1	-0%	77.5	-1.6	-2%
Blindwells	48.5	47.9	-0.6	-1%	48.5	+0.6	+1%
East Lothian Rural	75.2	76.2	+1.0	+1%	75.9	-0.4	-1%
ELC Total	67.7	62.8	-4.9	-7%	54.8	-8.0	-13%

A.2.13 Where relevant, Ratios of Flow to Capacity (RFCs), are presented graphically to highlight issues on the road network. It should be noted that the modelled RFCs provide an average, which

would be expected to vary depending on the profile of traffic demand. Therefore, the strategic model outputs should be used as an indicator of network 'hotspots' rather than absolute predictions of worst case conditions. Forecast passenger demand and equivalent capacities are considered on the rail network to highlight possible crowding issues.

A1 QMU Interchange

Relevant Development	Employment associated with the Craighall development northwest of QMU.
Impacts	Employment at this location attracts new trips during the AM peak hour, and generates additional trips in the PM peak hour.
Network Operation	The existing QMU junction is predicted to accommodate ELLDP traffic in all modelled time periods, however, there is congestion on A1 Old Craighall junction, as shown in Figure A.4. This is due to the considerable volume of ELLDP traffic where westbound trips exiting from QMU currently need to travel via Old Craighall.
Suggested Mitigation	A1 QMU All-Ways Interchange.
Mitigation Effects	The addition of westbound slips would remove a significant volume of traffic from the eastbound A1 and Old Craighall junction, alleviating congestion.
Mitigation Required	Yes.

A1 Old Craighall Interchange

Relevant Development	The strategically important location of Old Craighall junction, forming the interchange between the A1 and A720, is likely to experience traffic from the majority of ELLDP developments across East Lothian.
Impacts	The additional ELLDP trips are expected to add pressure to this key interchange, which is already congested.
Network Operation	Old Craighall junction exhibits some congestion issues in the base year, which get worse under the Without LDP scenario and are then exacerbated by the additional ELLDP traffic. All approaches to the junction are heavily congested in both the 'With LDP' and 'Without LDP' scenarios, as shown in Figure A.4 to **Error! Reference source not found.**. The Ratios of Flow to Capacity (RFCs) on the A1 western approach increase as a result of additional traffic coming from QMU.
Suggested Mitigation	A1 Old Craighall Interchange — Signal Control.
Mitigation Effects	Signalising and widening the roundabout approaches and circulatory carriageway would provide more efficient operation and increase effective capacity. Testing of this potential intervention is required to quantify the extent to which this intervention can successfully handle the additional traffic generated by the LDP. Whilst this can be assessed within SRM to an extent, the local micro-simulation model would be required for a full assessment where there are complex vehicle interactions.
Mitigation Required	Yes.

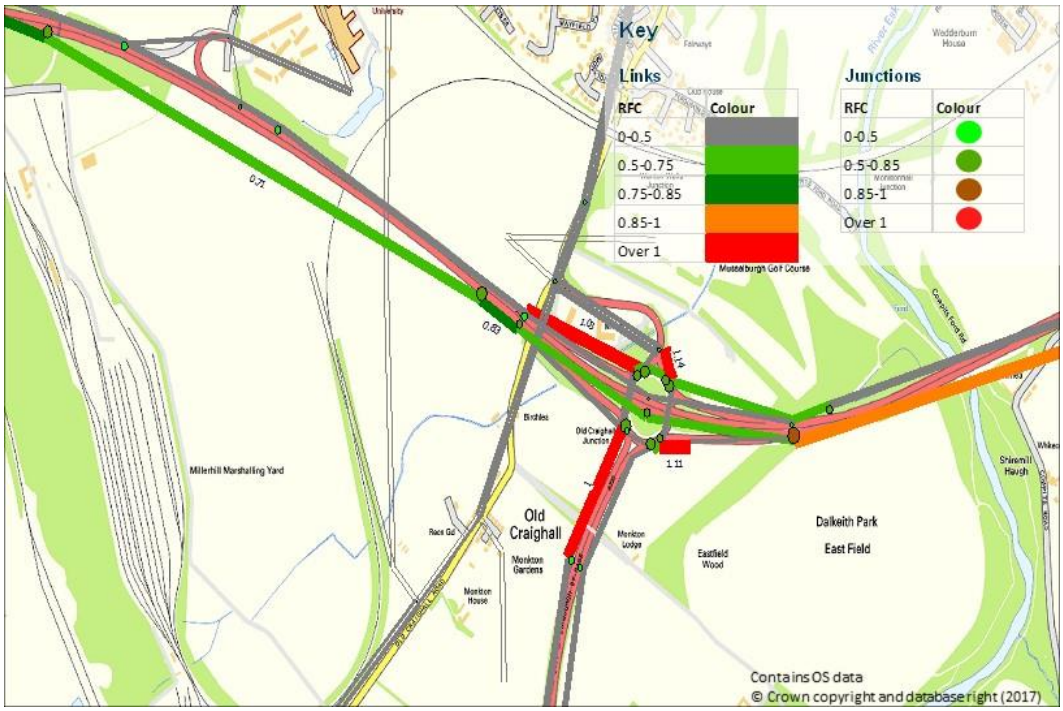

Figure A.4 RFC at A1 Old Craighall Junction – Without LDP Scenario – AM Peak Hour

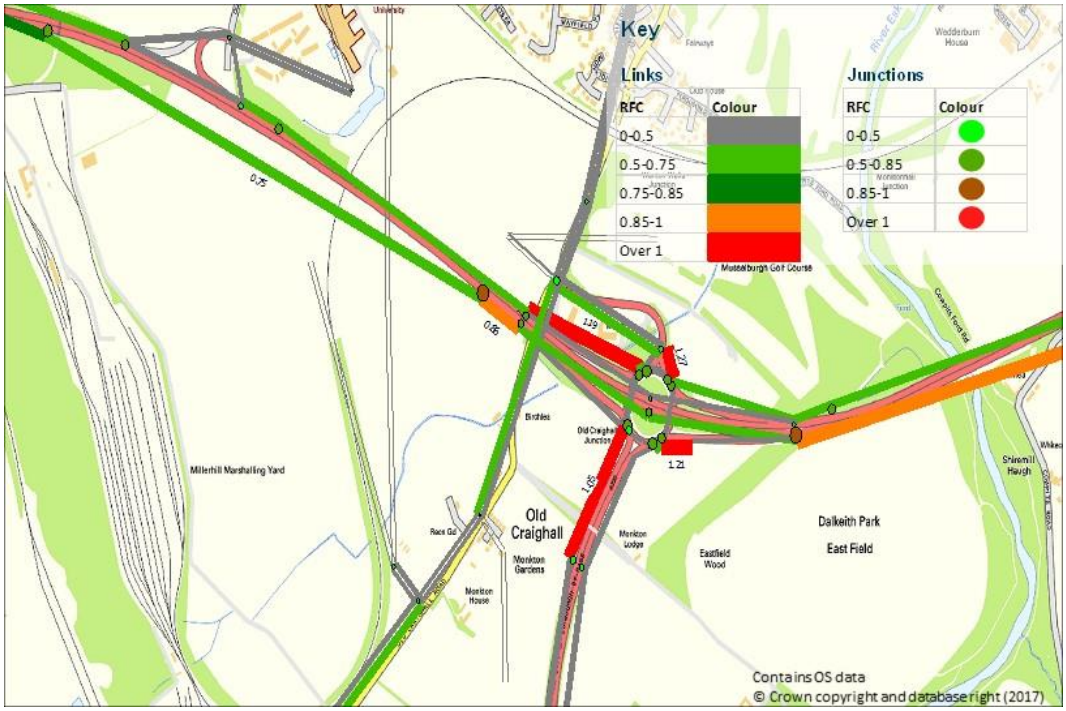

Figure A.5 RFC at Old Craighall – LDP Without Mitigation Scenario – AM Peak Hour

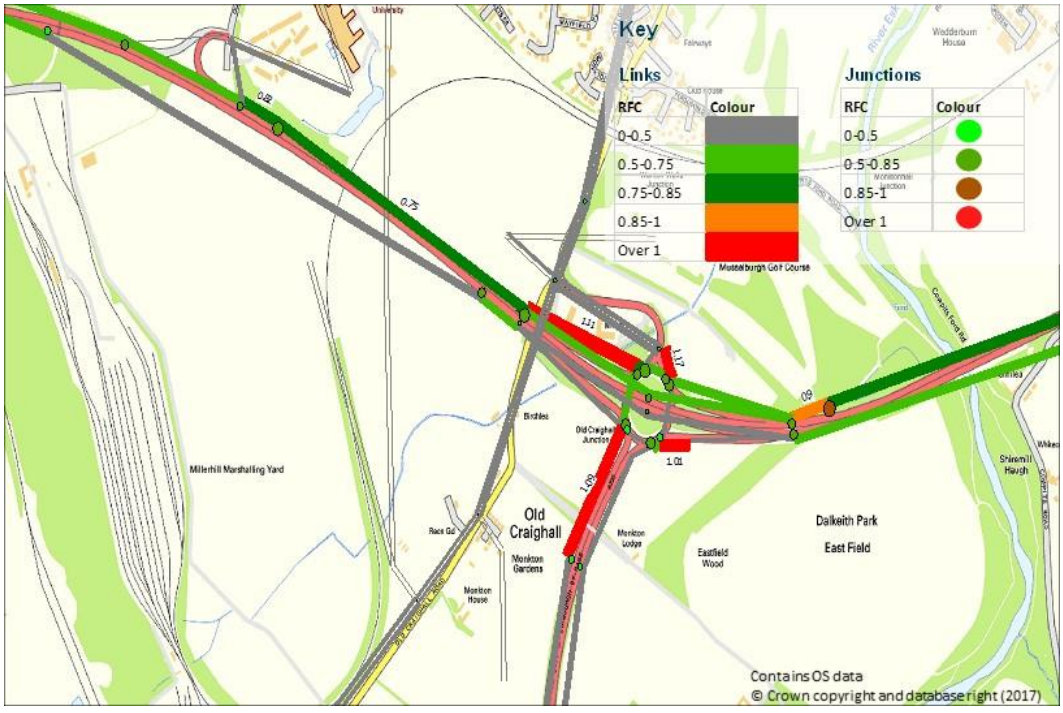

Figure A.6 RFC at A1 Old Craighall Junction – Without LDP Scenario – PM Peak Hour

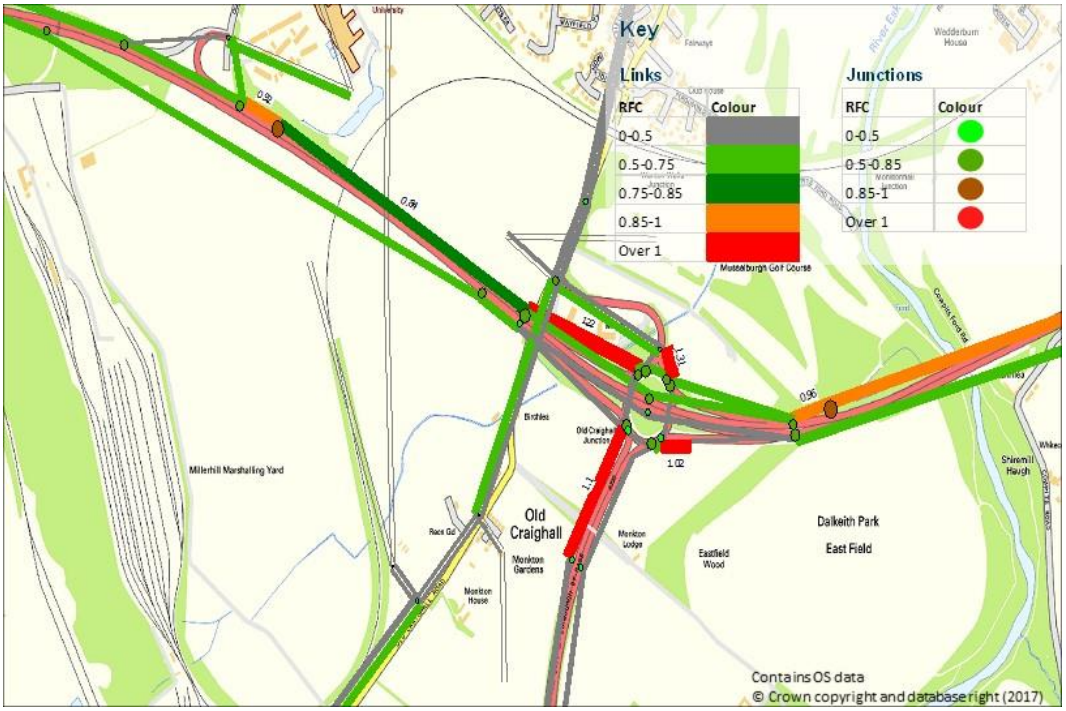

Figure A.7 RFC at Old Craighall – LDP Without Mitigation Scenario – PM Peak Hour

A1 Bankton Interchange and A198 Junction

Relevant Development	Residential and employment at Blindwells and developments around Tranent.
Impacts	The Blindwells development will generate additional trips, which will access the road network on the A198 and at Bankton northern roundabout. Developments around Tranent also result in extra traffic.
Network Operation	The existing junction shows capacity issues in the Without LDP scenario, with RFCs greater than 100% on the eastbound off slip in the PM. The addition of LDP traffic, including Blindwells, has the effect of significant increasing RFCs, as shown in Figure A.8 to Figure A.11, with particular issues in the AM peak where several links are predicted to be over capacity suggesting significant delays.
Suggested Mitigation	Introduction of signal control on northern roundabout and redesign of both roundabouts with local widening and improved lane markings.
Mitigation Effects	The mitigation intervention would increase capacity at both northern and southern dumbbells by redesigning and/or signalising the roundabouts. Whilst this can be assessed within SRM to an extent, the local micro-simulation model would also be required for a full assessment where there are complex vehicle interactions.
Mitigation Required	Detailed modelling to confirm intervention requirements.

A.2.14 There is also a requirement to consider the impact of a full build-out of Blindwells (resulting in a total of 6,000 new dwellings), which are being proposed as safe-guarded sites in the ELLDP. A

sensitivity test will be undertaken to support the ELLDP Appraisal to consider the impact on the transport network and the effectiveness of mitigation interventions with additional travel demand. It is anticipated that this will identify the need for further mitigation at Bankton junction, as a minimum, with possible requirement for enhancement of the A198 and Meadowmill Roundabout as well.

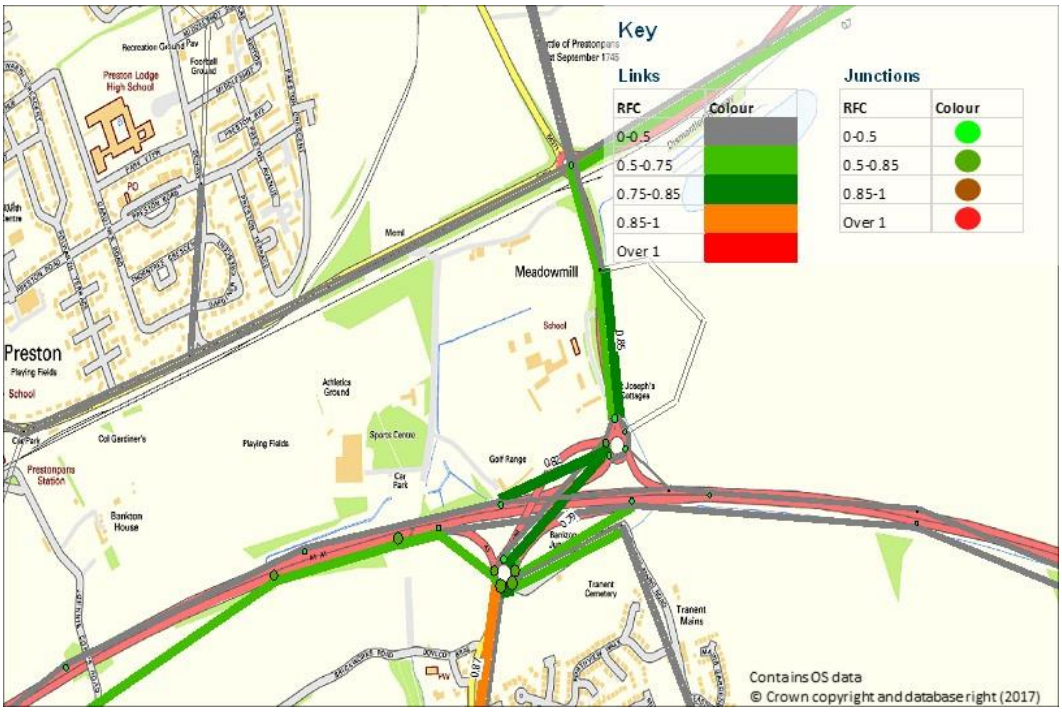

Figure A.8 RFC at A1 Bankton Junction – Without LDP Scenario – AM Peak Hour

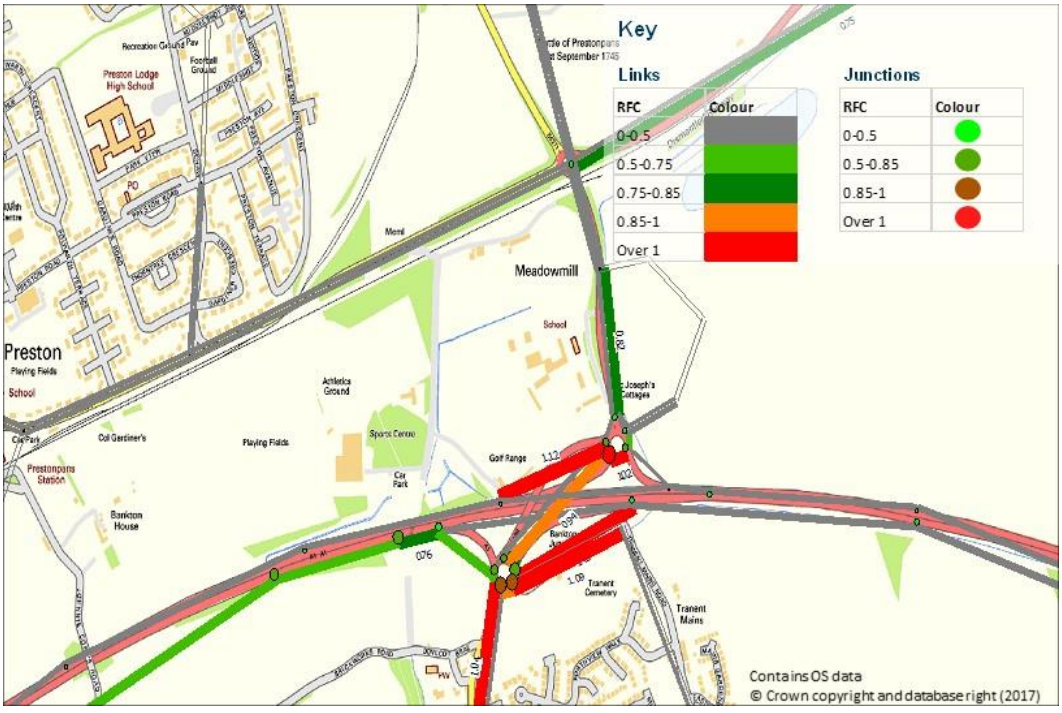

Figure A.9 RFC at A1 Bankton Junction – LDP Without Mitigation Scenario – AM Peak Hour

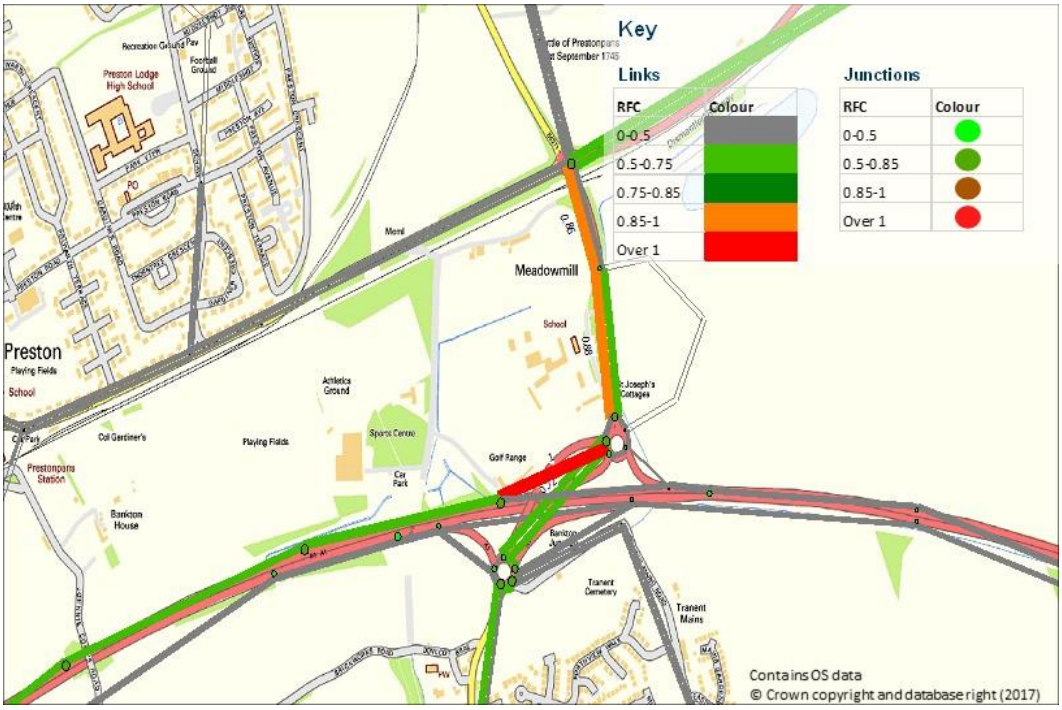

Figure A.10 RFC at A1 Bankton Junction – Without LDP Scenario – PM Peak Hour

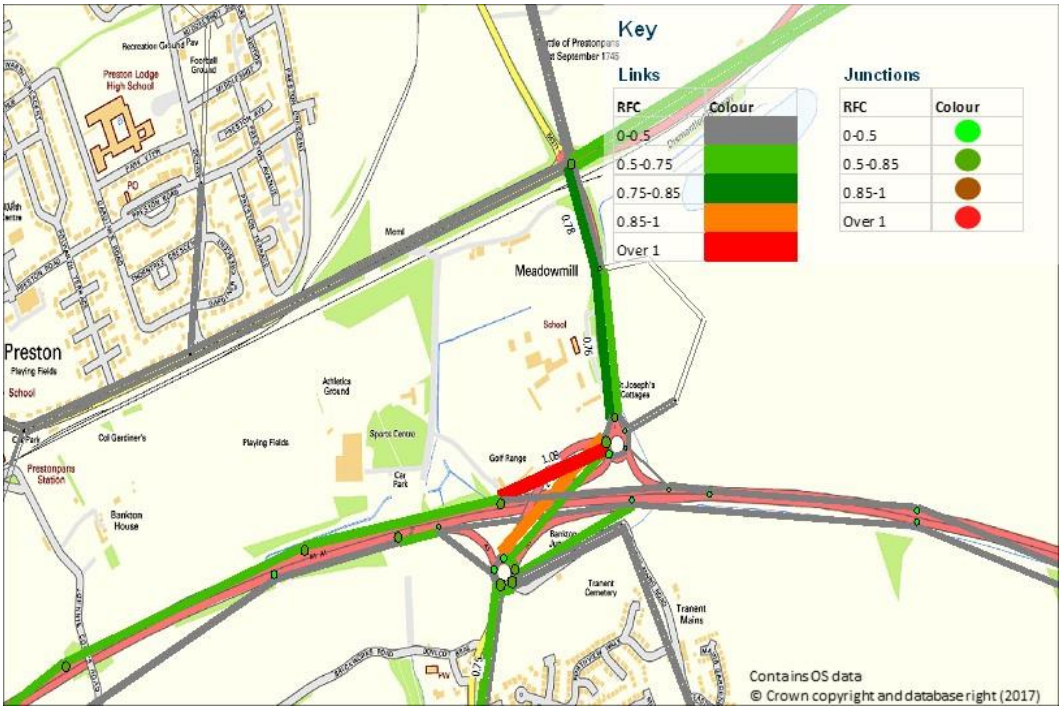

Figure A.11 RFC at A1 Bankton Junction – LDP Without Mitigation Scenario – PM Peak Hour

Musselburgh Town

Relevant Development	Residential and employment developments in and around Musselburgh and Wallyford.
Impacts	Additional traffic generated by these developments is expected add to congestion in Musselburgh town centre.
Network Operation	The network detail in the strategic SRM model is not sufficient to accurately analyse the local traffic impacts within Musselburgh; and local microsimulation traffic modelling is required. However, high level analysis in SRM suggests that there could be some congestion issues in both the AM and PM LDP scenario on Eskview Terrace, Clayknowes Road and at the High Street/Bridge Street junction, as shown in Figure A.12 and Figure A.13.
Suggested Mitigation	Introduction of signal control and/or redesign of local junctions to more efficiently manage forecast traffic flows and minimise impacts including local air quality.
Mitigation Effects	The interventions would be expected to help alleviate congestion issues in the town, with the interventions expected to create a more efficient traffic flow; however, there is insufficient local detail in SRM to fully assess this.
Mitigation Required	Detailed modelling to confirm intervention requirements.

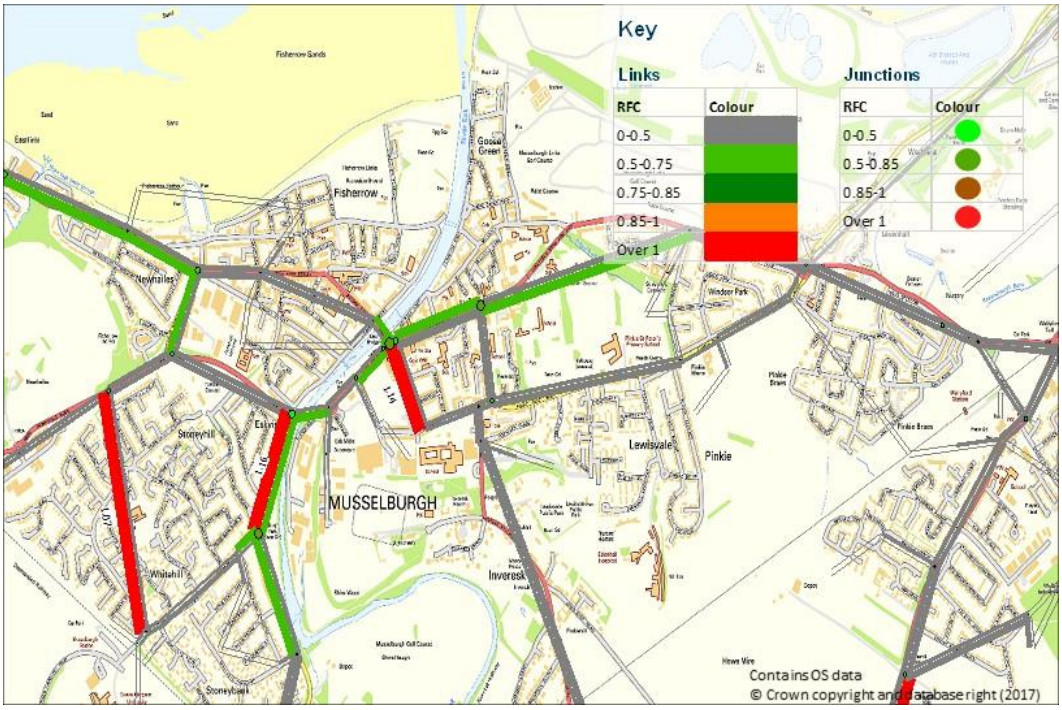

Figure A.12 RFC in Musselburgh Town Centre – LDP Without Mitigation Scenario – AM Peak Hour

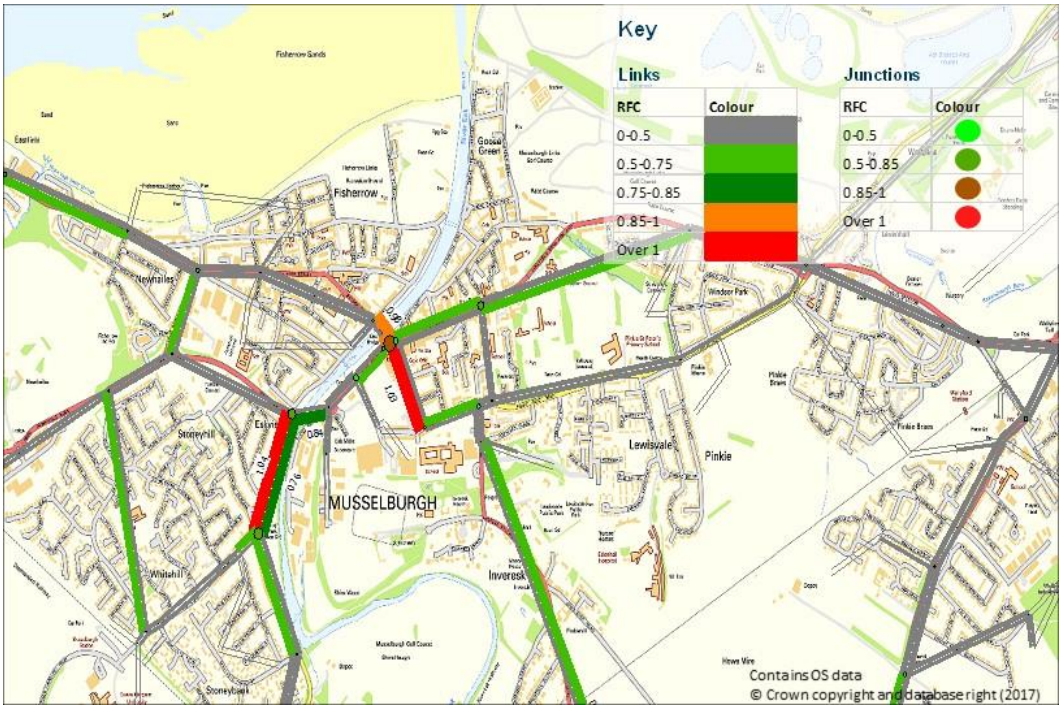

Figure A.13 RFC in Musselburgh Town Centre – LDP Without Mitigation Scenario – PM Peak Hour

Tranent Town

Relevant Development	Residential and employment developments in and around Tranent, with the Blindwells development nearby.
Impacts	Additional traffic generated by these developments is expected to add to congestion in Tranent town centre.
Network Operation	The network detail in the strategic SRM model is not sufficient to accurately analyse the local traffic impacts within Tranent; and local microsimulation traffic modelling is required. However, high level analysis in SRM suggests minor congestion at the Bridge Street/Church Street roundabout in the AM and PM Without LDP scenario is exacerbated by additional LDP traffic, as shown in Figure A.14 and Figure A.15.
Suggested Mitigation	One Way Operation in Tranent town centre.
Mitigation Effects	The interventions would be expected to help alleviate congestion issues in the town, in particular at the Bridge Street/Church Street roundabout; however, there is insufficient local detail in SRM to fully assess this.
Mitigation Required	Detailed modelling to confirm intervention requirements.

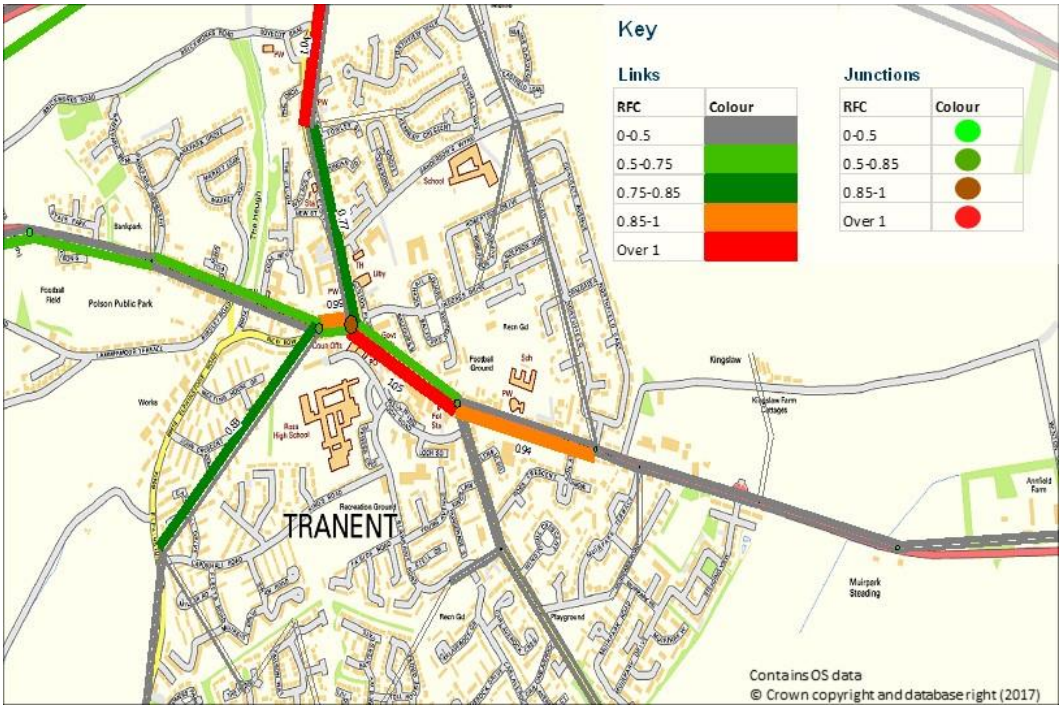

Figure A.14 RFC in Tranent Town Centre – LDP Without Mitigation Scenario – AM Peak Hour

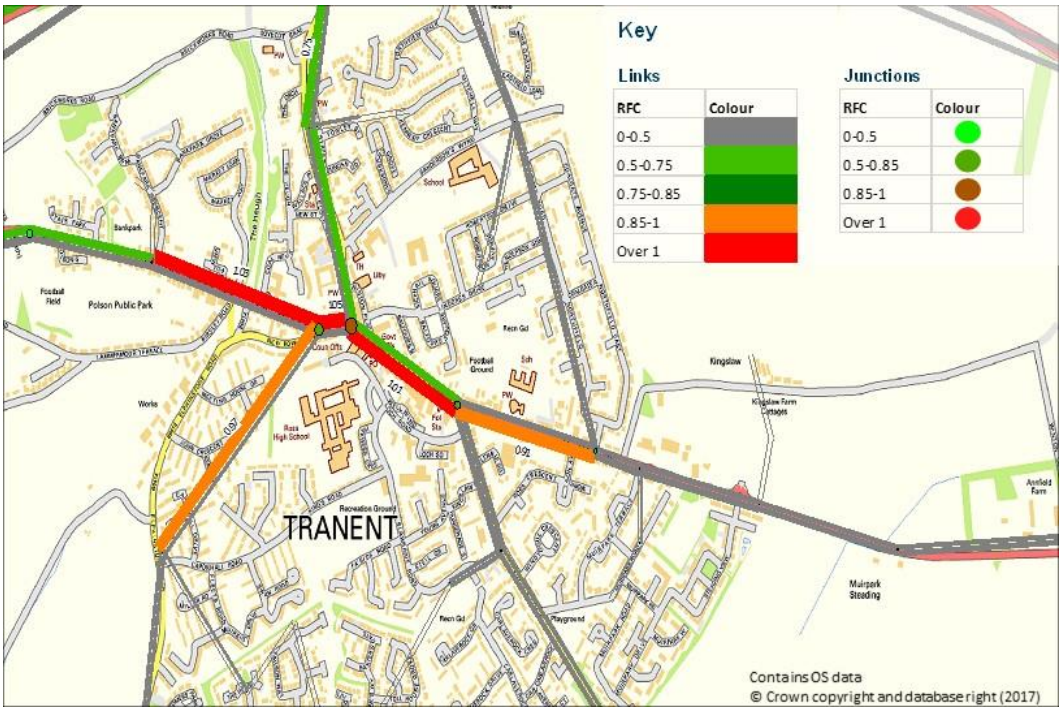

Figure A.15 RFC in Tranent Town Centre – LDP Without Mitigation Scenario – PM Peak Hour

A1 Dolphingstone Interchange

Relevant Development	Dolphingstone site directly adjacent. Plus, majority of Wallyford and Tranent sites will generate traffic that goes through these junctions.
Impacts	Additional traffic generated by these developments is expected to add to congestion to A199 arm of the junction.
Network Operation	The existing junction shows no significant issues in the Without LDP scenario, although there is some queuing on the eastbound A199 approach in the PM.
Suggested Mitigation	Signals optimisation and committed development interventions are expected to address these issues.
Mitigation Effects	Reduction in RFC and delay at the A199/A1 northbound slips junction, for the movements from the A199.
Mitigation Required	Committed.

A1 Salters Rd Interchange

Relevant Development	Wallyford and Barbachlaw sites directly adjacent. Plus, majority of sites in Wallyford will generate traffic that goes through these junctions.
Impacts	Additional traffic generated by these developments is expected to add to congestion in Salters Rd arms of the interchange.
Network Operation	The existing junction does not show major issues in the Without LDP scenario, although there are moderate RFCs on the Salters Rd arms in the AM. The addition of traffic to/from the new developments has the effect of increasing RFCs on the Salters Rd arms as shown in Figure A.17 below.
Suggested Mitigation	Signals optimisation, additional capacity on the northbound Salters Road approach.
Mitigation Effects	Reduction in RFC and delay on the Salters Road arms of the interchange.
Mitigation Required	Yes.

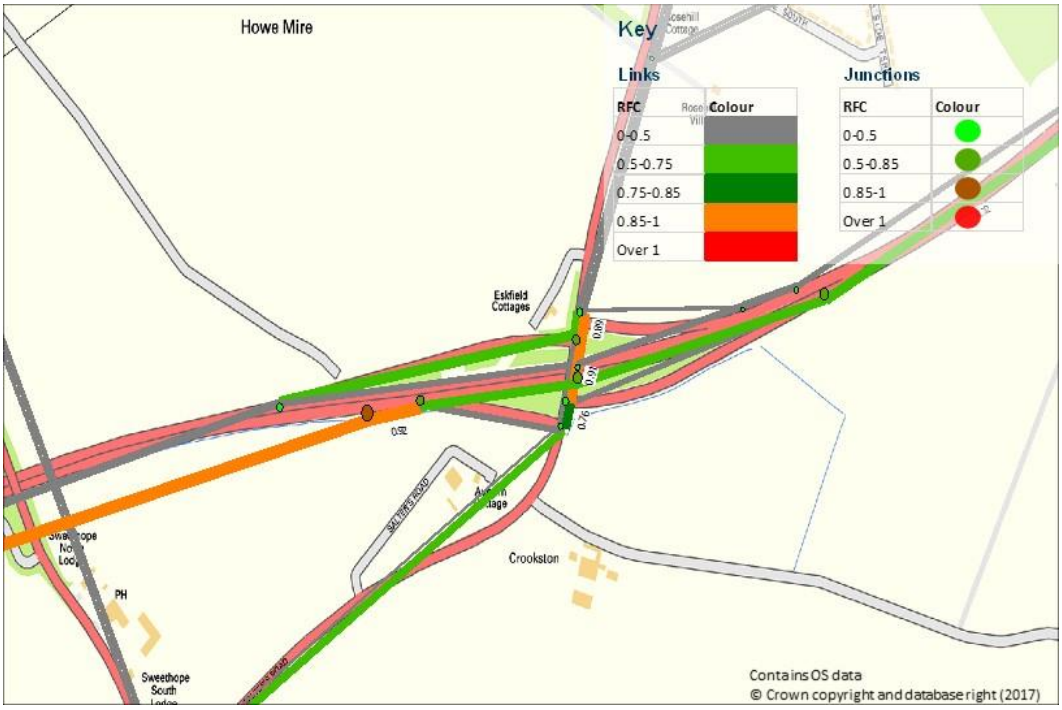

Figure A.16 RFC at A1 Salters Rd Interchange – Without LDP Scenario – AM Peak Hour

Figure A.17 RFC at A1 Salters Rd Interchange – LDP Without Mitigation Scenario – PM Peak Hour

A.2.15 Analysis of the impacts on the public transport network were undertaken, in particular the local rail services along the ECML between Edinburgh and North Berwick. It should be noted that in the forecast year scenarios, services are assumed to be operated by 6-car trains in line with current plans as per the defined Reference Case.

A.2.16 There is evidence that lack of capacity on the rail network is constraining the growth in PT travel which results in the PT mode share in East Lothian decreasing slightly between the base year and forecast years by approximately 1 percentage point. The decrease is greatest in Musselburgh, Wallyford and Tranent, suggesting that despite the additional capacity provided by 6-car trains, it is not sufficient to meet future demand on the network during peak times.

Musselburgh Rail Station and Wallyford Rail Station

Relevant Development	A number of sites are within driving distance of the stations, which have substantial P&R facilities. The largest sites within walking distance are: ▪ Employment associated with the Craighall development northwest of QMU ▪ Residential at Old Craighall ▪ Residential at Dolphingstone ▪ Residential at Wallyford
Impacts	The residential and employment developments around Musselburgh and Wallyford result in a considerable number of additional PT trips, putting pressure on train capacities.
Network Operation	The 6-car services are shown to have very high load factors between Wallyford, Musselburgh and Edinburgh in both the 'With LDP' and 'Without LDP' scenarios; this is focused on westbound services in the AM and eastbound services in the PM, reflecting commuting patterns. Some additional demand from the LDP scenario is likely supressed due to lack of capacity. Figure A.18 and Figure A.19 show loadings in the 'Without LDP' and 'With LDP' scenarios.
Suggested Mitigation	Larger Trains & Platforms at Musselburgh and Wallyford Rail Stations.
Mitigation Effects	Introducing 8-car trains, with associated platform extensions, would provide extra capacity on congested services, potentially encouraging more PT trips and as a result, reducing road traffic.
Mitigation Required	Yes.

A.2.17 Figure A.18 and Figure A.19 show train boardings and alightings at each of the stations along the North Berwick line as follows:

- Without LDP boardings (orange bar) and alightings (red bar)
- With LDP boardings (light blue bar) and alightings (dark blue bar)
- Without LDP loading on departure (red line with triangle markers)
- With LDP loading on departure (blue line with triangle markers)
- Seated capacities and crush capacities – square and circle marker series respectively

A.2.18 The graphs show the seating capacity line being exceeded between Wallyford, Musselburgh and Edinburgh.

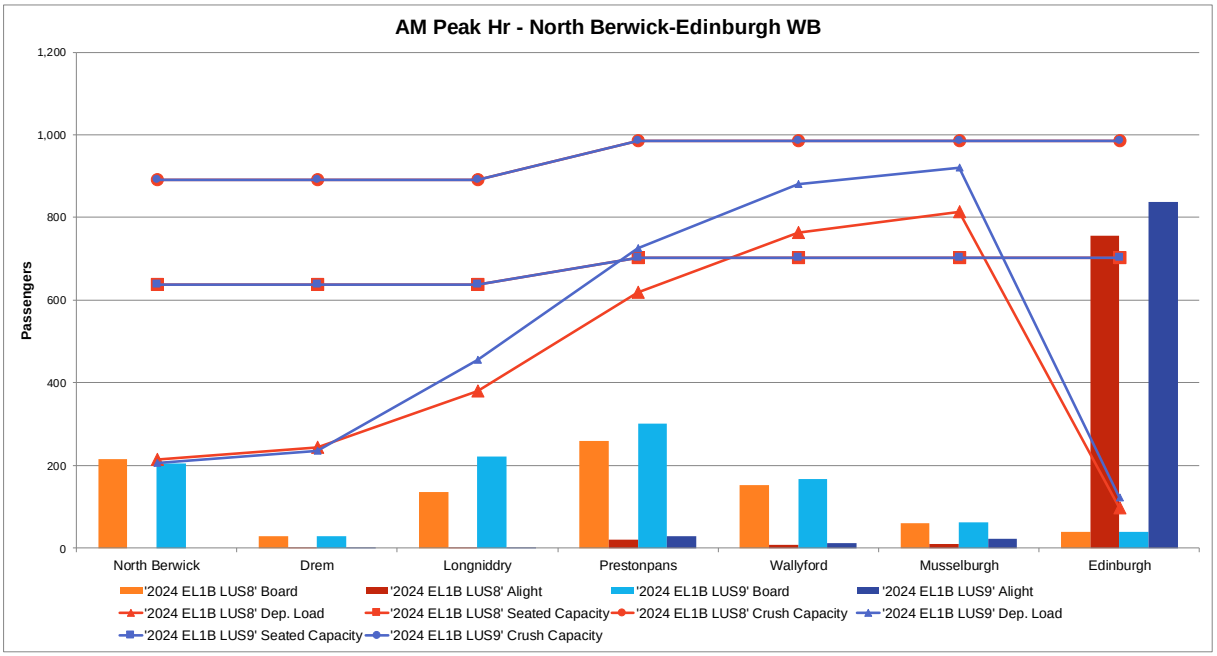

Figure A.18 AM Peak Hour Westbound Rail Loadings

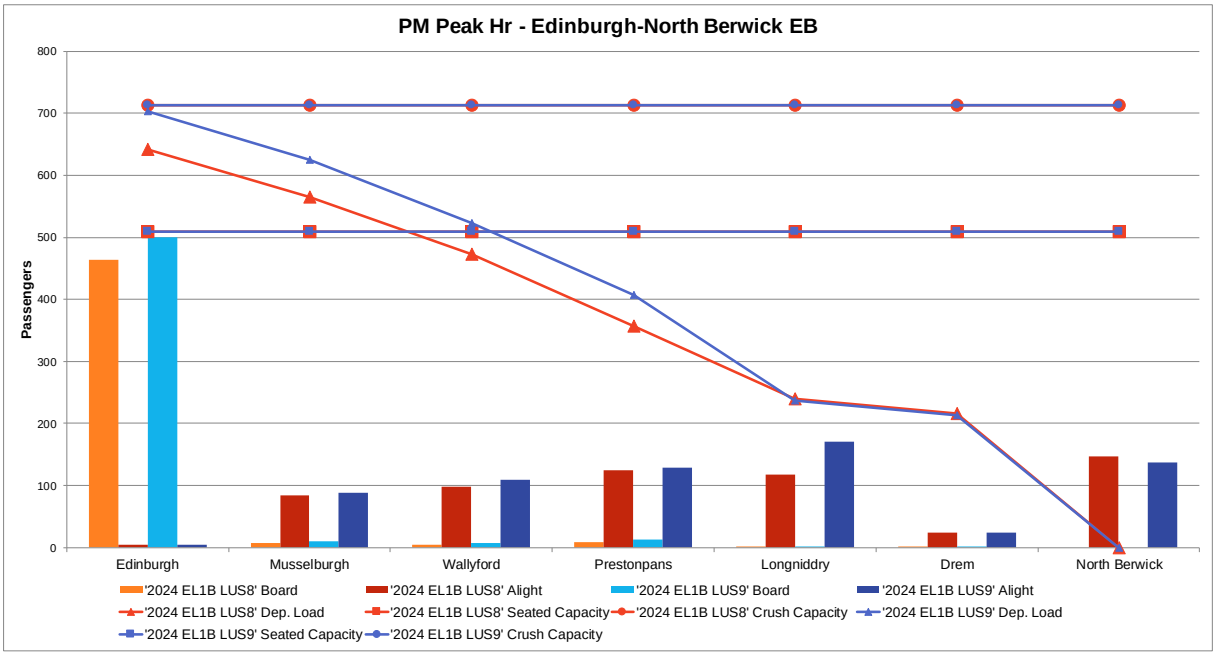

Figure A.19 PM Peak Hour Eastbound Rail Loadings

Prestonpans Rail Station, Longniddry Rail Station and Drem Rail Station

Relevant Development	A number of sites east of Wallyford are within driving distance of the stations, which have P&R facilities.
Impacts	The residential and employment developments around Musselburgh and Wallyford result in a considerable number of additional PT trips, putting pressure on train capacities.
Network Operation	The 6-car services are shown to have very high load factors between Wallyford, Musselburgh and Edinburgh in both the 'With LDP' and 'Without LDP' scenarios, although rail crowding is considerably less pronounced east of here. Examination of the modelled Park & Ride usage indicates that there is spare capacity, however, this is contrary to local anecdotal evidence and may be a function of the model validation.
Suggested Mitigation	Larger Trains & Platforms at Prestonpans Rail Station, Longniddry Rail Station, and Drem Rail Station Longniddry Rail Station Car Park and Drem Rail Station Car Park
Mitigation Effects	Introducing 8-car trains, with associated platform extensions would provide extra capacity on congested services; this would be required across the length of the line. Addition car parking could also be provided at Longniddry and Drem stations, however, this would need to be in conjunction with increase train capacities otherwise any increase in Park & Ride demand could exacerbate crowding issues potentially limiting public transport mode shift.
Mitigation required	Yes.

New Rail Station North of Blindwells

Relevant Development	Residential and employment development at Blindwells.
Impacts	The large residential and employment development at Blindwells generates a considerable number of additional trips to and from the site. The lack of a rail station means the attractiveness of PT travel is considerably less than could be achieved with direct rail access.
Network Operation	The lack of direct rail access results in a high proportion of road based trips to/from the site, putting pressure on the road network. On the rail network, the 6-car services are shown to have very high load factors between Wallyford, Musselburgh and Edinburgh in both the 'With LDP' and 'Without LDP' scenarios, although congestion is considerably less pronounced east of here; if 8-car trains were introduced, these capacity constraints would likely be relieved.
Suggested Mitigation	New Rail Station north of Blindwells and ECML Overbridge.
Mitigation Effects	Constructing a station at Blindwells would give direct rail access for residents and employees at the site, reducing dependence on road based transport and the associated pressure on the road network. Introducing 8-car trains, with associated platform extensions, would provide considerable extra capacity on a very congested service; this would be required across the length of the line, and as such a new Blindwells station would also be designed to accommodate 8-car trains.
Mitigation required	Yes, but noted that this intervention is outside the domain of ELC.

A.3 Impact of ELLDP Transport Mitigation

A.3.1 This section summarises the SRM12 outputs comparing the 2024 ELLDP scenario with and without mitigation to inform the Appraisal of the recommended intervention package.

Trip Productions and Attractions

A.3.2 The forecast number of car and public transport trips in terms of total productions and attractions by sector are shown in Table A.8, and Table A.9 respectively, presented as a 12-hour total. Inspection of these tables reveals that total modelled trip generation does not change significantly with the introduction of the mitigation interventions.

Table A.8 All Mode Trip Productions (12 hour, Persons)

Sector	Without Mitigation	With Mitigation	Difference	% Change in Trip Production
East Lothian Rural	13,100	13,100	0	0.0%
Musselburgh & Wallyford	71,900	72,200	300	0.4%
Tranent	26,100	26,000	-100	-0.4%
Prestonpans	27,700	27,600	-100	-0.4%
Haddington	15,900	15,900	0	0.0%
North Berwick	16,600	16,600	0	0.0%
Dunbar	16,100	16,100	0	0.0%
Blindwells	3,700	3,700	0	0.0%
ELC Total	191,100	191,300	200	0.1%

Table A.9 All Mode Trip Attractions (12 hour, Persons)

Sector	Without Mitigation	With Mitigation	Difference	% Change in Trip Attraction
East Lothian Rural	13,600	13,500	-100	-0.7%
Musselburgh & Wallyford	72,500	72,900	400	0.6%
Tranent	26,800	26,800	0	0.0%
Prestonpans	28,500	28,300	-200	-0.7%
Haddington	16,300	16,200	-100	-0.6%
North Berwick	16,700	16,600	-100	-0.6%
Dunbar	16,100	16,100	0	0.0%
Blindwells	4,300	4,300	0	0.0%
ELC Total	194,800	194,700	-100	-0.1%

A.3.3 The public transport trip production from East Lothian Sectors are shown in Table A.10 and Table A.11, for the with and without mitigation scenarios. The modelled outputs indicate that the mitigation interventions are expected to lead to higher public transport usage in Prestonpans, North Berwick and Musselburgh and Wallyford, but the overall impact is minor.

Table A.10 Public Transport Trip Productions (12 hour, Persons)

Sector	Without Mitigation	With Mitigation	Difference	% Change in Trip Production
East Lothian Rural	1,700	1,700	0	0.0%
Musselburgh & Wallyford	13,000	13,100	100	0.8%
Tranent	4,100	4,100	0	0.0%
Prestonpans	6,000	6,000	0	0.0%
Haddington	2,000	2,000	0	0.0%
North Berwick	2,200	2,200	0	0.0%
Dunbar	2,100	2,100	0	0.0%
Blindwells	600	600	0	0.0%
ELC Total	31,700	31,800	100	0.3%

Table A.11 Public Transport Trip Attractions (12 hour, Persons)

Sector	Without Mitigation	With Mitigation	Difference	% Change in Trip Production
East Lothian Rural	1,800	1,800	0	0.0%
Musselburgh & Wallyford	12,500	12,600	100	0.8%
Tranent	4,000	4,000	0	0.0%
Prestonpans	5,800	5,800	0	0.0%
Haddington	1,900	1,900	0	0.0%
North Berwick	2,200	2,200	0	0.0%
Dunbar	2,100	2,100	0	0.0%
Blindwells	700	700	0	0.0%
ELC Total	31,000	31,100	100	0.3%

A.3.4 The Park & Ride trip productions from East Lothian sectors are shown in Table A.12, for the with and without mitigation scenarios.

Table A.12 Park & Ride Trip Productions (12 hour, persons)

Sector	Without Mitigation	With Mitigation	Difference	% Change in Trip Production
East Lothian Rural	200	200	0	0.0%
Musselburgh & Wallyford	600	600	0	0.0%
Tranent	200	200	0	0.0%
Prestonpans	600	600	0	0.0%
Haddington	0	0	0	0.0%
North Berwick	300	300	0	0.0%
Dunbar	300	200	-100	-33.3%
Blindwells	100	100	0	0.0%
ELC Total	2,300	2,200	-100	-4.3%

A.3.5 Table A.12 indicates that the mitigation interventions are not expected to have a significant impact on Park & Ride usage. There is slight reduction predicted for some sectors, possibly due to the improved road provision attracting users away from Park & Ride.

A.3.6 Figure A.20 shows the modelled public transport mode share, expressed as a percentage for each defined sector, for each scenario. It should be noted that this excludes non-motorised modes, which are not modelled in SRM. This indicates a minor increase in PT mode share in the ELLDP 'With Mitigation' scenario compared to the 'Without Mitigation' scenario.

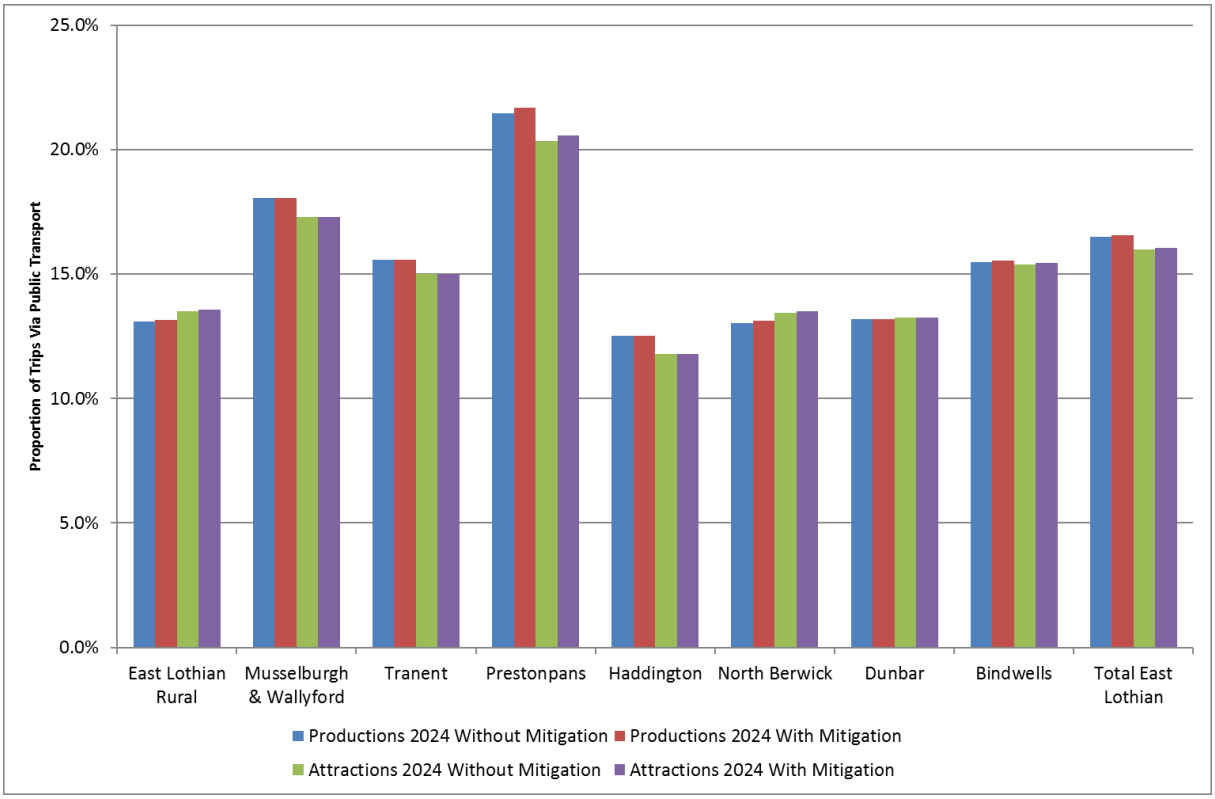

Figure A.20 Public Transport Mode Share

Travel Demand on Network

A.3.7 Table A.13 provides a comparison of the modelled vehicle distance (two-way, 12-hour) on the key corridors.

Table A.13 Two-Way Vehicle Distance on Key Corridors (12-hour, Kilometres)

Corridor	Without Mitigation	With Mitigation	Difference	% Difference
A199	68,700	59,500	-9,200	-13%
A1	396,900	402,000	5,100	1%
A198	62,200	60,700	-1,500	-2%

A.3.8 This indicates a predicted re-routing away from the A198 and A199 onto the A1 and reflects the improvements to grade separated junction on the A1, included in the mitigation interventions.

A.3.9 Table A.14 provides a comparison of the total vehicle distance (AM peak hour, in kilometres) by sector.

Table A.14 Vehicle Distance by Sector (AM Peak Hour, Kilometres)

Sector	2024 ELLDP Without Mitigation	2024 ELLDP 'With Mitigation' vs 'Without Mitigation'		
Musselburgh & Wallyford	55,500	58,700	3,200	6%
Tranent	29,000	28,500	-500	-2%
Prestonpans	41,200	42,700	1,500	4%
Haddington	38,700	38,700	0	0
North Berwick	9,900	10,000	100	1%
Dunbar	19,500	19,700	200	1%
Blindwells	5,900	6,100	200	3%
East Lothian Rural	45,600	45,900	300	1%
ELC Total	199,700	204,400	4,700	2%

A.3.10 This indicates that there is a predicted increase in overall AM peak vehicle demand, with the introduction of the mitigation interventions. This, however, partly reflects the release of suppressed demand with the improvements to the road network, particularly in Musselburgh. In addition, it reflects re-routing to take advantage of improved infrastructure.

A.3.11 Table A.15 shows a comparison of the two-way, 12-hour road public transport passenger distance (in kilometres) on the key corridors:

Table A.15 Public Transport Two-Way Passenger Distance on Key Corridors (12-hour, Kilometres)

Corridor	Without Mitigation Vehicle Distance	With Mitigation Vehicle Distance	Difference	% Difference
A199	30,500	30,100	-400	-1%
A1	26,900	26,300	-600	-2%
A198	6,000	5,800	-200	-3%
Rail	322,200	326,100	3,900	1%

A.3.12 This indicates that there is a predicted slight reduction in the use of road-based public transport on the main corridors through East Lothian with the introduction of the mitigation interventions. This is largely due to modal shift to rail, which has an increase in usage on the main rail line through East Lothian, with the introduction of the mitigation interventions (see Figure A.29 and Figure A.30).

A.3.13 Total public transport based distance, in kilometres, for each scenario is shown in Table A.16 for the AM peak hour. This shows a mixture of decreases and increases in public transport mileage, reflecting the impact of both public transport and road mitigation interventions.

Table A.16 Passenger Distance by Sector (AM Peak Hour, Kilometres)

Sector	2024 ELLDP Without Mitigation	2024 ELLDP With Mitigation (versus Without Mitigation)		
Musselburgh & Wallyford	33,300	34,900	1,600	5%
Tranent	3,600	3,600	0	0
Prestonpans	50,600	51,000	400	1%
Haddington	4,000	4,000	0	0
North Berwick	2,300	2,500	200	9%
Dunbar	104,800	104,800	0	0
Blindwells	200	200	0	0
East Lothian Rural	4,800	4,700	-100	-2%
ELC Total	198,800	201,000	2,200	1%

ELLDP Network Impacts

A.3.14 Table A.17 presents the change in vehicle journey time on the key corridors, in minutes:

Table A.17 Two-Way All Vehicle Journey Time on Key Corridors (12-hour, Minutes)

Corridor	Without Mitigation Vehicle JT	With Mitigation Vehicle JT	Difference	% Difference
A199	110,800	88,400	-22,400	-20%
A1	290,700	295,900	5,200	2%
A198	69,100	69,400	300	0%

A.3.15 Using the total vehicles, total vehicle journey time and the length of the corridors, journey times can be calculated. Table A.18 shows the average 12-hour speeds on these corridors, calculated from the total vehicle distance and total vehicle journey time above:

Table A.18 Two-Way Average Speed on Key Corridors (12-hour, Kilometres per Hour)

Corridor	Without Mitigation	With Mitigation	Difference	% Difference
A199	37.2	40.4	3.1	8%
A1	81.9	81.5	-0.4	0%
A198	53.9	52.5	-1.4	-3%

A.3.16 This indicates a moderate predicted reduction in congestion on the A199. It also indicates that there is no significant increase in congestion on the A1, despite an increase in the traffic flows. A minor decrease in speed is predicted on the A198 where traffic signal controls are introduced at Bankton.

A.3.17 Table A.19 presents the change in vehicle journey time by sector during the AM peak. This indicates that there are no major changes in overall AM vehicle time with the introduction of the mitigation interventions, despite significant increases in vehicle distance. This indicates an expected increase in average vehicle speeds.

Table A.19 Total Vehicle Journey Time by Sector (AM Peak Hour, Minutes)

Sector	2024 ELLDP Without Mitigation	2024 ELLDP With Mitigation (versus Without Mitigation)		
Musselburgh & Wallyford	89,600	83,500	-6,100	-7%
Tranent	27,500	26,500	-1,000	-4%
Prestonpans	40,800	41,900	1,100	3%
Haddington	27,100	27,100	0	0
North Berwick	11,300	11,300	0	0
Dunbar	15,100	15,200	100	1%
Blindwells	7,300	7,300	0	0
East Lothian Rural	36,000	36,200	200	1%
ELC Total	218,700	212,800	-5,900	-3%

A.3.18 By dividing total vehicle distance by total vehicle journey time, the average speed can be calculated by sector. This is presented, for the AM peak, in Table A.20. This indicates that the mitigation interventions are predicted to deliver benefits in terms of improved vehicle speeds during the AM peak period.

Table A.20 Average Vehicle Speed by Sector (AM Peak Hour, Kilometres per Hour)

Sector	2024 ELLDP Without Mitigation	2024 ELLDP With Mitigation (versus Without Mitigation)		
Musselburgh & Wallyford	37.2	42.2	5.0	13%
Tranent	63.2	64.5	1.3	2%
Prestonpans	60.7	61.1	0.5	1%
Haddington	85.7	85.8	0.1	0%
North Berwick	52.3	53.2	0.9	2%
Dunbar	77.5	77.5	0.0	0%
Blindwells	48.5	50.1	1.6	3%
East Lothian Rural	75.9	76.0	0.1	0%
ELC Total	54.8	57.6	2.8	5%

A.3.19 Table A.21 and Table A.22 show the average road AM journey time from East Lothian to Central Edinburgh, and PM peak journey time from Central Edinburgh to East Lothian, 'With' and 'Without' the mitigation interventions. This indicates that there is a slight increase in journey times to Edinburgh with the introduction of the mitigation interventions.

Table A.21 Road AM Peak Hour Journey Time to Central Edinburgh (minutes)

Sector	2024 ELLDP Without Mitigation	2024 ELLDP With Mitigation (versus Without Mitigation)		
Musselburgh & Wallyford	29.2	28.9	-0.3	-1%
Tranent	37.7	39.6	1.9	5%
Prestonpans	39.5	42.6	3.1	8%
Haddington	42.5	45.1	2.6	6%
North Berwick	57.0	60	3.0	5%
Dunbar	54.4	57	2.6	5%
Blindwells	36.3	38.9	2.6	7%
East Lothian Rural	46.7	48.5	1.8	4%

Table A.22 Road PM Peak Hour Journey Time from Central Edinburgh (in minutes)

Sector	2024 ELLDP Without Mitigation	2024 ELLDP With Mitigation (versus Without Mitigation)		
Musselburgh & Wallyford	32.4	32.2	-0.2	-1%
Tranent	38.8	39.3	0.5	1%
Prestonpans	40.8	41.7	0.9	2%
Haddington	43.8	44.8	1.0	2%
North Berwick	57.8	59	1.2	2%
Dunbar	54.6	55.7	1.1	2%
Blindwells	37.6	38.5	0.9	2%
East Lothian Rural	48.9	49.4	0.5	1%

A.3.20 Table A.23 and Table A.24 show the average public transport AM journey time from East Lothian to Central Edinburgh, and PM peak journey time from Central Edinburgh to East Lothian, with and without the mitigation interventions. This indicates that there are benefits from the mitigation interventions for public transport travel between East Lothian and Edinburgh.

Table A.23 Public Transport AM Peak Hour Journey Time to Central Edinburgh (minutes)

Sector	2024 ELLDP Without Mitigation	2024 ELLDP With Mitigation (versus Without Mitigation)		
Musselburgh & Wallyford	42.4	41	-1.4	-3%
Tranent	62.7	62.7	0	0
Prestonpans	48.3	44.3	-4.0	-8%
Haddington	73.4	73.7	0.3	0%
North Berwick	59.8	56.9	-2.9	-5%
Dunbar	44.6	44.6	0	0
Blindwells	49.5	46.3	-3.2	-6%
East Lothian Rural	76.8	75.3	-1.5	-2%

Table A.24 Public Transport PM Peak Hour Journey Time from Central Edinburgh (minutes)

Sector	2024 ELLDP Without Mitigation	2024 ELLDP With Mitigation (versus Without Mitigation)		
Musselburgh & Wallyford	34.2	31.5	-2.7	-8%
Tranent	61.2	60.6	-0.6	-1%
Prestonpans	42.5	40.3	-2.2	-5%
Haddington	73.8	74	0.2	0%
North Berwick	56.7	55.4	-1.3	-2%
Dunbar	36.9	36.9	0	0
Blindwells	44.5	42.1	-2.4	-5%
East Lothian Rural	75.2	75.0	-0.2	-0%

Operational Assessment

A.3.21 A mitigation assessment was undertaken using SRM12 for the following interventions to review their effectiveness and refine scheme details:

- A1 QMU All-Ways Interchange;
- A1 Old Craighall Interchange — Signal Control of Roundabout;
- Larger Trains & Platforms on the North Berwick Line; and
- New Rail Station north of Blindwells.

A.3.22 Analysis of the A1 QMU All-Ways Interchange intervention indicates that, while this has some positive impact on the operation of the A1 Old Craighall junction with the removal of U-turns, the significant impact is on trips to/from the QMU and Craighall development sites that would benefit directly from improved access to/from Edinburgh.

A.3.23 Signal control at the A1 Old Craighall Interchange roundabout is predicted to enhance traffic management and reduce congestion and delay, as shown in Figure A.21 to Figure A.24. This location attracts traffic from locations across East Lothian and beyond and, therefore, the majority of ELLDP development allocations would be expected to have an impact on this junction.

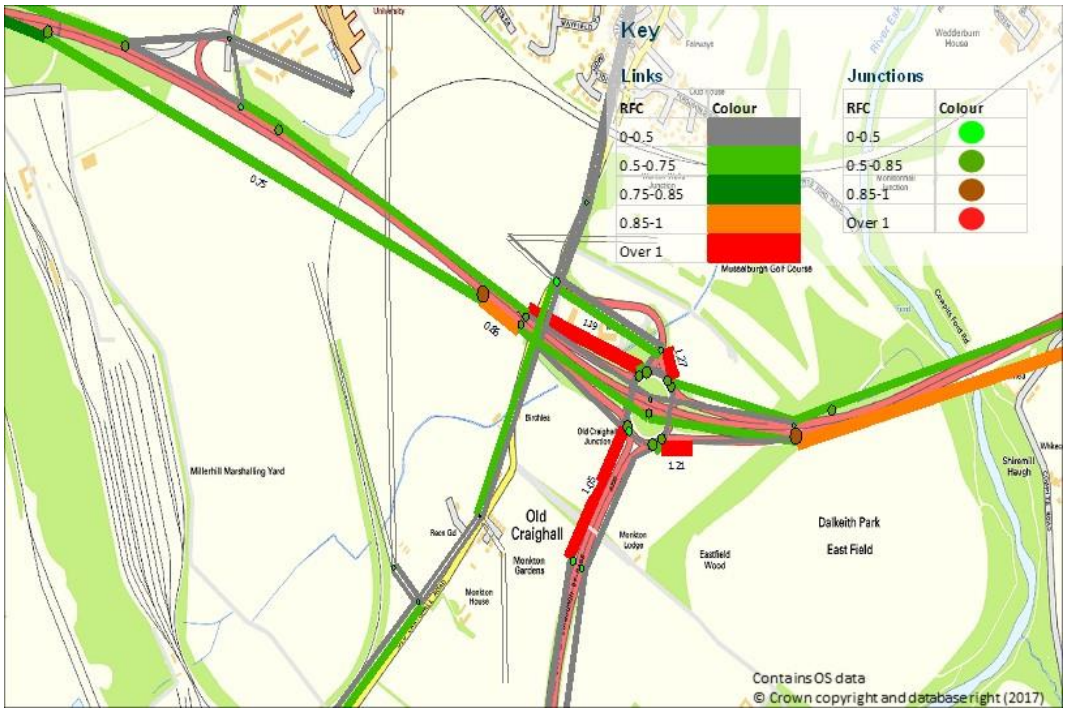

Figure A.21 RFC at Old Craighall– LDP Without Mitigation Scenario – AM Peak Hour

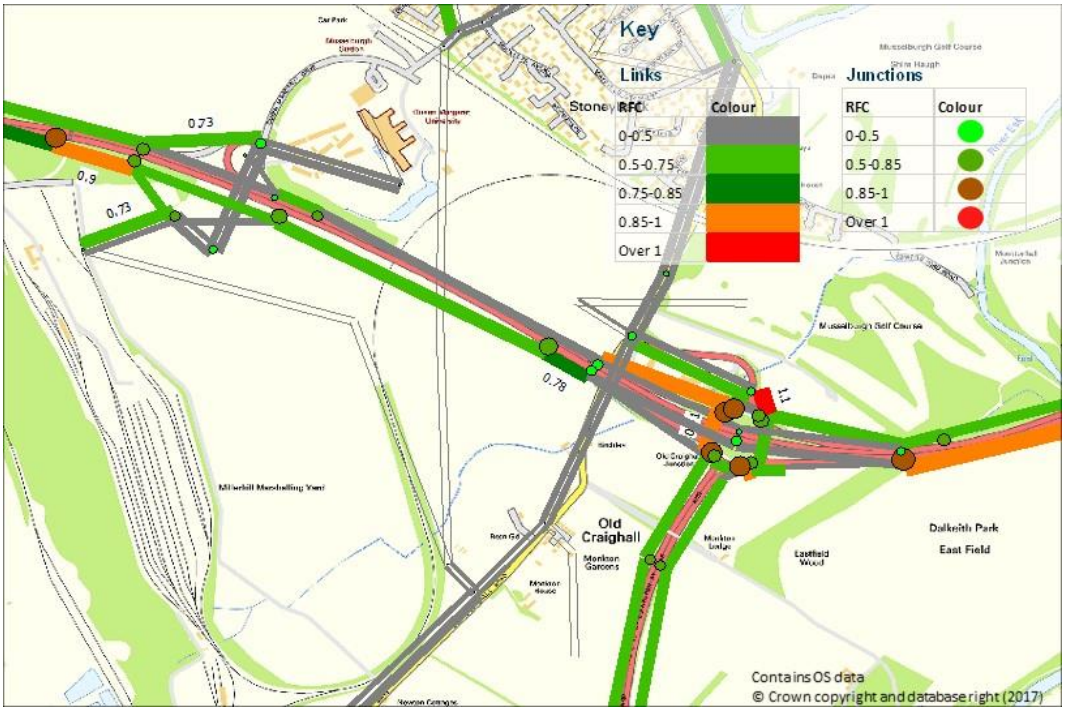

Figure A.22 RFC at Old Craighall – LDP With Mitigation Scenario – AM Peak Hour

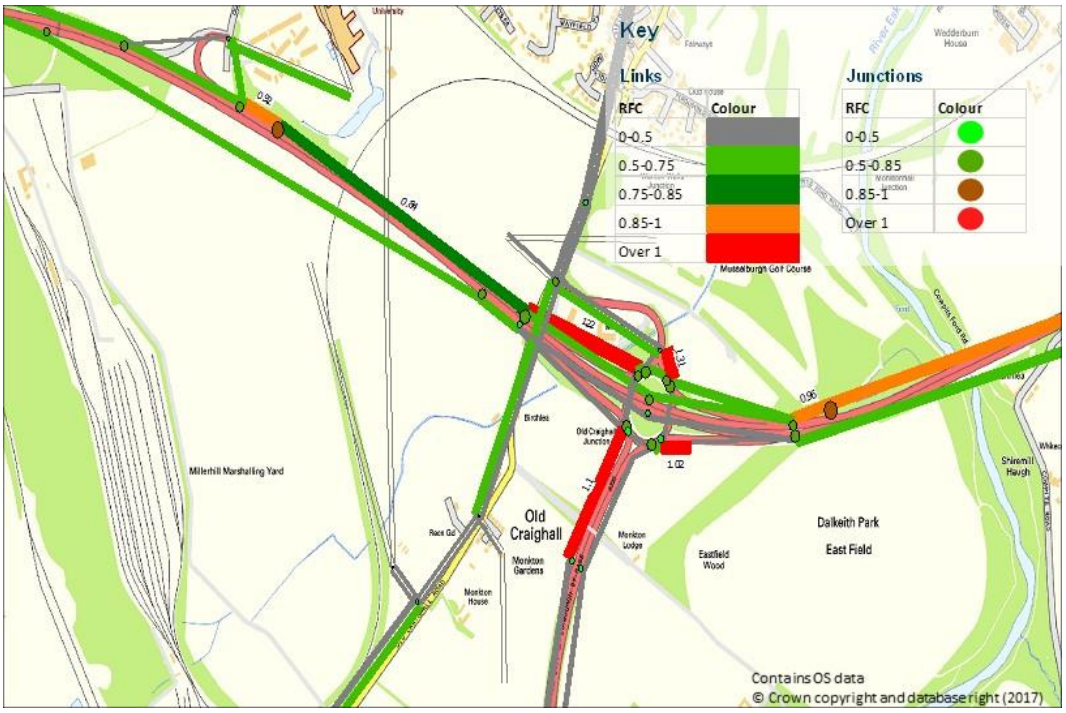

Figure A.23 RFC at Old Craighall– LDP Without Mitigation Scenario – PM Peak Hour

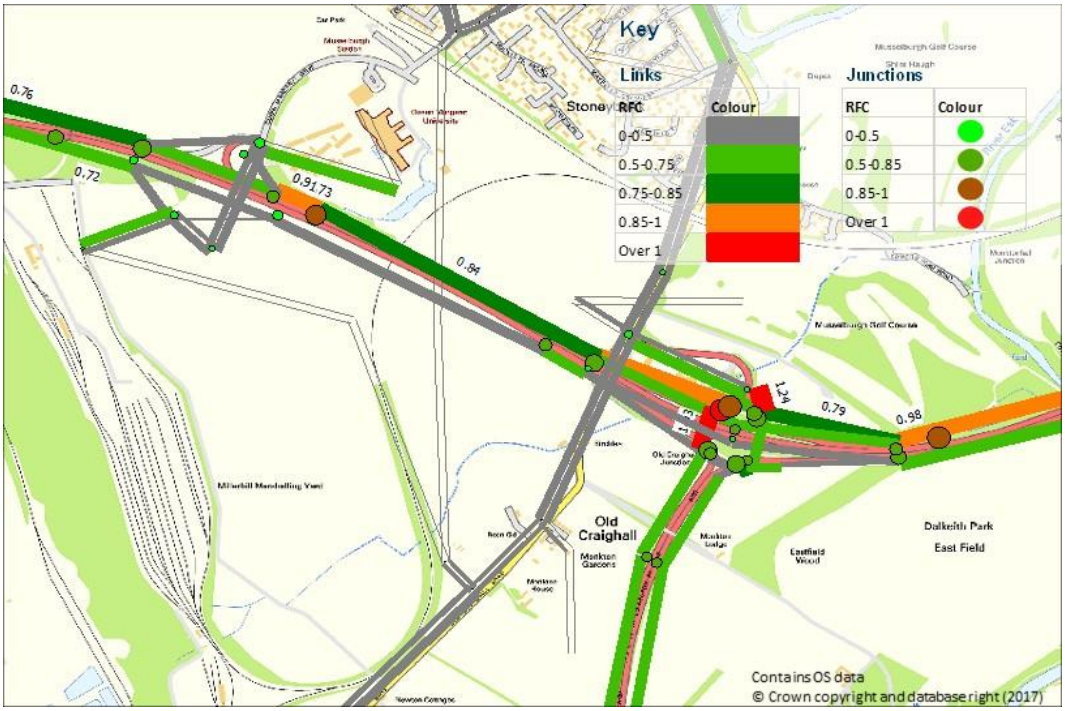

Figure A.24 RFC at Old Craighall – LDP With Mitigation Scenario – PM Peak Hour

A.3.24 Figure A.25 and Figure A.26 show the Bankton grade separated junction in the PM peak in the "without mitigation" and "with mitigation" scenarios. This indicates significant reductions in the RFCs at this interchange with the signalisation of the north roundabout and the approach widening at both roundabouts.

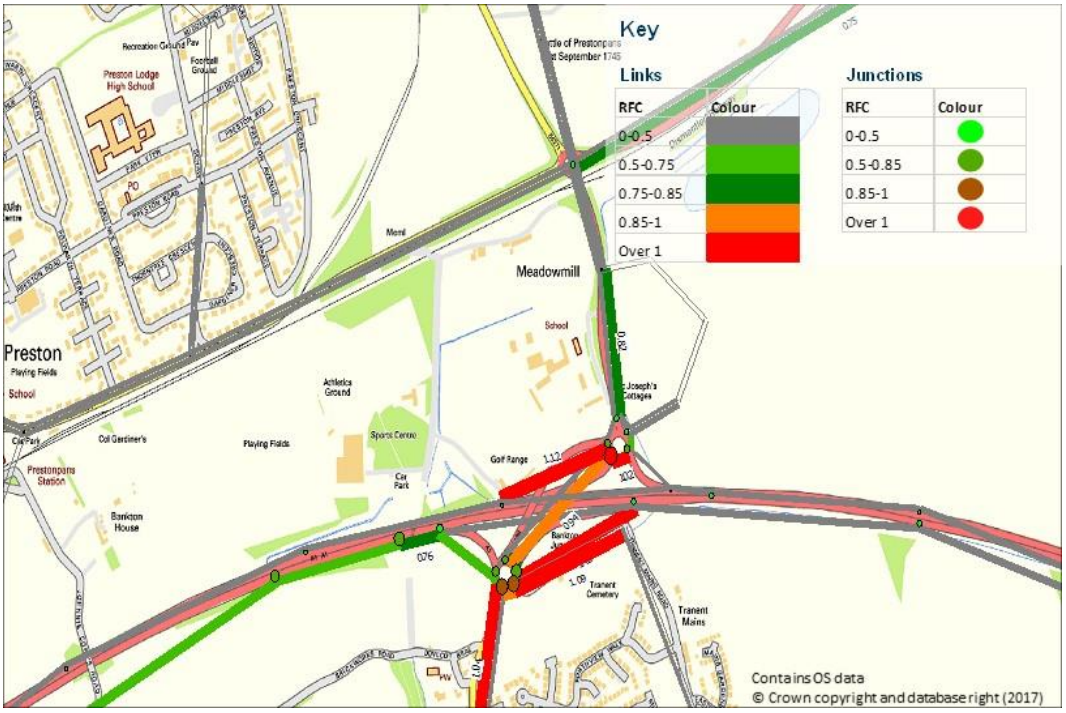

Figure A.25 RFC at A1 Bankton Interchange – LDP Without Mitigation Scenario – AM Peak Hour

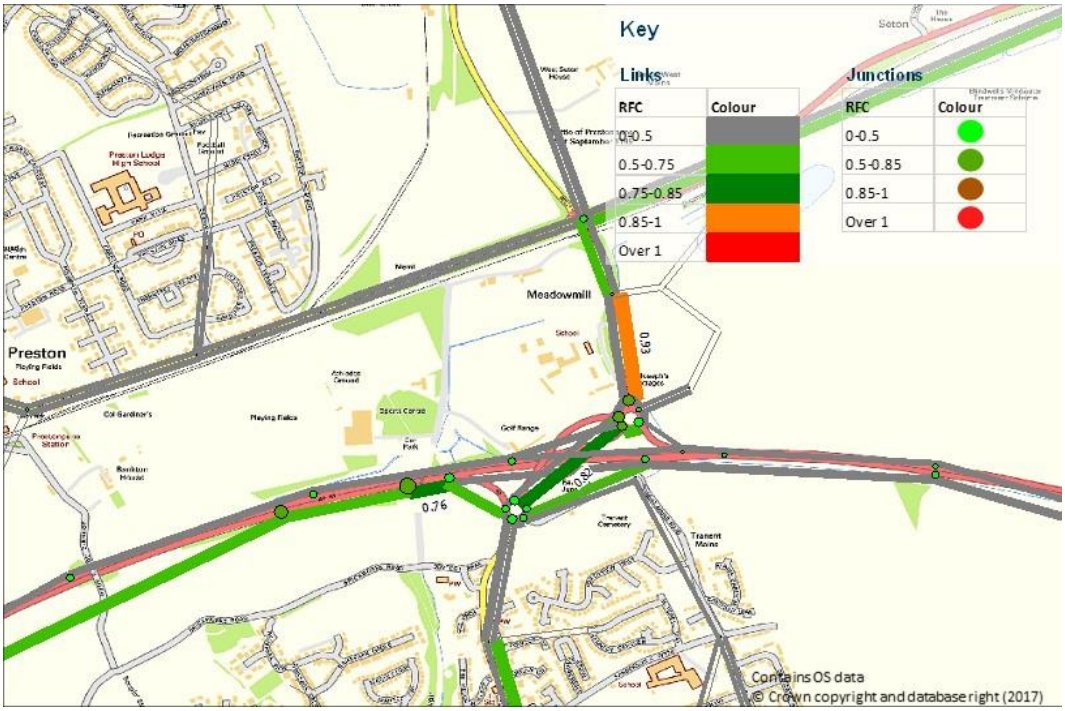

Figure A.26 RFC at A1 Bankton Interchange– LDP With Mitigation Scenario – AM Peak Hour

A.3.25 Figure A.27 and Figure A.28 show the Salters Road grade separated junction in the AM peak in the "without mitigation" and "with mitigation" scenarios. This indicates moderate reductions in RFCs on Salters Road southbound during the AM Peak, which are enabled by the enhanced layout, including the widening of the northbound approach.

Figure A.27 RFC at A1 Salters Rd Interchange – LDP Without Mitigation Scenario – AM Peak Hour

Figure A.28 RFC at A1 Salters Rd Interchange – LDP With Mitigation Scenario – AM Peak Hour

A.3.26 Analysis of the impact of providing larger trains and platforms on the Edinburgh to North Berwick rail line indicates this extra capacity reduces crowding, whilst attracting some additional demand, and mitigates ELLDP impacts.

A.3.27 Figure A.29 and Figure A.30 highlight the positive impacts on passenger volumes and crowding where the blue lines representing loadings against seated and crush capacity with 8-car trains in comparison to the without mitigation scenario (red lines).

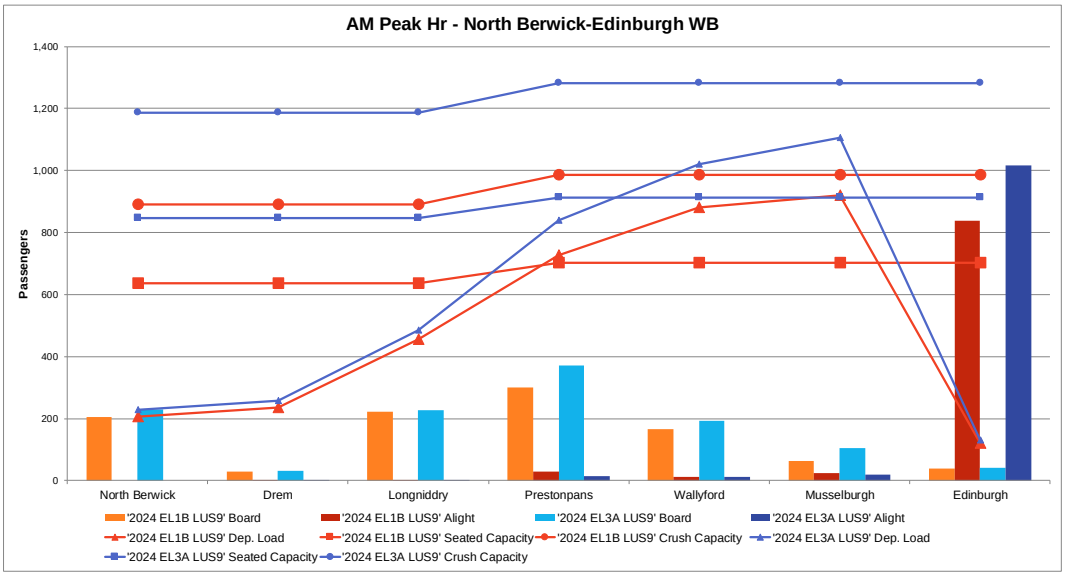

Figure A.29 North Berwick Line Westbound AM – LDP Without and With Mitigation

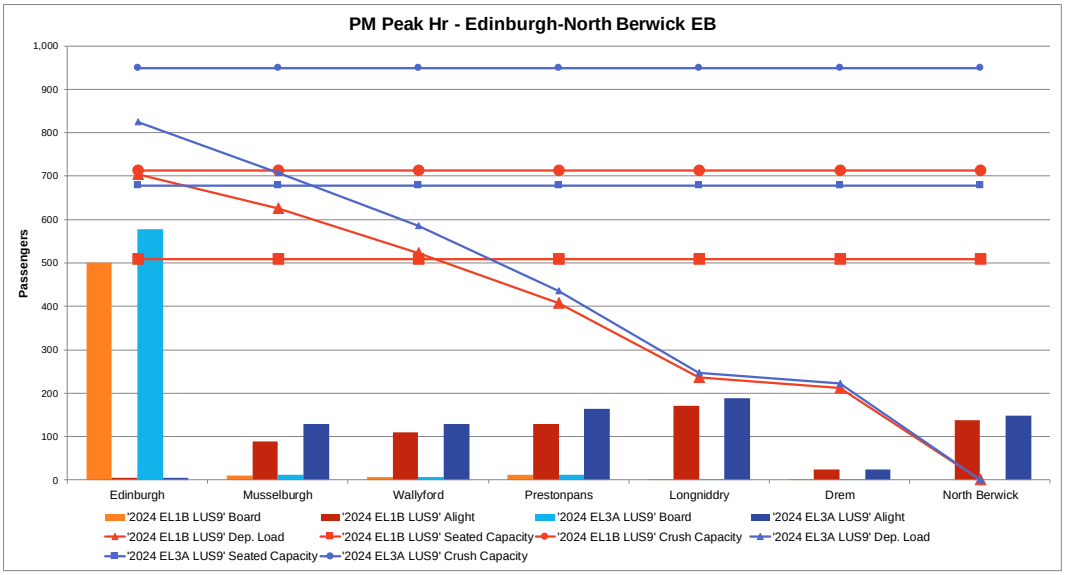

Figure A.30 North Berwick Line Westbound PM – LDP Without and With Mitigation

Appendix B Musselburgh and Tranent Traffic Model Outputs

B.1 Overview

B.1.1 The Musselburgh and Tranent Traffic Model (MTTM) was used to assess the impact of the ELLDP mitigation interventions and inform the Appraisal.

B.1.2 The scenarios presented are:

- 2024 Without LDP; and
- 2024 With LDP Including Mitigation.

B.1.3 It was not possible to extract data for the 2024 With LDP scenario without mitigation where the modelled levels of congestion were significant, preventing meaningful outputs being produced from the MTTM. Therefore, outputs are compared for the 'Without LDP' scenario versus 'With LDP' Including Mitigation scenario, to assess the impact of the ELLDP on the road network performance. It should be noted that there is considerably greater demand in the 'With LDP' scenario that, as expected, considerably impacts on the network statistics and should be considered when interpreting the model outputs.

B.1.4 Some of the numbers in the tables that follow have been rounded from those that are predicted by the transport model. While the absolute numbers have been rounded, the % differences have been retained from the actual model outputs.

B.2 Mitigation Scenario Definition

B.2.1 The following mitigation interventions are included in the 2024 'Without LDP' Model:

- Salters Road Interchange;
- Musselburgh High Street;
- Signal junction at Ashgrove/Pinkie Road;
- Signal junction at Salters Road/The Loan/Inchview Road;
- Widening of Mall Avenue eastbound lane from Inveresk Road to Bridge Street;
- Signal junction at Salters Road/Drummohr Avenue; and
- Harbour Road changed to one-way northbound.

B.2.2 In addition to this, signal optimisation was included at the following junctions:

- Newhailes Road/A199 Edinburgh Road;
- Olive Bank Road/Monktonhall Terrace;
- Monktonhall Terrace/Stoneybank Terrace; and
- Mall Avenue/Inveresk Road.

B.2.3 The following mitigation interventions were identified for inclusion in the 2024 With LDP Including Mitigation scenario:

- Old Craighall Interchange;
- Dolphingstone Interchange;
- Bankton Interchange and A198 Junction;

- Meadowmill Roundabout;
- Queen Margaret University All Ways Junction;
- Musselburgh Junction Signalisation:
  - New Street/A199 Edinburgh Road;
  - Millhill/A199 Linkfield Road; and
  - Newbigging/A6124 Inveresk Road.
- One way gyratory of Tranent High Street and Loch road with a new link road joining Loch Road to High Street at Winton place;
- New Row changed to one-way westbound; and
- Inveresk Road to Newbigging included a barred turn to Inveresk Road from north Newbigging.

B.2.4 Further details can be found in The *Musselburgh and Tranent Local Development Plan Microsimulation Modelling Report* (SYSTRA, May 2017).

B.3 Model Network Statistics

B.3.1 The total vehicle time, vehicle distance and average speed, in the AM peak, are shown in Table B.1.

Table B.1 AM Peak Period Vehicle Time, Distance and Average Speed

Model Statistic	Without ELLDP	With LDP Including Mitigation	% Difference
Total Vehicle Time (s)	12,400,000	15,100,000	22%
Distance (m)	161,300,000	194,100,000	20%
Average Speed (kph)	47	46	-1%

Note: Absolute numbers have been rounded. % Difference based on non-rounded modelled numbers

B.3.2 The total vehicle time, vehicle distance and average speed, in the PM peak, are shown in Table B.2.

Table B.2 PM Peak Period Vehicle Time, Distance and Average Speed

Model Statistic	Without ELLDP	With LDP Including Mitigation	% Difference
Total Vehicle Time (s)	15,700,000	15,800,000	0.5%
Distance (m)	163,200,000	196,600,000	20%
Average Speed (kph)	37	45	20%

Note: Absolute numbers have been rounded. % Difference based on non-rounded modelled numbers

B.3.3 The above tables indicate that the ELLDP interventions are expected to broadly mitigate predicted impacts with similar AM average speeds and higher PM average speeds compared to the 'Without LDP' scenario, even with the additional traffic demand from the LDP.

B.4 Modelled Journey Times

B.4.1 Ten journey time routes have been defined in the traffic model, as shown in Figure B.1.

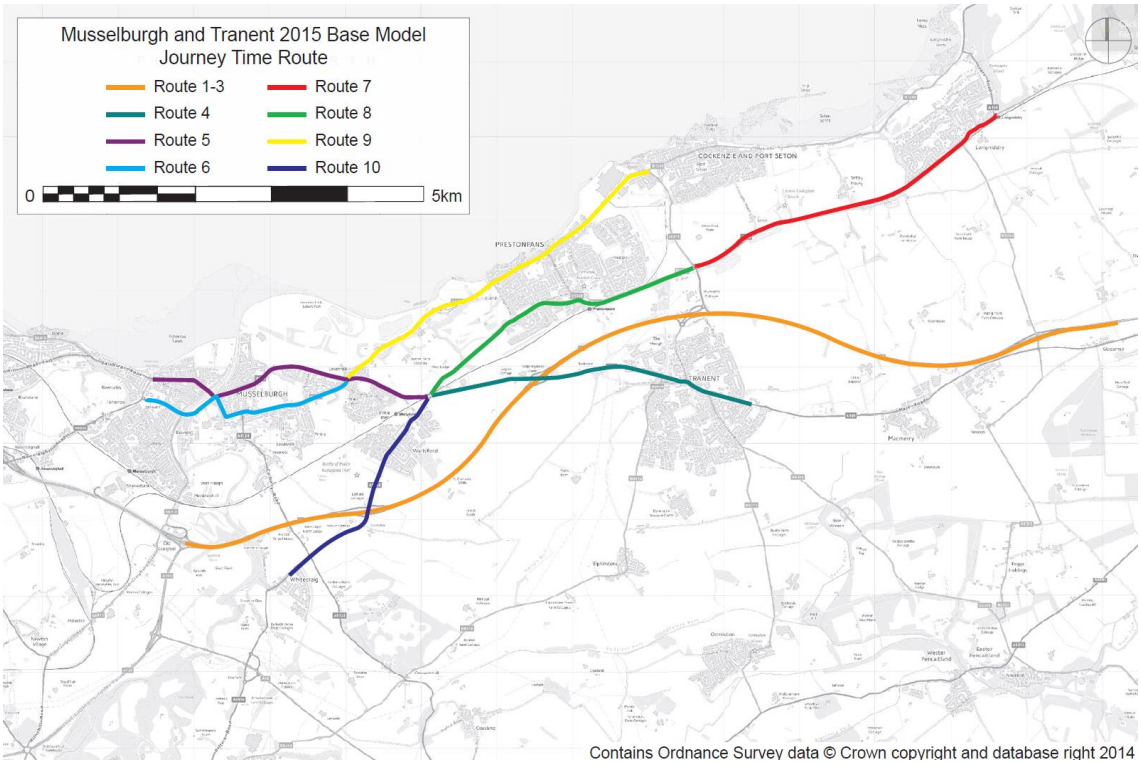

Figure B.1 Key Journey Time Routes

B.4.2 The AM Westbound car journey times for the defined routes are presented in Table B.3. This indicates a predicted reduction in journey time on the A1 westbound, despite the additional LDP demand. This is largely due to the benefits from the Old Craighall improvements. The other mitigation interventions at junctions on the A1 benefit vehicles accessing the A1 via slip roads, rather than the mainline flows.

B.4.3 Through Musselburgh, changes to local junction layouts and the introduction of signal control leads to a decrease in journey time on Route 5. However, Route 6 indicates a corresponding increase in journey time.

B.4.4 A decrease in journey time is indicated on the A6094 (Salters Road) / Route 10, where mitigation interventions include the signalisation of The Loan/Salters Road and Salters Road/Drummohr Avenue junctions, which are currently priority junctions. These interventions will facilitate access to/from The Loan and Drummohr Avenue, but disbenefit the mainline flow on Salters Road.

Table B.3 Westbound Car Journey Time (AM Peak, minutes and seconds)

Route ID	Without ELLDP	With LDP Including Mitigation	Difference	% Difference
Route 1	14:54	12:52	-02:02	-14%
Route 4	06:27	06:26	-00:00	0%
Route 5	09:08	10:38	01:30	16%
Route 6	10:38	09:41	-00:56	-9%
Route 7	03:57	03:36	-00:22	-9%
Route 8	04:03	04:08	00:05	2%
Route 9	06:09	06:11	00:02	1%
Route 10	07:07	05:41	-01:26	-20%

B.4.5 The PM Eastbound car journey times for the defined routes are shown in Table B.4. This indicates a broadly minor impact on journey times in absolute terms and in the context of typical variations, all less than 1 minute.

Table B.4 Eastbound Car Journey Time (PM Peak, minutes and seconds)

Route ID	Without ELLDP	With LDP Including Mitigation	Difference	% Difference
Route 1	08:02	08:33	00:31	7%
Route 4	08:09	08:41	00:32	7%
Route 5	06:14	06:56	00:42	11%
Route 6	06:33	07:09	00:37	9%
Route 7	03:26	03:29	00:03	2%
Route 8	04:59	04:27	-00:32	-11%
Route 9	06:29	06:21	-00:08	-2%
Route 10	06:38	06:33	-00:05	-1%

B.5 Modelled Junction Queues

B.5.1 Model queue data has been extracted for key junctions in Musselburgh and Tranent, and is presented in Table B.5 and Table B.6. The queues are presented as total average queues, across all arms, in the AM and PM peak periods. This indicates that the increase in demand, associated with the introduction in the ELLDP results in an increase in peak hour queuing on junctions, even with the introduction of mitigation measures to improve the performance of these junctions. The mitigation interventions do, however, result in a reduction in queuing relative to the Without ELLDP scenario, at certain junctions in Tranent, enabled by the new One-Way Tranent Gyratory system. In Musselburgh, there are also benefits at the Inveresk Road Junction in the AM peak period and the Newbigging/ High St Junction in the PM peak period, reflecting the impact of the of the one-way system at the junction of High Street, Bridge Street and Dalrymple Loan.

B.5.2 In general, the traffic model indicates that the network is predicted to operate satisfactorily in the 'With LDP' Including Mitigation scenario. Whilst there are some locations that are predicted to experience additional congestion, this is not unexpected given the increase in demand associated with LDP development.

Table B.5 Total Average Queue Across All Arms at Key Junctions (AM Peak, Metres)

Junction	Without ELLDP	With LDP Including Mitigation	Difference	% Difference
Newhailes Rd/A199 Junction - Musselburgh	470	450	-20	-4%
Inveresk Rd Junction - Musselburgh	287	239	-48	-17%
High Street/ Newbigging Junction - Musselburgh	841	960	119	14%
Levenhall R'bout- Musselburgh	249	259	10	4%
Wallyford Toll R'bout - Musselburgh	139	190	50	36%
Birsley Brae Tranent Junction	259	293	34	13%
New Row R'bout -Tranent	47	41	-6	-13%
Church Street / High St Junction - Tranent	77	124	47	61%
High Street/ Haddington Road Junction - Tranent	144	146	2	1%
Loch Road Junction - Tranent	122	69	-53	-43%
Meadowmill R'bout	228	142	-86	-38%

Table B.6 Total Average Queue Across All Arms at Key Junctions (PM Peak, Metres)

Junction	Without ELLDP	With LDP Including Mitigation	Difference	% Difference
Newhailes Rd/A199 Junction - Musselburgh	431	443	12	3%
Inveresk Rd Junction - Musselburgh	242	263	21	9%
High Street/ Newbigging Junction - Musselburgh	409	367	-43	-10%
Levenhall R'bout - Musselburgh	151	174	23	15%
Wallyford Toll R'bout - Musselburgh	100	119	19	19%
Birsley Brae Tranent Junction	283	392	109	38%
New Row R'bout -Tranent	74	76	2	2%
Church Street / High St Junction - Tranent	107	197	90	85%
High Street/ Haddington Road Junction - Tranent	150	156	6	4%
Loch Road Junction - Tranent	104	40	-64	-62%
Meadowmill R'bout	179	157	-22	-12%

B.5.3 Modelled queue length analysis has been undertaken comparing the maximum queue length to the slip length for the off-slips on the main A1 junctions to assess if blocking back from these junctions is predicted to interfere with the mainline traffic flow. Table B.7, Table B.8 , Table B.9 and Table B.10 present a comparison of the slip length to the average queue in the AM and PM peak hours, for the Without ELLDP and 'With LDP' Including Mitigation scenarios respectively. This queue length comparison is also presented graphically in Figures B.2 to B.5. This queue analysis does not include the A1 Queen Margaret University (QMU) intersection where nominal queueing is evident in both the SRM12 and the MTTM.

B.5.4 Inspection of the tables and figures indicates some predicted blocking back of queues at Old Craighall on the A1 off-slips in the 'Without ELLDP' scenario. This is mitigated in the 'With LDP' Including Mitigation scenario with the introduction of local widening and signalisation.

B.5.5 From further analysis of MTTM outputs at the A720 approach to Old Craighall, it is evident that there is an increase in delay at this location. Journey times from the edge of the MTTM model (on the A720 near Dalkeith Northern Bypass) to the stop line at the A720 at Old Craighall increase from 121 seconds in the base year AM Peak, to 138 seconds in the 2024 Committed scenario and then to 411 seconds in the 2024 LDP (with mitigation scenario). The equivalent values for the PM Peak are 130, 483 and 1026 seconds respectively.

B.5.6 This represents a significant journey time and consequently delay in the PM Peak in particular for this movement. Given the queuing on the other approaches at Old Craighall are not predicted to block back onto the A1, it may be possible that queuing could be managed through detailed design and operation, for example the use of variable signal-control timings.

Table B.7 Without ELLDP, Queues at Strategic Road Network Junctions (AM Peak, Metres)

Junction	Arm	Slip Length	Max Queue	% of Slip
Old Craighall	A1 Eastbound Off Slip	287	367	128%
	A1 Westbound Off Slip	293	319	109%
Bankton	A1 Westbound Off Slip	307	30	10%
	A1 Eastbound Off Slip	331	80	24%
Dolphingstone	A1 Eastbound Off Slip	226	67	30%
	A1 Westbound Off Slip	416	67	16%
Salters Road	A1 Westbound Off Slip	492	150	31%
	A1 Eastbound Off Slip	403	87	22%

- The A720 Approach has been measured as the distance between the A68 eastbound on slip to the A720 and the A720 eastbound stop line at Old Craighall.

Table B.8 With LDP Including Mitigation, Queues at Strategic Road Network Junctions (AM Peak, Metres)

Junction	Arm	Slip Length	Max Queue	% of Slip
Old Craighall	A1 Eastbound Off Slip	286	98	34%
	A1 Westbound Off Slip	292	150	51%
Bankton	A1 Westbound Off Slip	306	50	16%
	A1 Eastbound Off Slip	328	96	29%
Dolphingstone	A1 Eastbound Off Slip	226	121	54%
	A1 Westbound Off Slip	416	109	26%
Salters Road	A1 Westbound Off Slip	492	104	21%
	A1 Eastbound Off Slip	403	106	26%

Table B.9 Without ELLDP, Queues at Strategic Road Network Junctions (PM Peak, Metres)

Junction	Arm	Slip Length	Max Queue	% of Slip
Old Craighall	A1 Eastbound Off Slip	287	402	140%
	A1 Westbound Off Slip	293	145	49%
Bankton	A1 Westbound Off Slip	307	43	14%
	A1 Eastbound Off Slip	331	189	57%
Dolphingstone	A1 Eastbound Off Slip	226	108	48%
	A1 Westbound Off Slip	416	54	13%
Salters Road	A1 Westbound Off Slip	492	43	9%
	A1 Eastbound Off Slip	403	115	28%

Table B.10 With LDP Including Mitigation, Queues at Strategic Road Network Junctions (PM Peak, Metres)

Junction	Arm	Slip Length	Max Queue	% of Slip
Old Craighall	A1 Eastbound Off Slip	286	151	53%
	A1 Westbound Off Slip	292	147	50%
Bankton	A1 Westbound Off Slip	306	78	25%
	A1 Eastbound Off Slip	328	139	42%
Dolphingstone	A1 Eastbound Off Slip	226	116	52%
	A1 Westbound Off Slip	416	178	43%
Salters Road	A1 Westbound Off Slip	492	69	14%
	A1 Eastbound Off Slip	403	184	46%

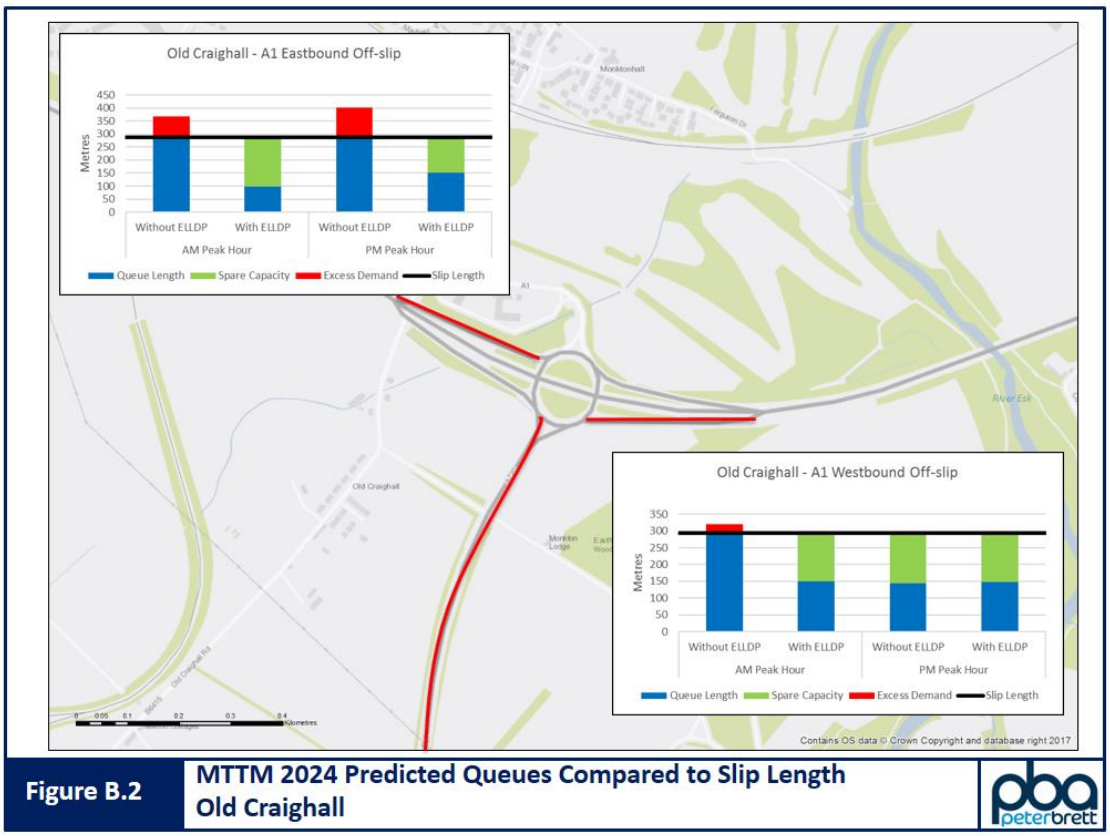

Figure B.2 MTTM 2024 Predicted Queues Compared to Slip Length - Old Craighall

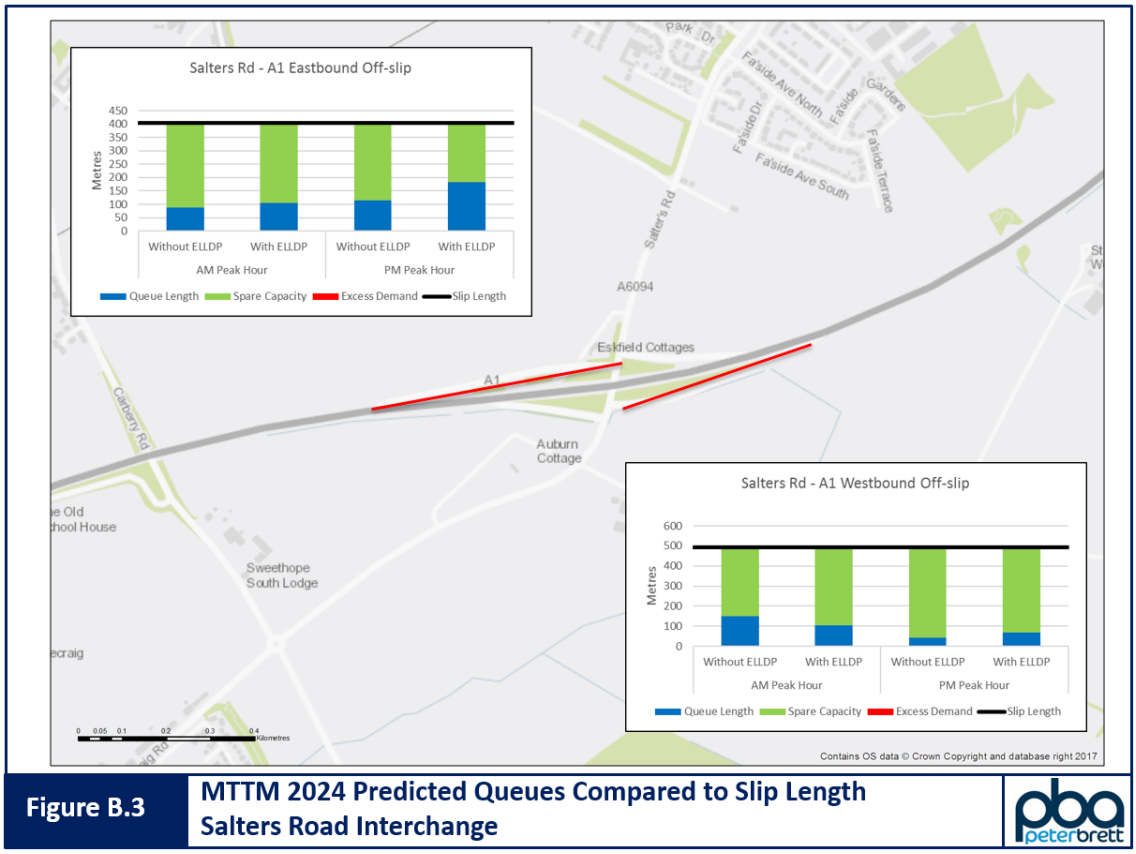

Figure B.3 **MTTM 2024 Predicted Queues Compared to Slip Length**
Salters Road Interchange

Figure B.3 MTTM 2024 Predicted Queues Compared to Slip Length – Salters Road

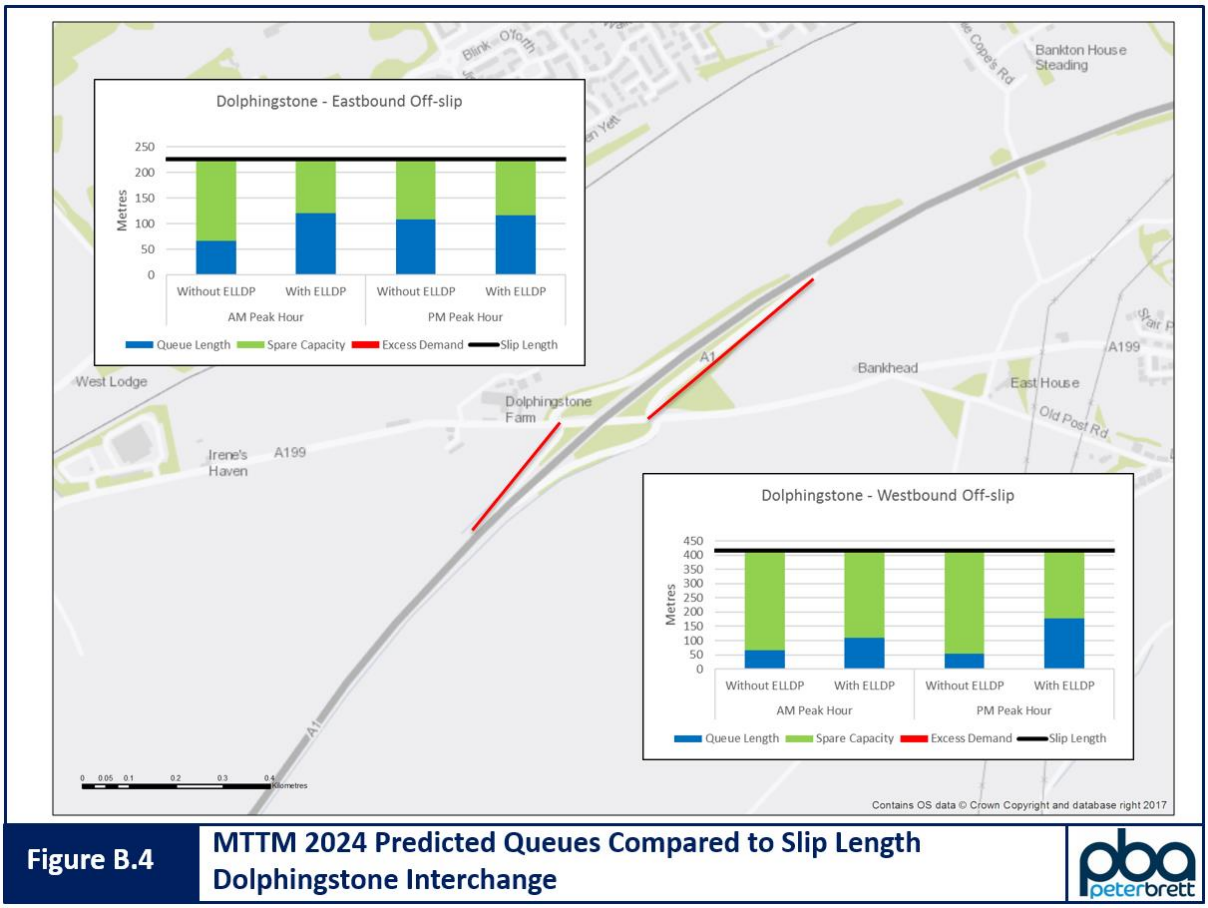

Figure B.4 **MTTM 2024 Predicted Queues Compared to Slip Length**
Dolphingstone Interchange

Figure B.4 MTTM 2024 Predicted Queues Compared to Slip Length – Dolphingstone Interchange

Figure B.5 **MTTM 2024 Predicted Queues Compared to Slip Length Bankton Interchange**

Figure B.5 MTTM 2024 Predicted Queues Compared to Slip Length - Bankton Interchange

B.6 Forecast Emissions

B.6.1 AIRE software was used to produce estimates of vehicle emissions from the forecast traffic flows. The model outputs for the Musselburgh Cordon are shown in Table B.11. This indicates that overall emissions increase in Musselburgh, due to the increase in traffic from the East Lothian Local Development Plan, despite the mitigation measures provided.

Table B.11 Musselburgh Cordon Air Quality Model Outputs

Time Period	Emission Type	Without ELLDP	With LDP Including Mitigation	Difference	% Difference
AM	NOx (kg)	139	162	23	16%
	PM10 (kg)	4	5	1	16%
	Carbon (kg)	23,100	26,600	3,500	15%
PM	NOx (kg)	121	143	22	18%
	PM10 (kg)	4	4	1	19%
	Carbon (kg)	22,900	27,000	4,100	18%

Note: Absolute numbers have been rounded. % Difference based on non-rounded modelled numbers

B.6.2 The model outputs for the Tranent Cordon are shown in Table B.12. This indicates that the emissions within the Tranent Cordon increase, due to the additional demand through Tranent, despite the mitigation measures provided.

Table B.12 Tranent Cordon Air Quality Model Outputs

Time Period	Emission Type	Without ELLDP	With LDP Including Mitigation	Difference	% Difference
AM	NOx (kg)	4	5	1	25%
	PM10 (kg)	0	0	0	23%
	Carbon (kg)	834	1,021	187	22%
PM	NOx (kg)	4	5	1	27%
	PM10 (kg)	0	0	0	24%
	Carbon (kg)	894	1,121	227	25%

Note: Absolute numbers have been rounded. % Difference based on non-rounded modelled numbers

B.6.3 The model outputs for the Musselburgh High Street AQMA are shown in Table B.13. This indicates a moderate air quality benefit to the Musselburgh High St AQMA, even with the additional ELLDP traffic demand, which is a result of the mitigation interventions.

Table B.13 Musselburgh High Street Cordon Air Quality Model Outputs

Time Period	Emission Type	Without ELLDP	With LDP Including Mitigation	Difference	% Difference
AM	NOx (kg)	1	1	-0	-2%
	PM10 (kg)	0	0	-0	-2%
	Carbon (kg)	216	208	-8	-4%
PM	NOx (kg)	1	1	-0	-2%
	PM10 (kg)	0	0	-0	-2%
	Carbon (kg)	216	210	-6	-3%

Note: Absolute numbers have been rounded. % Difference based on non-rounded modelled numbers

Addendum

Context:
Following an examination of the proposed East Lothian Council (ELC) Local Development Plan (LDP) on behalf of Scottish Ministers, a number of amendments were proposed. This Addendum has been prepared to inform the predicted transport impacts relating to a change in planning data from that which was defined and used in the cumulative LDP appraisal (and reported earlier in this Report) to that which has been proposed by the examination.

Planning Data Changes:
The proposed amendments to the LDP planning data were as follows:

- Prop MH13: Land ay Howe Mire Wallyford delete allocation of 170 homes;
- Prop TT15: Humbie North delete allocation of 20 homes;
- Prop TT16: East Saltoun deleted allocation of 75 homes; and
- Land at Newtonlees Farm add 115 homes and cemetery.

The resultant land use scenario was given the nomenclature: EDP1 for modelling and reporting purposes.

Methodology:
The above changes were made to the planning data previously used in the appraisal of the LDP (scenario LUS9). This revised planning dataset was then used within the SRM to derive travel demand and subsequently model the predicted impacts of the revised development plan (scenario EDP1).
The method of preparing and running the SRM for a 2024 forecast year was identical to that of the previous LDP modelling. A model run was undertaking using the EDP1 planning scenario along with the transport mitigation that was derived for the LDP (using scenario LUS9 and discussed in Chapter 4) to note if there were any differences

Results:
Comparisons have been drawn from a range of model outputs as follows:

Travel Demand Matrices
The differences between the travel demand matrices derived by SRM following a full multi modal run are as noted in Table 1 below.

Table 10 2024 Travel Demand Matrix Comparison

Network	Time Period	LUS9	EDP1	Dif	% Dif
"With Mitigation"	AM	212,667	212,614	-53	-0.02%
	IP	163,669	163,629	-40	-0.02%
	PM	235,314	235,246	-68	-0.03%

Notes: - LUS9: LDP travel demand used in the DPMTAG main reporting
- EDP1: the updated LDP travel demand (noted in this Addendum)

The above comparison shows a negligible difference between the travel demand matrices of the SRM for all time periods.

Link Flows
Table 2 presents a comparison of link flow analysis at a number of locations throughout East Lothian for the AM Peak.

Table 11 AM Peak 2024 Link Flow Comparison

Description	Location	Direction	LUS9	EDP1	Dif	%Dif
Bypass before Dalkeith Bypass	A720	EB	1,885	1,892	7	0%
Bypass before Dalkeith Bypass	A720	WB	2,425	2,424	-1	-0%
Bypass App Newcraighall	A720	EB	2,327	2,331	5	0%
Bypass App Newcraighall	A720	WB	2,321	2,323	2	0%
Slaters Rd S of Wallyford	Slaters Rd	NB	596	594	-2	-0%
Slaters Rd S of Wallyford	Slaters Rd	SB	1,154	1,150	-4	-0%
Salters Rd S of A1	Slaters Rd	NB	281	281	-1	-0%
Salters Rd S of A1	Slaters Rd	SB	522	522	0	0%
A1 between Wallyford and Tranent	A1	EB	1,942	1,947	5	0%
A1 between Wallyford and Tranent	A1	WB	3,379	3,372	-8	-0%
A199 West of A1	A199	EB	412	402	-9	-2%
A199 West of A1	A199	WB	357	359	2	0%
A199 East of A1	A199	EB	781	778	-3	-0%
A199 East of A1	A199	WB	837	837	-0	-0%
A1 Between Tranent Junctions	A1	EB	1,574	1,573	-1	-0%
A1 Between Tranent Junctions	A1	WB	2,899	2,893	-6	-0%
A1 East of Tranent	A1	EB	1,290	1,287	-3	-0%
A1 East of Tranent	A1	WB	1,889	1,890	1	0%
A1 North of Newcraighall	A1	EB	1,916	1,920	4	0%
A1 North of Newcraighall	A1	WB	2,935	2,935	0	0%
B6363 N of A1	B6363	NB	83	83	-0	-0%
B6363 N of A1	B6363	SB	261	256	-5	-2%
B6363 S of A1	B6363	NB	136	136	-0	-0%
B6363 S of A1	B6363	SB	292	292	-0	-0%

The differences highlighted in Table 2 are negligible. While Table 2 provides a summary of the AM Peak Total PCUs, it can be noted that similar negligible changes are prevalent in the Inter and PM Peak model results and are also negligible in the disaggregate comparisons of Car, LGV and HGV (which, when combined, create the Total PCU values).

Conclusion and Recommendations

With negligible differences in resultant travel demand matrices and link flows between the two LDP scenarios, it is concluded that the recommendations within main body of this DPMTAG report are still valid and there is no requirement to revise or change the proposed LDP mitigation as a result of this change in planning data.