Appendix K Greater Blindwells Modelling

INFORMATION NOTE

Project Name:	**Greater Blindwells: Strategic Modelling and Option Development**
Project Ref:	**39211**
Note Number:	**3**
Note Title:	**Network Performance Review**
Date:	**12 February 2019**
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1 Introduction

1.1 Overview

1.1.1 PBA was previously commissioned to assist in the development and transport assessment of the current East Lothian Local Development Plan (ELLDP) Appraisal Study for East Lothian Council (ELC). That study included an appraisal of the predicted cumulative impacts of the proposed LDP for a forecast year of 2024.

1.1.2 Within the LDP, a 1,600-unit housing development and circa 350 jobs at Blindwells, associated site access and wider mitigation was included. Beyond the timeframe of the proposed LDP, it is considered that a further (circa) 3,400 to 8,500+ residential units and 1,200 jobs could potentially be developed, with associated civic and education facilities (including primary and secondary schooling) to the east of the Blindwells site included in the LDP. This proposed additional housing and commercial activity is known as the Greater Blindwells Development (GBD).

1.1.3 In order to understand the predicted impacts associated with the GBD, a number of studies and investigations will be required. Taylor Wimpey & Hargreaves have commissioned PBA to undertake an initial investigation into the likely strategic transport impacts associated with the GBD and to then consider transport options that would assist in mitigating those impacts.

1.1.4 PBA prepared a method statement that should be read in conjunction with this Information Note (*180613 PBA Blindwells Masterplan Assessment Proposal V1d.pdf*, PBA, June 2018).

1.1.5 This Information Note describes a modelling assessment of the predicted strategic transport impacts of adding the GBD to a 'Do Minimum' scenario. The model runs available from this work will inform the next step of preparing indicative transport infrastructure scenarios designed to help mitigate the transport impacts of the GBD. The proposed approach to this was to keep the land use scenario consistent throughout this study and prepare three core infrastructure and PT service mitigation scenarios as follows:

- **Road Infrastructure Mitigation Scenario:** This would consider a more road focussed set of link and junction based mitigation measures, but could still consider 'most likely' PT improvements such as a potential Blindwells Rail Station;
- **PT Infrastructure and Service Improvements Mitigation Scenario:** A scenario that focusses more strongly on PT investment (e.g. new or upgraded rail infrastructure such as stations and park and ride facilities; bus priority measures; and travel demand measures) and consider a consequent higher level of PT modal share; and
- **Mixed Mode Mitigation Scenario:** A combination of the above scenarios balancing both road and PT based investment.

1.1.6 The modelling assessment has been undertaken using similar modelling methods to those applied during the LDP appraisal. One notable change is that a 2037 travel demand forecast was provided by Transport Scotland for their SEStran Regional Model (SRM). The horizon year of SRM forecasts provided previously was 2024.

2 Modelling Approach

2.1 Overview

2.1.1 The SRM has been used to prepare model scenarios for the GBD modelling.

2.1.2 The 'With LDP including Mitigation' scenario1 as agreed by East Lothian Council Councillors in May 2018 has been used as the basis of the GBD 2037 forecast scenarios. This includes the expected level of development and associated transport infrastructure in East Lothian up to the year 2037. This has been combined with the latest SRM12 2037 forecast prepared by Systra on behalf of Transport Scotland.

2.2 SEStran Regional Model

2.2.1 The SRM12 is a multi-modal strategic transport model with a focus on key transport movements (trunk road and principal public transport corridors) within its simulation area, which covers the SEStran area (including the whole of East Lothian).

2.2.2 The SRM12 was developed by Transport Scotland for the purpose of the SESplan Cross Boundary Study and was enhanced by PBA for application in the East Lothian Local Development Plan (ELLDP) by way of network and service changes, the inclusion of the most up-to-date planning data, the introduction of committed infrastructure, the derivation of infrastructure to mitigate the ELLDP and revision of the development-based trip rate process.

2.2.3 At the time of preparing the ELLDP during 2016, the only forecast year available from the SRM12 was 2024 – which was aligned to the horizon year of the LDP. For the purpose of the GBD assessment, a horizon year further into the future is required.

2.2.4 A recent set of forecasts was prepared by Systra on behalf of Transport Scotland, which includes a 2037 'Do Minimum' scenario. This scenario is documented in: "SRM12: 2014-2037 Forecasting: Transport Interventions Note (Systra, June 2018)". This scenario, however, does not include the enhanced representation of the ELLDP land-use and infrastructure.

2.2.5 Therefore, a new set of 2037 forecast scenarios has been prepared for the GBD assessment including the following key aspects:

- A "Do Minimum" which includes:
  - ELLDP land-use and infrastructure inside East Lothian;
  - 2037 SRM 'Do Minimum' land-use and infrastructure outside East Lothian; and
- A 'Reference Case' which includes:
  - The Do Minimum with the addition of GBD land-use and 'local development infrastructure' (local development infrastructure is an indicative transport network within the proposed development to provide access to the wider transport network. It does not include any mitigation to the surrounding transport network to cater for increased levels of travel demand).

2.2.6 The definition and preparation of these scenarios is described in Section 3 below.

[1] https://www.eastlothian.gov.uk/downloads/file/24172/cd_041_proposed_ldp_2016_transport_appraisal

2.3 SRM Model Dimensions

2.3.1 The SRM 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.

2.3.2 Individual factors are applied by mode and time period to create an 'average' peak hour for assignment purposes.

2.3.3 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.

2.3.4 The public transport (PT) assignment model includes three assigned purposes as follows:

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

2.4 SRM12 Sector System

2.4.1 For the purposes of analysing the predicted GBD impacts, a matrix sector system was prepared. It is presented in Table 2.1 and illustrated in Figure 2.1. 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. The Blindwells development site has been defined as an individual sector, which includes the consented development (1,600 houses and 350 jobs) plus the proposed GBD (8,500 houses and 1,200 jobs).

Table 2.1 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

Figure 2.1 SRM12 Zone Sector System

Key Corridors

2.4.2 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.

2.4.3 The location of these key corridors is illustrated in Figure 2.2 .

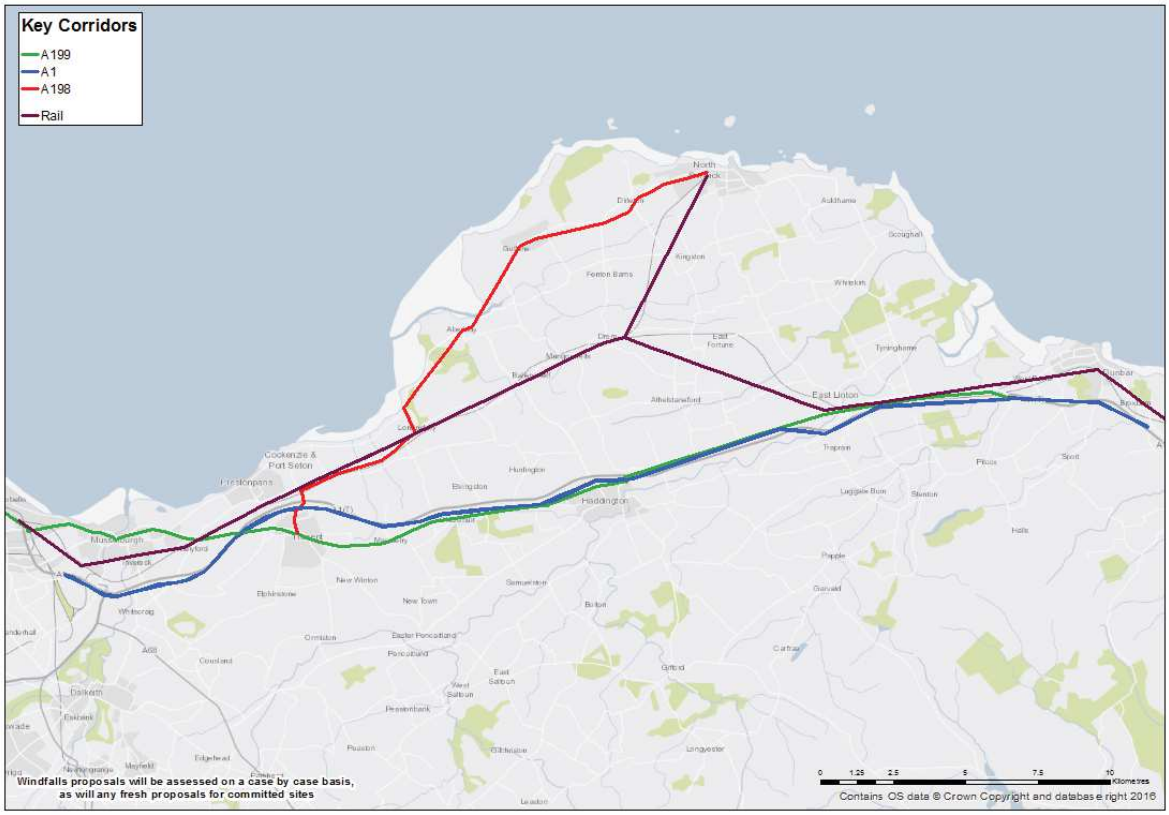

Figure 2.2 SRM Key Corridors

3 Preparation of Scenarios

3.1 Overview

3.1.1 The Model Forecasting Definition Information Note (PBA, July 2018) set out the proposed modelling scenarios and associated modelling methodology to undertake a strategic assessment of the GBD. The defined approach was subsequently agreed with Taylor Wimpey, East Lothian Council and Transport Scotland.

3.2 Definition of Forecast Scenarios

3.2.1 The following scenarios have been prepared for the GBD modelling to assess the predicted impacts of the proposed development on the strategic transport network:

Scenario	Travel Demand	Transport Infrastructure
2037 Do Minimum	2037 SRM forecast, with ELC area replaced with 2024 'With LDP including Mitigation' scenario plus growth factors to represent change in travel demand to 2037.	Identical to 2024 'with LDP including mitigation' scenario.
2037 Reference Case	As per 2037 Do Minimum scenario plus GBD development.	As per 2037 Do Minimum scenario plus GBD local network infrastructure (see Section 3.4).

3.2.2 2037 'Do Something' scenarios will be defined and prepared at a later stage to assess potential mitigation options.

ELLDP Forecast Scenarios

3.2.3 Three core travel demand forecast model scenarios were prepared during the appraisal of the ELLDP as follows:

- **Without LDP** land-use development scenario. This includes completed and committed development up to 2024 only;
- **With LDP & HLA 2017** 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), while also taking cognisance of the Housing Land Audit 2017;
- **With LDP including Mitigation.** This is as per the 'With LDP' land use development scenario, but with infrastructure included to mitigate the transport impacts of the land use associated with the LDP.

3.2.4 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. As noted above, the modelled ELLDP land-use has been applied to a model year of 2037 in line with the latest 'standard' SRM forecasts.

Table 3.1 ELLDP Summary – Modelled Land-use

Location	2012 Base Year	Without LDP (versus 2012 Base)			With LDP (versus 2012 Base)		
Households	42,984	51,559	+8,575	+20%	57,393	+14,409	+34%
Population	98,180	105,936	+7,757	+8%	115,684	+17,504	+18%
Jobs	23,317	29,528	+6,211	+27%	36,862	+13,545	+58%

3.2.5 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.

Transport Infrastructure Forecast Scenarios

3.2.6 In addition to committed road and public transport schemes, the Mitigated LDP SRM forecast includes a package of interventions that aim to address the cumulative impact of the ELLDP for a forecast year of 2024. This includes the following infrastructure improvements, which are represented in SRM:

- A1 QMU All-Ways Interchange – addition of west-bound on and off slips;
- A1 Old Craighall Interchange – signal control of roundabout;
- A1 Wallyford (Salters Road) Interchange – local widening on Salters Road and optimisation of signal control staging, phasing and timings;
- A1 Bankton Interchange – signal control of northern roundabout with local widening. Redesign of southern roundabout with local widening;
- Musselburgh Town Centre Road Network – local junction improvements at various locations including introduction of signal control;
- Tranent Town Centre Road Network – one-way system in town centre; and
- East Lothian Rail Stations – longer trains and platforms.

Forecast Scenarios – outside East Lothian

3.2.7 Travel demand and transport infrastructure in 2037 for all other areas outside East Lothian has been taken from the latest SRM12 2037 forecast prepared by Systra on behalf of Transport Scotland and which is documented in the "SRM12: 2014-2037 Forecasting: Transport Interventions Note (Systra, June 2018)".

3.3 GBD Land-Use

3.3.1 For this initial strategic assessment of GBD impacts, the quantum of development is considered to be at the higher end of possible delivery for the site which then provides a 'worst case' scenario for predicted transport impacts. The modelled GBD land-use adds the following development to the ELLDP:

- 8,500 houses; and
- 1,200 jobs.

3.4 GBD Transport Network Infrastructure

3.4.1 In the absence of a defined Masterplan (which will follow various ongoing constraints studies), two SRM zones have been prepared for residential traffic to access/egress the transport network, with a further zone used for commercial traffic.

3.4.2 The new zones are located such that they facilitate the loading of traffic onto a number of new internal access links that have been added to the SRM12 within the GBD area. Two vehicular accesses connecting to the B6363 have been included to facilitate access to/from the new internal development links. The final size and nature of these access points will be determined through an iterative process of mitigation analysis.

3.4.3 A plan showing the footprint of the GBD and the **indicative** internal road layout used for the initial strategic modelling assessment is illustrated in Figure 3.1.

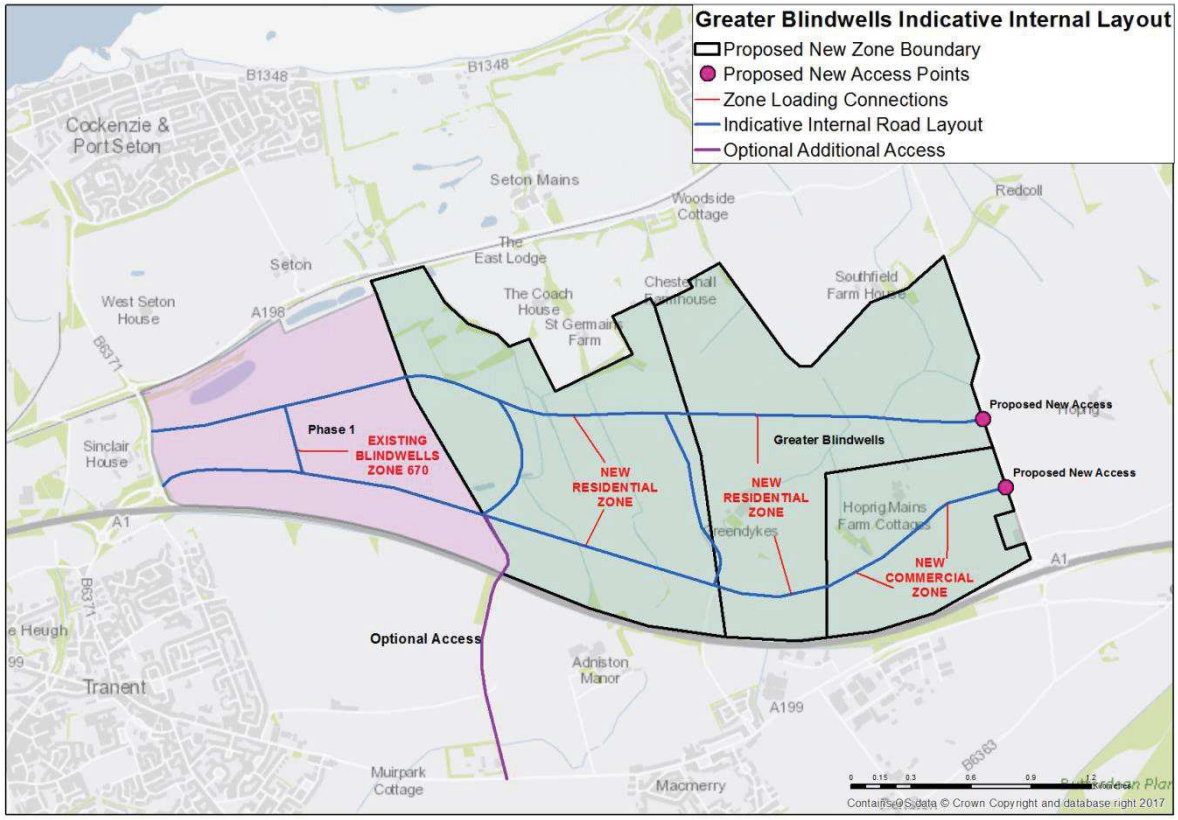

Figure 3.1 Greater Blindwells Development Indicative Plan

4 Travel Demand Forecasts

4.1 Overview

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

4.2 Trip Origins and Destinations

4.2.1 Table 4.1 and Table 4.2 present the number of production and attraction trips over a 12-hour period respectively.

Table 4.1 SRM Total 12 Hour Production Trips

Sector	2037 Do Minimum	2037 Reference Case	Difference	% Difference
Blindwells	2,967	17,553	14,586	492%
Tranent	26,879	27,148	269	1%
Prestonpans	28,484	28,720	236	1%
Musselburgh & Wallyford	70,662	71,105	443	1%
Haddington	16,533	16,738	206	1%
East Lothian Rural	13,172	13,308	136	1%
North Berwick	17,091	17,276	185	1%
Dunbar	15,805	15,943	139	1%
City of Edinburgh	1,038,426	1,043,099	4,673	0%
Rest of SRM	1,457,942	1,466,492	8,550	1%

Table 4.2 SRM Total 12 Hour Attraction Trips

Sector	2037 Do Minimum	2037 Reference Case	Difference	% Difference
Blindwells	3,532	20,782	17,250	488%
Tranent	27,617	27,829	213	1%
Prestonpans	29,464	29,621	157	1%
Musselburgh & Wallyford	72,162	72,547	385	1%
Haddington	17,030	17,183	153	1%
East Lothian Rural	13,694	13,799	104	1%
North Berwick	17,251	17,395	145	1%
Dunbar	15,752	15,861	109	1%
City of Edinburgh	1,030,878	1,035,115	4,236	0%
Rest of SRM	1,460,640	1,467,313	6,673	0%

4.2.2 Table 4.3 shows the modal split of the production and attraction trips for the Greater Blindwells area. It is split into trips associated with housing and employment. It should be noted that this data does not include the Blindwells development that already has planning permission.

Table 4.3 12-Hour Production and Attraction Trips for the Greater Blindwells Development (persons)

		Car	PT	Park & Ride	Total
Productions	Housing	11,175	2,471	78	13,725
	Employment	797	65	0	862
	Total	11,972	2,536	78	14,587
Attractions	Housing	13,452	2,895	78	16,426
	Employment	811	72	0	883
	Total	14,263	2,967	78	17,309

4.2.3 Table 4.4 presents the traffic trips originating at Greater Blindwells in the AM peak hour and trips destined for Greater Blindwells in the PM peak hour. This is further split into trips associated with the housing zones and the employment zone.

Table 4.4 Peak Direction Traffic Origin and Destination Trips for the Greater Blindwells Area (PCUs)

	Origins (AM Peak Hour)	Destinations (PM Peak Hour)	Total
Housing	2,829	1,781	4,610
Employment	266	249	515
Total	3,095	2,030	5,125

4.2.4 Table 4.5 shows the PT trips originating at Greater Blindwells in the AM peak hour and trips destined for Greater Blindwells in the PM peak hour. This is further split into trips associated with the housing zones and the employment zone.

Table 4.5 Peak Direction PT Origin and Destination Trips for the Greater Blindwells Area (persons)

	Origins (AM Peak Hour)	Destinations (PM Peak Hour)	Total
Housing	1,072	518	1,590
Employment	1	2	3
Total	1,073	520	1,593

4.2.5 A series of Figures showing the distribution of trips to/from the Greater Blindwells Development are provided in Annex A. From these, the distribution of road trips to and from the GBD is disparate, but there are pockets of predicted higher levels of travel to\from West Edinburgh, East Edinburgh, Musselburgh, North Berwick and also local to the site (within a few miles). PT trips are also disparate with a predicted pocket of higher level of travel to\from the centre of Edinburgh.

4.2.6 It should be noted that the distribution of travel to\from the GBD has been derived from the use of a donor SRM zone in a similar location with a mix of residential and employment land use. It has then been run through the SRM demand model which will consider distribution and modal shift (depending on car availability) and can make changes to the distribution. It is also possible to look at 'what if' scenarios should there be a consideration of a higher level of site containment – ie where new residents to the GBD site may take up new employment opportunities also on

the GBD site (or on the adjacent Cockenzie site). This would reduce the need for wider travel, but would be an assumption for a potential alternative forecast scenario. This was suggested in the original proposal for this work, but to be considered after the development and analysis of the three mitigation scenarios noted in Section 1.1.5.

4.3 Travel Demand on Network

4.3.1 Table 4.6 presents the two-way vehicle km along the key corridors defined in section 2.4.2.

Table 4.6 Two-way Vehicle Kilometres on Key Corridors

	Corridor	Do Minimum	Reference Case	% Difference
AM Peak	A199	24,186	24,638	2%
	A1	112,316	117,360	4%
	A198	21,336	20,740	-3%
	Total	157,839	162,737	3%
PM Peak	A199	25,810	25,782	0%
	A1	193,370	197,924	2%
	A198	22,456	22,974	2%
	Total	241,636	246,681	2%

4.3.2 As anticipated, there is a general increase in vehicle kms. However, a negative or slight change can also be as a result of high levels of congestion restricting traffic movements.

4.3.3 Table 4.7 shows the two-way passenger km along the main corridors defined in section 2.4.2.

Table 4.7 Two-way Passenger Kilometres on Key Corridors

	Corridor	Do Minimum	Reference Case	% Difference
AM Peak	A199	12,847	15,723	22%
	A1	6,099	10,191	67%
	A198	2,257	2,765	23%
	Rail	141,406	145,989	3%
	Total	162,608	174,668	7%
PM Peak	A199	12,849	13,978	9%
	A1	11,593	14,802	28%
	A198	2,122	2,314	9%
	Rail	129,240	132,385	2%
	Total	155,804	163,479	5%

4.3.4 Annex B contains a series of Figures showing the change in traffic (in PCUs) comparing the GBD 'Do Minimum' and 'Reference Case'. This includes the change in modelled 'demand' traffic flows which do not include capacity restraint (ie the level of demand if there was no congestion on the roads) as well as the change in modelled 'actual' traffic flows which do include the effect of capacity restraint on downstream links (ie the traffic that can actually get through the network during the modelled hour despite levels of congestion).

4.3.5 Inspection of these Figures reveals the following key points:

- The 'Reference Case' traffic flows reflect the increase in travel demand associated with the GBD;
- Comparison of the change in 'demand' and 'actual' shows there is significant capacity restraint forecast on the network, particularly west of Salters Road junction on the A1 and A720 Edinburgh Bypass; and
- If mitigation measures were implemented and they relieved these congestion hot spots, it is possible that the downstream impacts may be more significant than currently shown.

4.3.6 Annex C contains a series of Figures presenting the change in public transport flows comparing the GBD 'Do Minimum' and 'Reference Case'. This shows a predicted increase in PT flows on rail and bus which reflects the increase in travel demand associated with the GBD. The resultant level of demand exceeds

4.4 Park and Ride

4.4.1 Table 4.8 shows the park and ride sites that travellers from the GBD would likely access, and the forecasted usage and utilisation of the sites. Usage at almost all sites increases. Sites around Edinburgh Bypass change at lower rates (or even negative at Shawfair), which is reflective of the increased levels of congestion along the A1 towards these sites. Demand for the Dunbar site exceeds capacity in the 'Do Minimum' scenario.

Table 4.8 Usage and Utilisation of Park and Ride Sites in East Lothian and Edinburgh

Site	Capacity	Usage			Utilisation		
		Do Minimum	Reference Case	% Difference	Do Minimum	Reference Case	% Difference
Drem	78	34	38	13%	43%	49%	6%
Dunbar	65	76	80	4%	117%	122%	5%
Longniddry	153	42	46	9%	28%	30%	3%
North Berwick	96	45	47	4%	47%	49%	2%
Musselburgh	122	26	28	8%	21%	23%	2%
Prestonpans	165	124	132	6%	75%	80%	5%
Wallyford	389	184	200	9%	47%	51%	4%
Newcraighall	582	297	313	5%	51%	54%	3%
Sheriffhall	561	145	146	1%	26%	26%	0%
Brunstane	25	12	22	89%	46%	87%	41%
Shawfair	59	25	23	-9%	43%	39%	-4%

5 Network Impacts

5.1 Overview

5.1.1 This section describes the predicted impacts that the GBD will have on the road and public transport networks.

5.2 Road Network Average Speeds

5.2.1 Table 5.1 shows the two-way average speeds on the key corridors defined in section 2.4.2. As expected, the average speed decreases on all key corridors, particularly on the A1.

Table 5.1 Two-way Average Speeds (in kmph) on Key Corridors

	Corridor	Do Minimum	Reference Case	% Difference
AM Peak	A199	33	30	-8%
	A1	78	65	-17%
	A198	52	51	-2%
	Total	61	54	-12%
PM Peak	A199	36	35	-2%
	A1	78	72	-7%
	A198	52	51	-1%
	Total	66	63	-5%

5.3 Road Network Performance

5.3.1 A series of Figures in Annex D present the predicted Ratio of Flow to Capacity (RFC) on the transport network (links and junction arms) in the AM and PM Peaks, for the modelled scenarios. These should be considered in the context of the strategic network representation of the road network in SRM.

5.3.2 Inspection of these Figures indicates the following key points:

- The access roads around the GBD (in all directions – to the A198 and A1) are predicted to exceed capacity, particularly in the AM peak hour. This causes the capacity on Bankton and Gladsmuir junctions to be exceeded; and
- In the 'Do Minimum' scenario, Salters Road junction exceeds capacity in the AM peak hour, this is worsened by the introduction of the GBD.

5.4 Public Transport Network Performance

5.4.1 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 8-car trains in line with the ELLDP Mitigation proposals.

5.4.2 Figure 5.1 and Figure 5.2 show rail boardings and alightings at each of the stations and loadings on the North Berwick rail line as follows:

- GBD 'Do Minimum' boardings (orange bar) and alightings (red bar)
- GBD 'Reference Case' boardings (light blue bar) and alightings (dark blue bar)
- GBD 'Do Minimum' loading on departure (red line with triangle markers)
- GBD 'Reference Case' loading on departure (blue line with triangle markers)
- Seated capacities and crush capacities – square and circle marker series respectively

5.4.3 The graphs show the forecast passenger loadings on the 8-car services exceed the seated capacity between Wallyford, Musselburgh and Edinburgh in both the GBD 'Do Minimum' and 'Reference Case' scenarios. This is focused on westbound services in the AM and eastbound services in the PM, reflecting anticipated commuting patterns.

5.4.4 The inclusion of the GBD development land-use and travel demand in the 'Reference Case' scenario is reflected in an increase in passenger volumes on the rail network notwithstanding the capacity restraint in the 'Do Minimum' scenario. This level of demand exceeds the crush capacity in the morning peak inbound to Edinburgh and is likely to represent a supressed flow which would increase if greater capacity were provided.

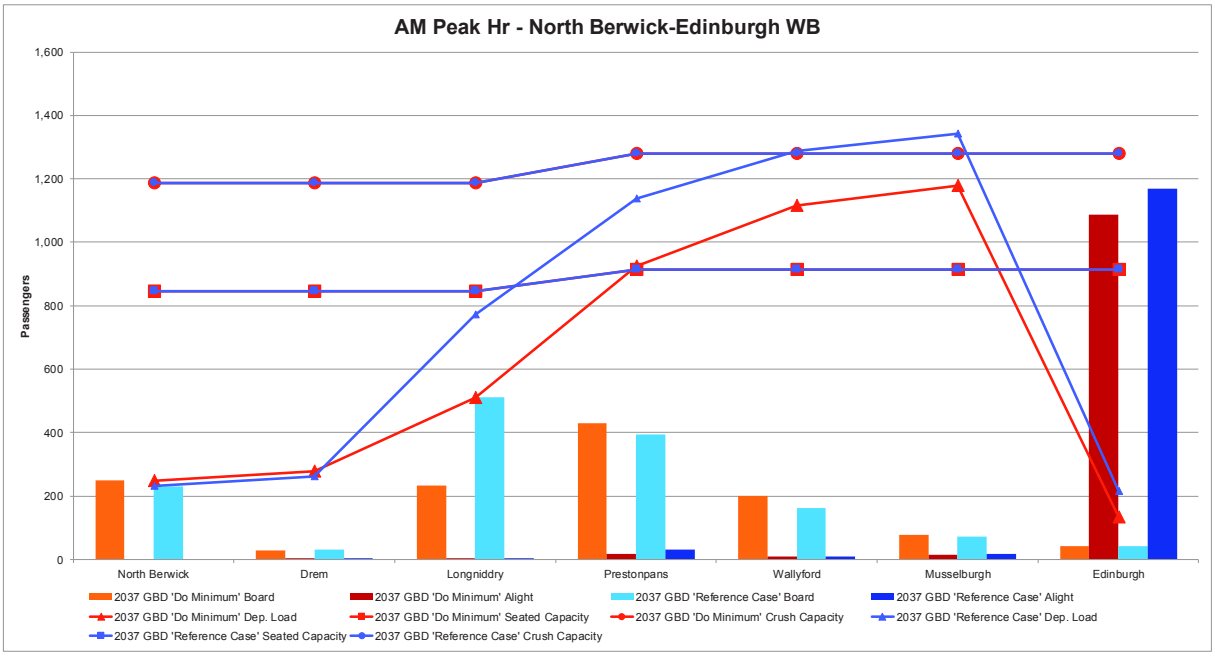

Figure 5.1 AM Peak Hour Westbound Rail Loadings

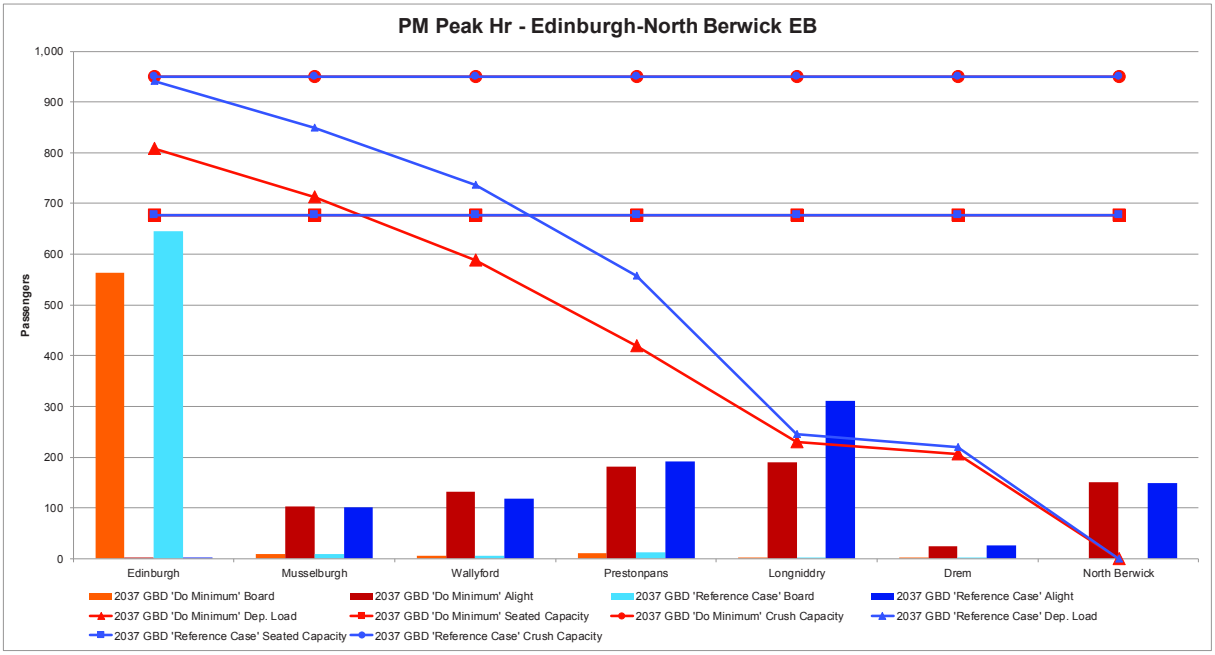

Figure 5.2 PM Peak Hour Eastbound Rail Loadings

5.5 Summary

5.5.1 Figure 5.3 shows the *key network hotspots* for the 'Reference Case', indicating where crush capacity is exceeded on the rail network and where capacity is exceeded on the road network.

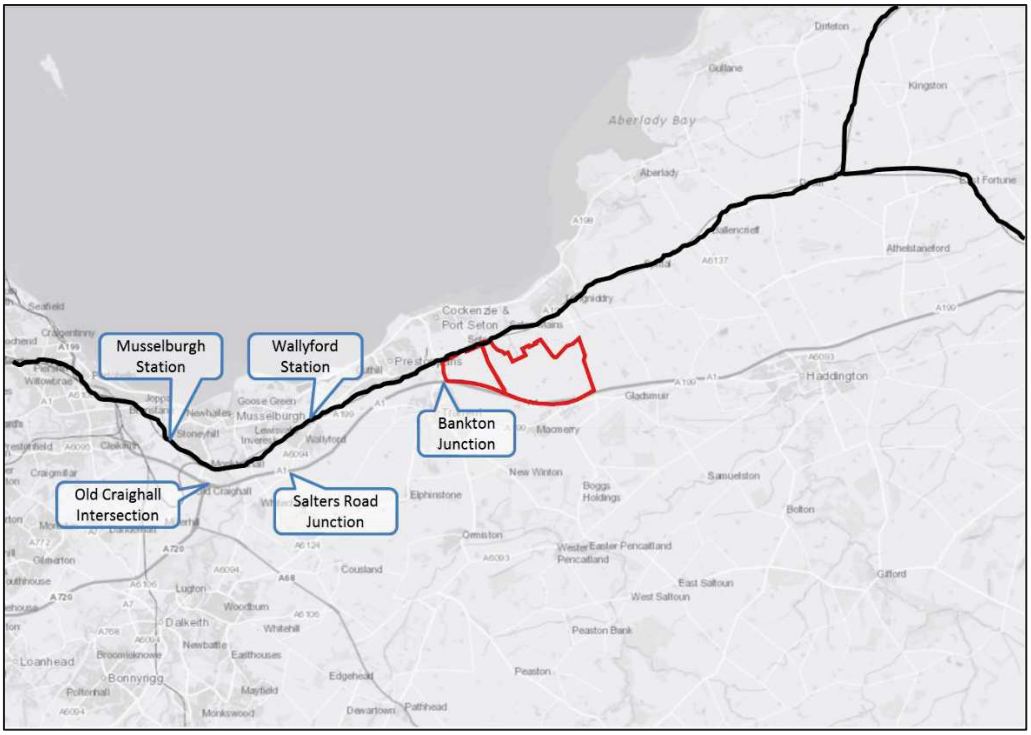

Figure 5.3 'Reference Case' Network Hotspots

5.6 Next Steps

5.6.1 The next step in this study is to consider infrastructure intervention options that could mitigate the impacts highlighted at the various locations outlined throughout the Do Minimum vs Reference Case analysis presented here and in-line with the three proposed scenarios discussed in Section 1.1.5. This is likely to include:

- Improvements to site access;
- Trunk Road junction and link improvements (eg A1, A720 and junctions at Bankton, Salters Road, Old Craighall);
- Bus Service provision;
- Park & Ride provision; and
- Rail options.

5.6.2 An outline specification of the three scenarios will be developed and shared with the client group for comment before the model runs are undertaken and analysis reported.

5.7 Further Considerations

5.7.1 Within the proposal to undertake this work (Section 3), a series of further considerations were suggested in consideration of the overall approach. A subset of these considerations is repeated here and expanded considering the analysis in this report and recent developments in other work 'in and around' the Blindwells site as follows:

- **Inclusion of Cockenzie:** While this proposal focuses on the inclusion of Greater Blindwells in addition to the current LDP and background traffic growth, it may also be prudent to consider a future scenario which also includes the development of the former Cockenzie Power Station site which is in close proximity to the Blindwells Development;

Further Comment: *A STAG appraisal of 'West' East Lothian is now underway. Part of this exercise will consider the predicted performance of the transport network in a future year where GBD is complete and the Cockenzie development is also fulfilled. The work reported here (to consider the GBD) will form the basis to build upon a representation of the Cockenzie development and associated transport interventions that arise from the STAG consultation and baselining work.*

- **Alternative Travel Demand Scenarios:** There are a wide range of uncertainties in forecasting long term developments and traveller behaviours. For the purpose of this study, we propose to consider the continuation of 'business as usual' trends that are inherent in the SRM12 model and contained within current modelling guidance. Given the possible horizon year that a Greater Blindwells development may be completed, it may also be prudent to consider additional forecast scenarios that consider further variations in forecast trends for aspects such as;
    - **Demographic change**: e.g. ageing population;
    - **Economic scenario**: e.g. sectoral change / employment trends;
    - **Short-medium term transport** as specified in DfT's Web Based Transport Appraisal Guidance (WebTAG): e.g. cost of travel, vehicle fleet assumptions;
    - **Transport:** e.g. reductions in personal trip making;
    - **Workplace:** e.g. changes in working practices – flexibility\remote working\multiple jobs\gig economy;

- **Business travel:** e.g. improved video communications;
- **Shopping:** e.g. online trends;
- **Licence holding:** e.g. will younger people continue to learn to drive? Peak Car?;
- **Decarbonisation of vehicle fleet:** Uncertainty how this feeds into behavioural change and how road transport is paid for by the consumer in future - new charging regimes likely;
- **Automation & Connectivity:** Partly or fully autonomous vehicles would create a wholly new paradigm in terms of e.g. the use of time spent whilst travelling, safety and network efficiency;
- **Car Ownership models:** 'Car ownership' versus 'the car as a public service' models could also have a major impact on travel behaviour; and
- **Other digital:** improved digital platforms may bring new travel opportunities and options. Developments in integrated payments & ticketing may also enhance public transport.

Further Comment: *The current work has been undertaken using a single scenario for future development using a 'standard' application of the model. Consideration should be given to varying these forecasts to represent possible future impacts that could influence lower car ownership and use and, in particular, a higher level of containment for the GBD site where more of the new residents are employed in the new commercial developments.*

5.7.2 These further considerations will be discussed further in the report that will summarise the three mitigation scenarios.

INFORMATION NOTE

DOCUMENT ISSUE RECORD

Document	Rev	Date	Prepared	Checked	Reviewed	Approved
IN3 - Network Performance Review	1.3	12/02/19	SS	AB	KL	DMcD

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Annex A Distribution of Trips to/from the GBD

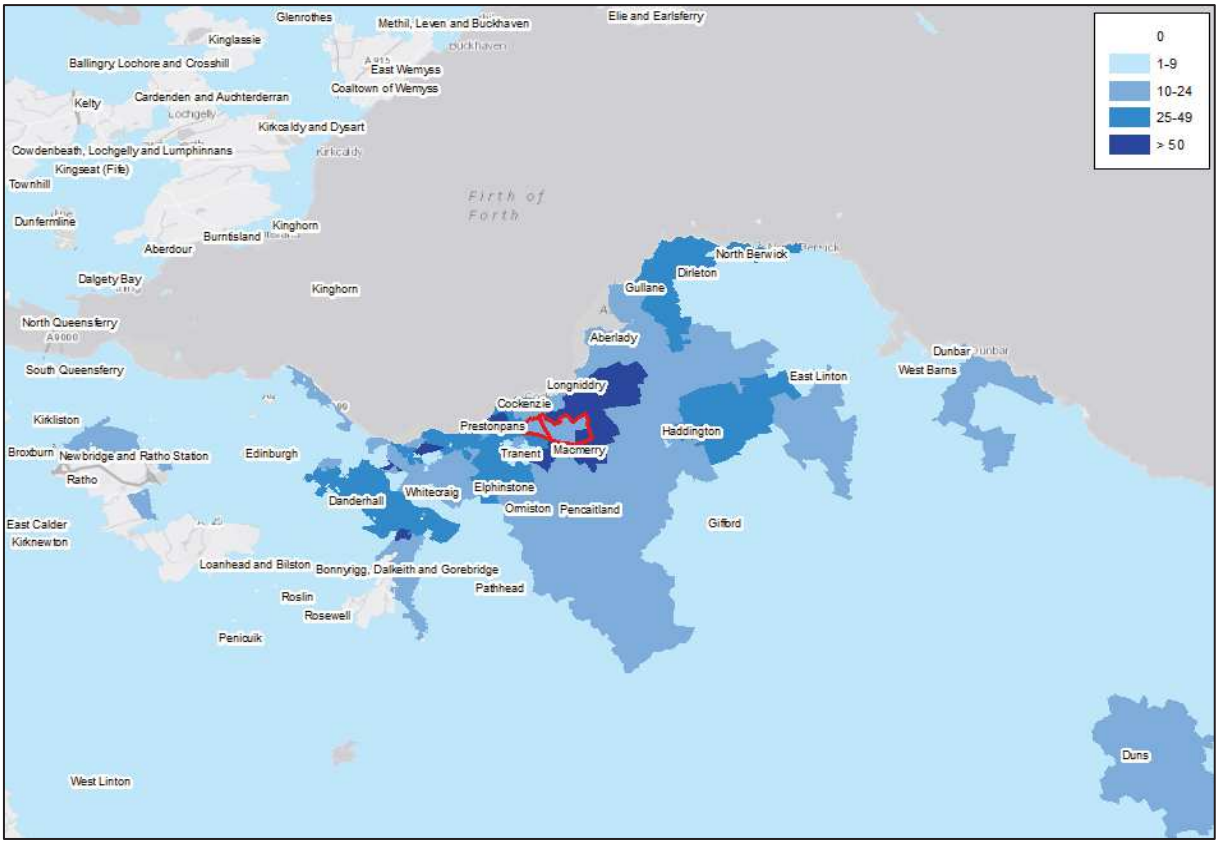

Figure A.1 2037 GBD 'Reference Case' Road Trips Originating from GBD (PCUs) – AM Peak Hour

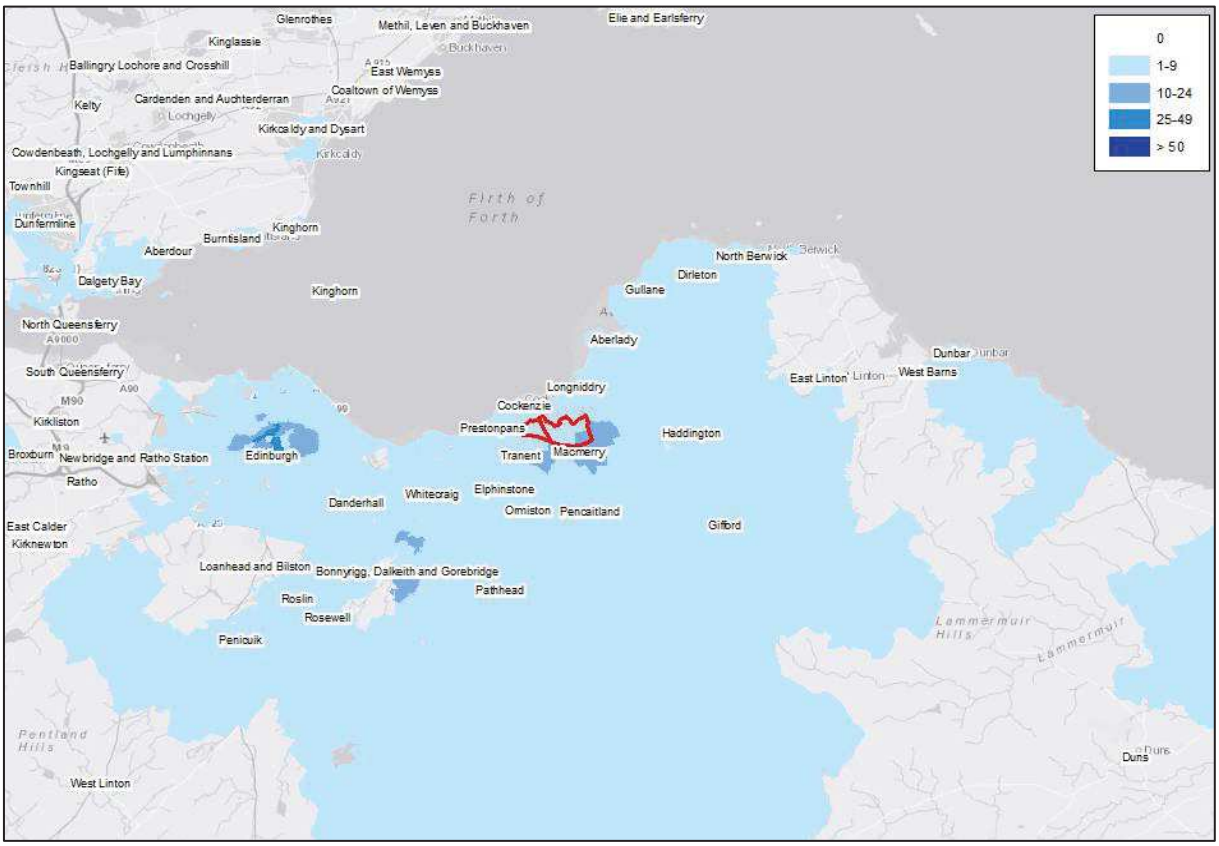

Figure A.2 2037 GBD 'Reference Case' PT Trips Originating from GBD (persons) – AM Peak Hour

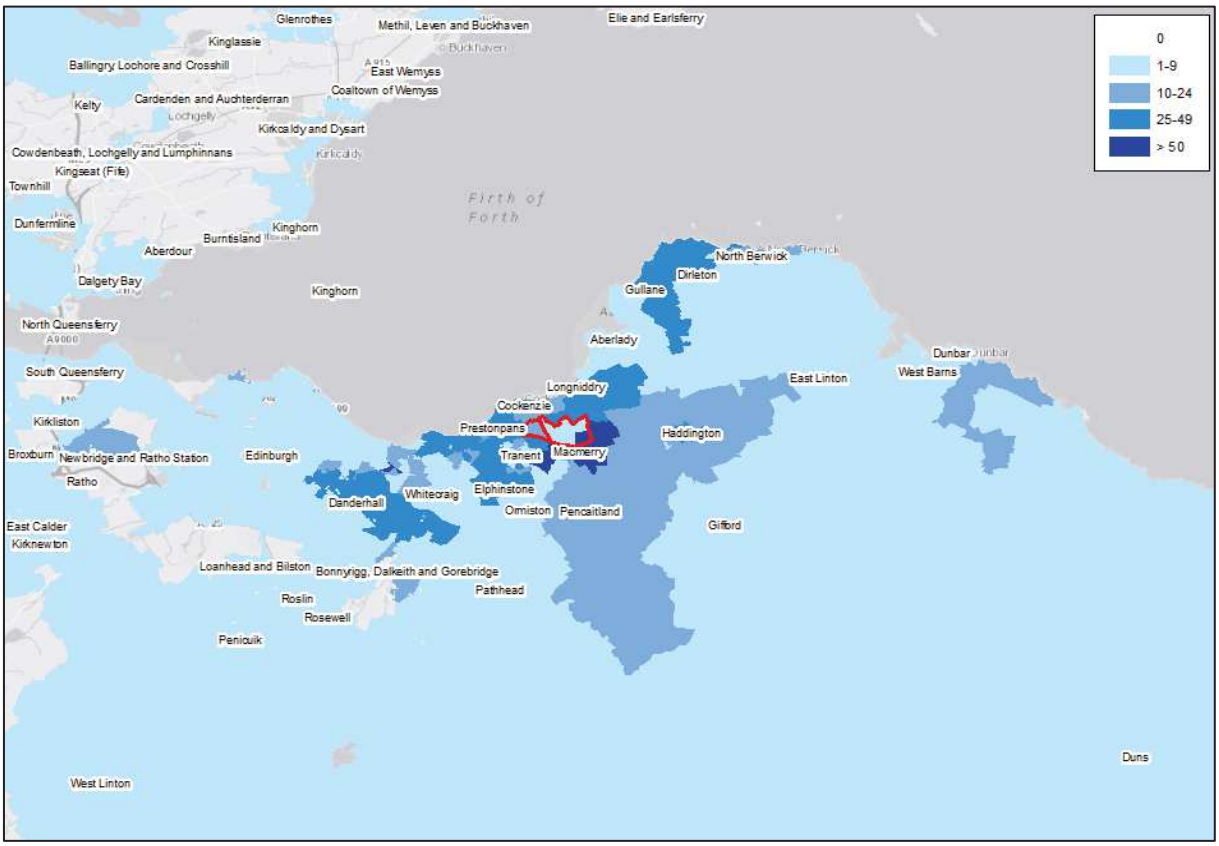

Figure A.3 2037 GBD 'Reference Case' Road Trips Destined for GBD (PCUs) – PM Peak Hour

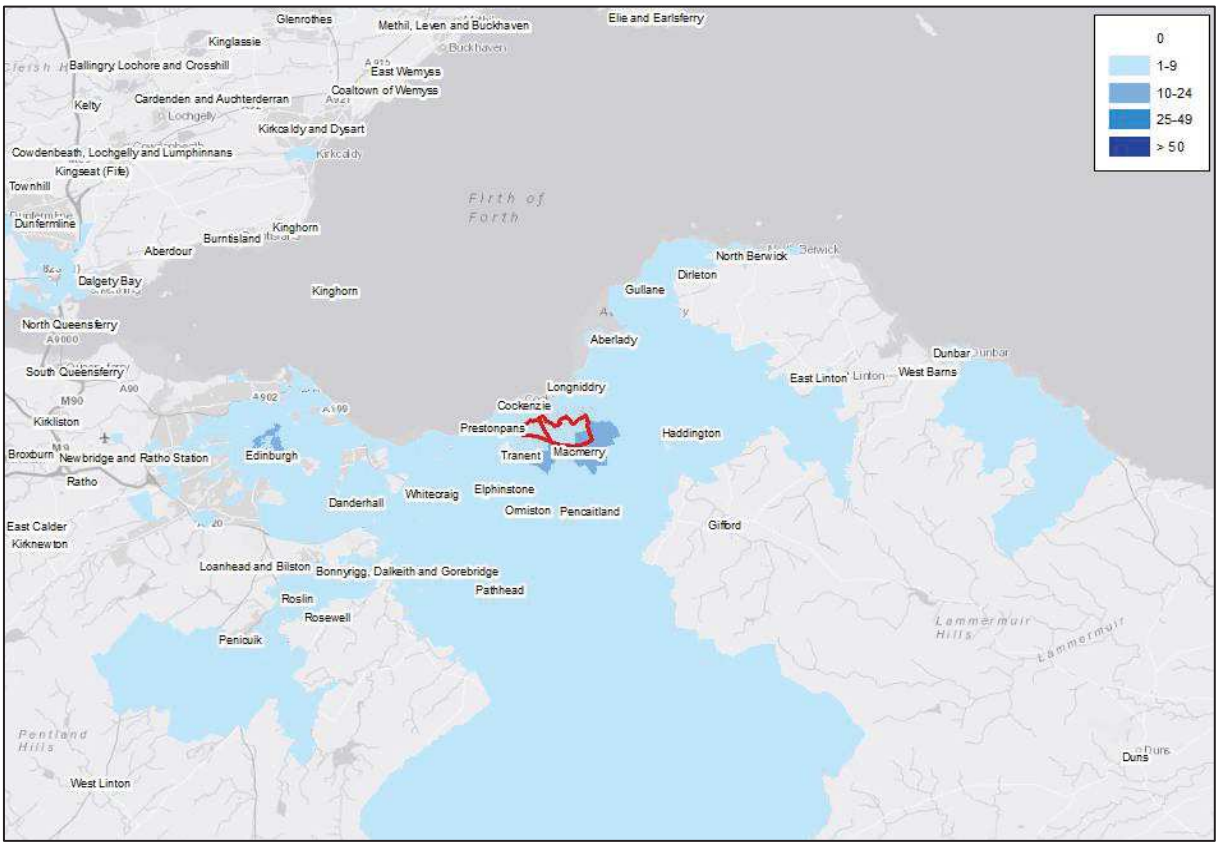

Figure A.4 2037 GBD 'Reference Case' PT Trips Destined for GBD (persons) – PM Peak Hour

Annex B Comparison of Traffic Flow

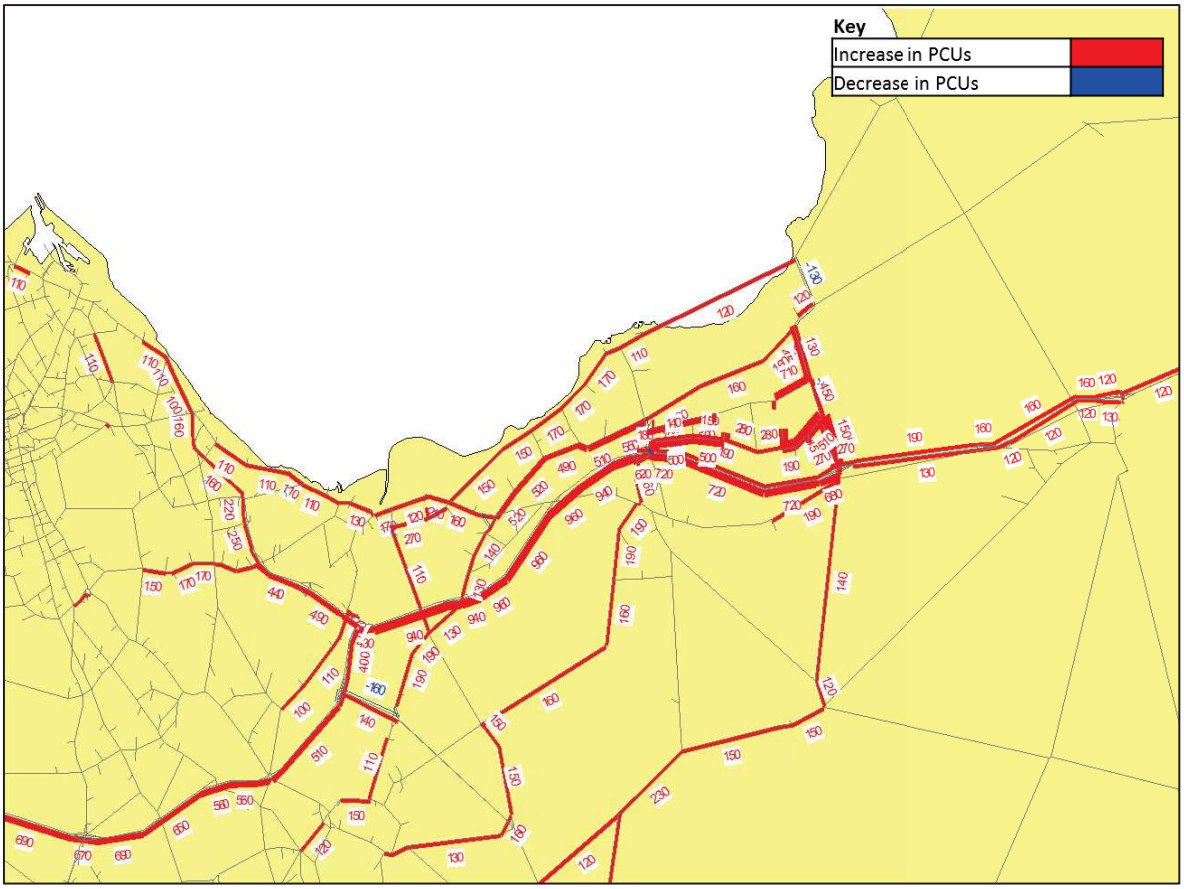

Figure B.1 2037 GBD 'Do Minimum' vs 'Reference Case' Change in Demand Traffic Flow (PCUs) – AM Peak Hour

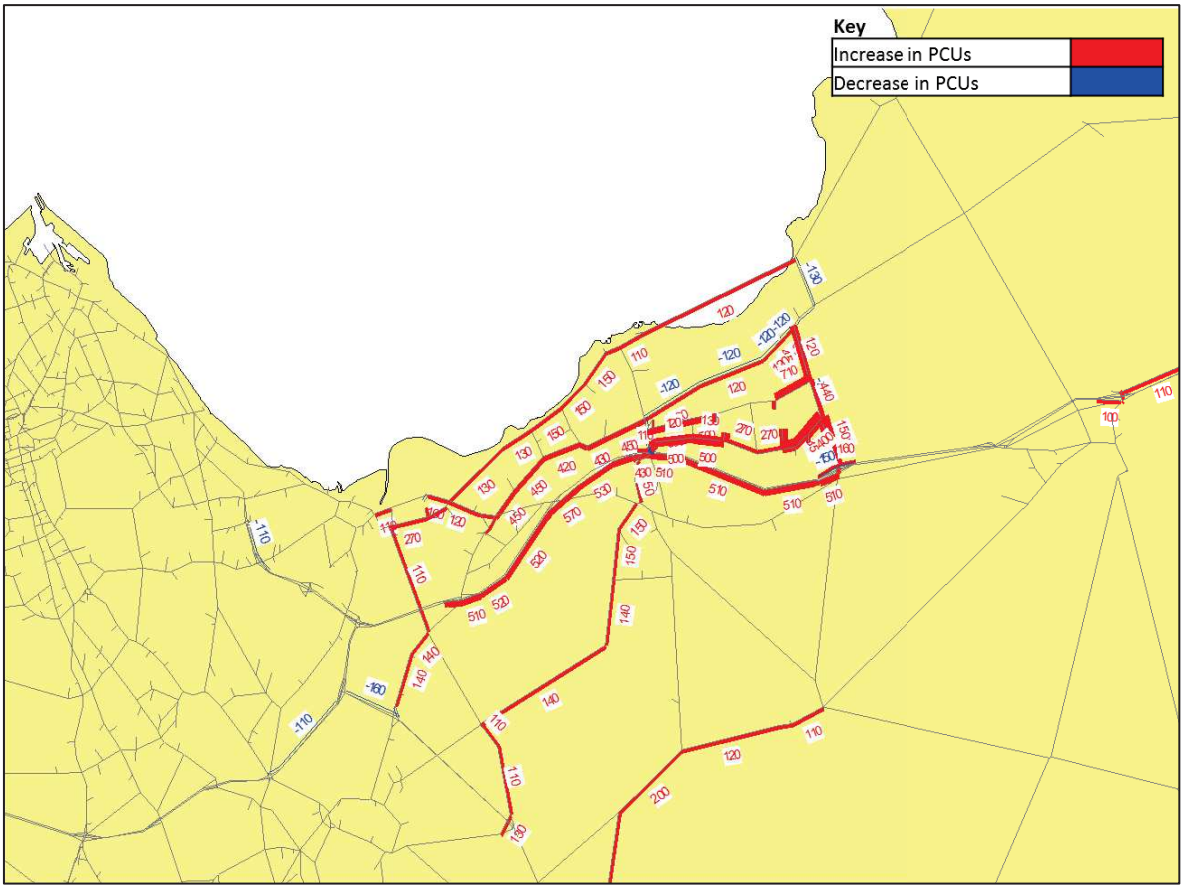

Figure B.2 2037 GBD 'Do Minimum' vs 'Reference Case' Change in Actual Traffic Flow (PCUs) – AM Peak Hour

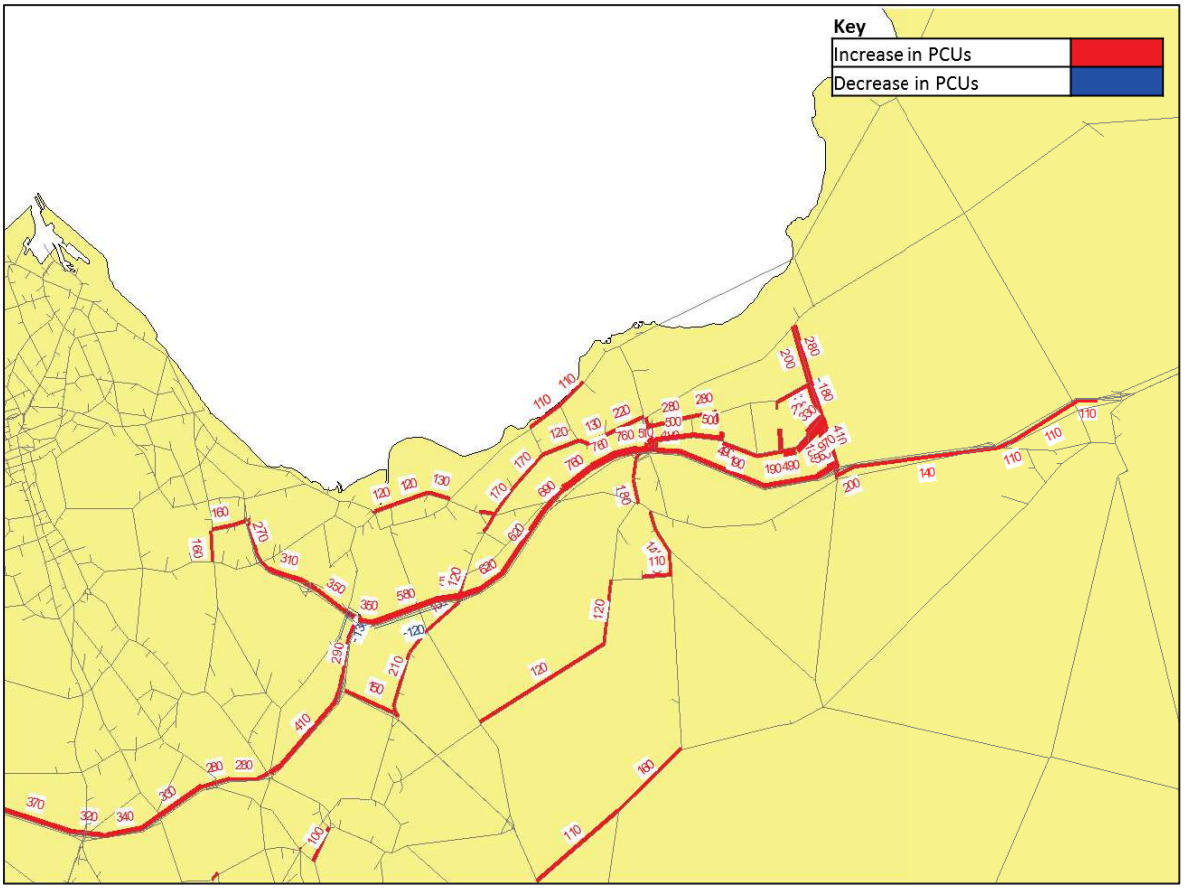

Figure B.3 2037 GBD 'Do Minimum' vs 'Reference Case' Change in Demand Traffic Flow (PCUs) – PM Peak Hour

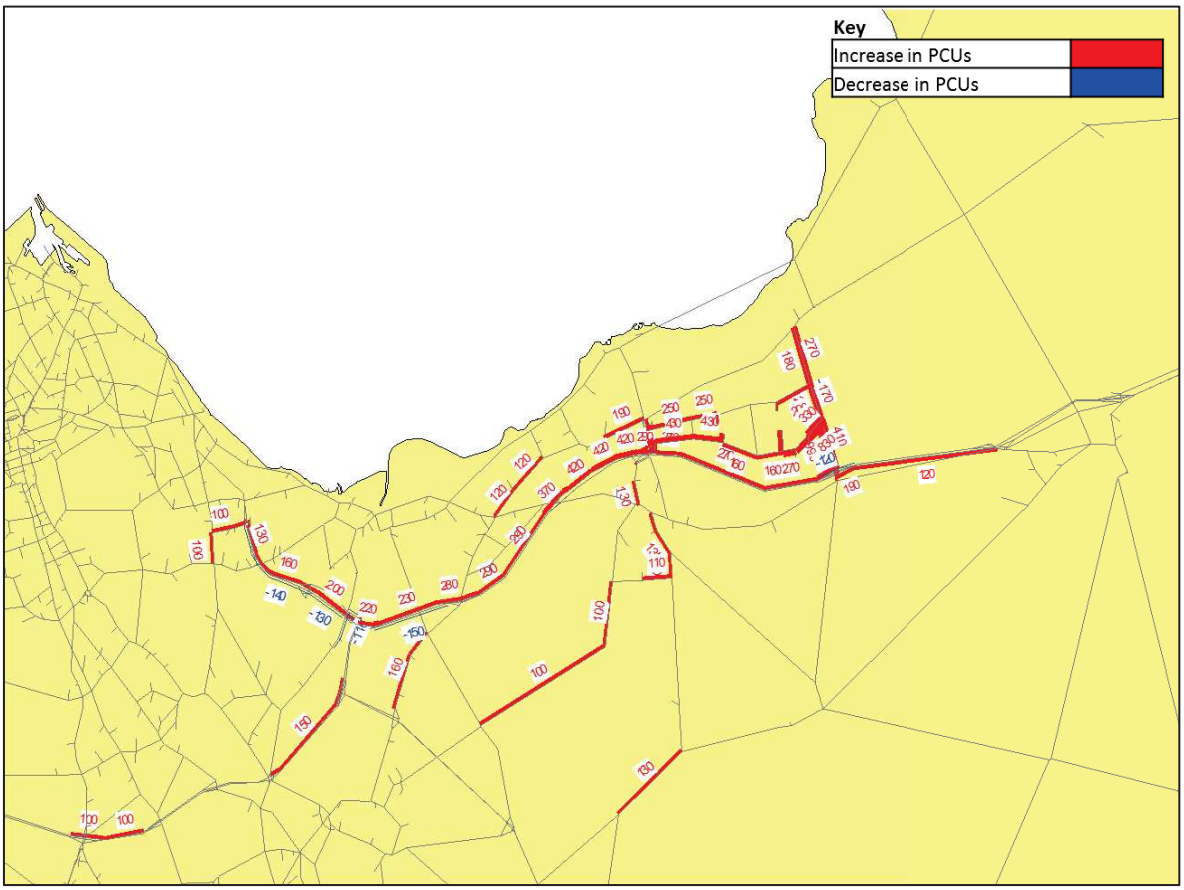

Figure B.4 2037 GBD 'Do Minimum' vs 'Reference Case' Change in Actual Traffic Flow (PCUs) – PM Peak Hour

Annex C Comparison of PT Passenger Flow

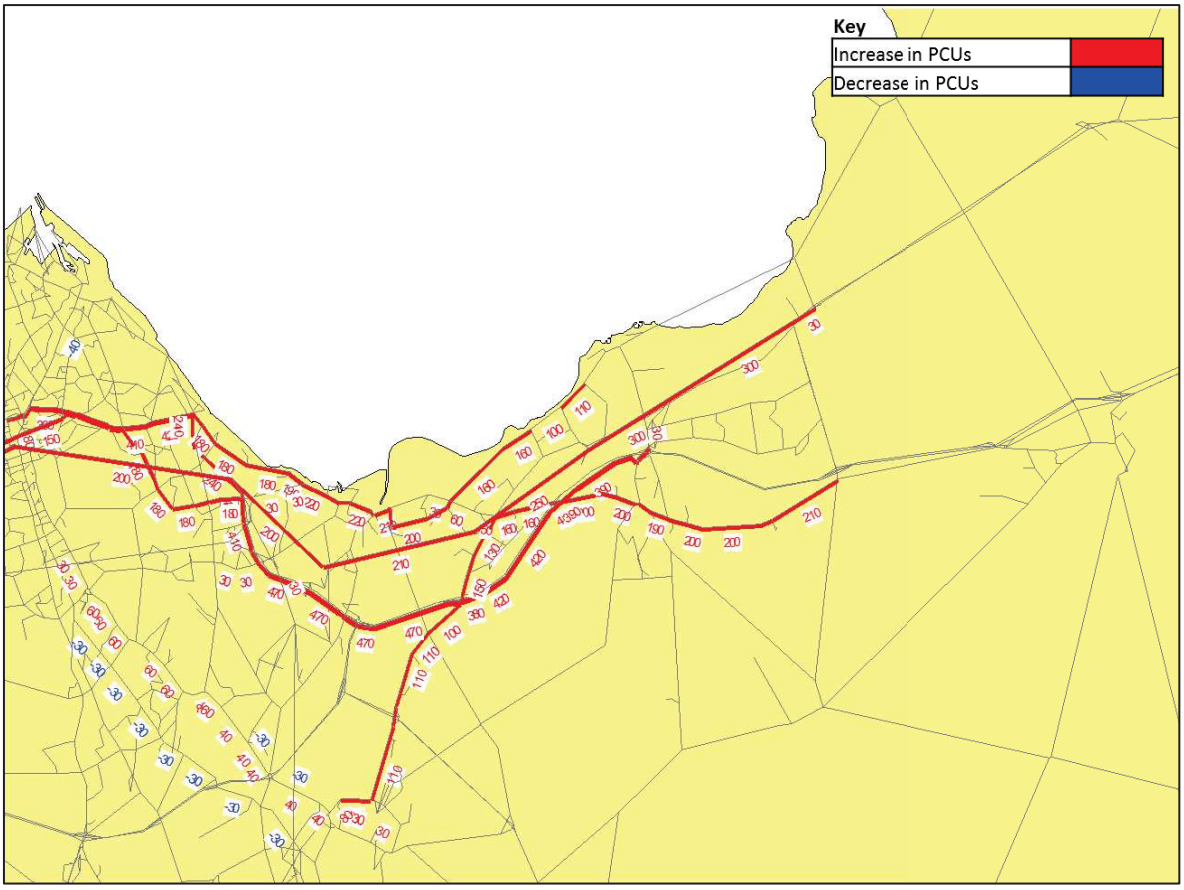

Figure C.1 2037 GBD 'Do Minimum' vs 'Reference Case' Change in PT Passenger Flow (persons) – AM Peak Hour

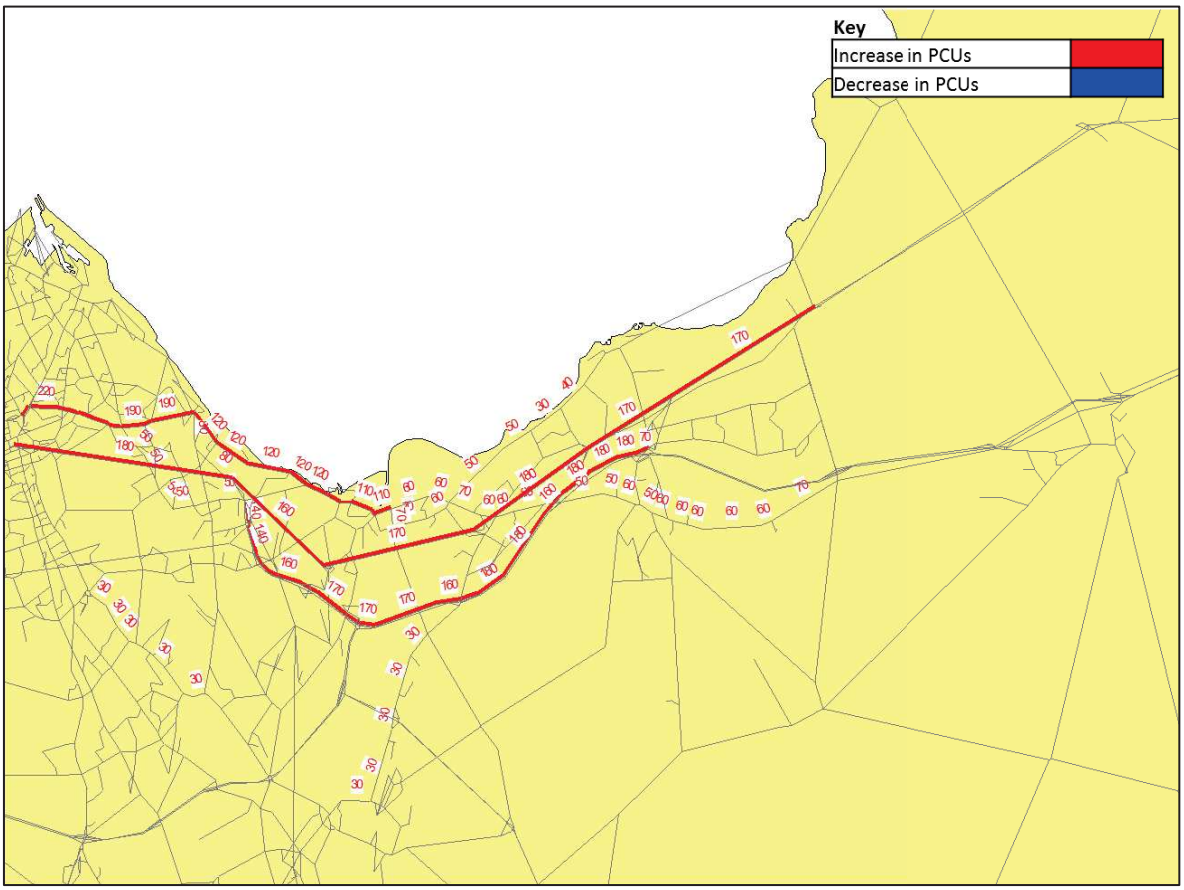

Figure C.2 2037 GBD 'Do Minimum' vs 'Reference Case' Change in PT Passenger Flow (persons) – PM Peak Hour

Annex D Predicted Ratio of Flow to Capacity

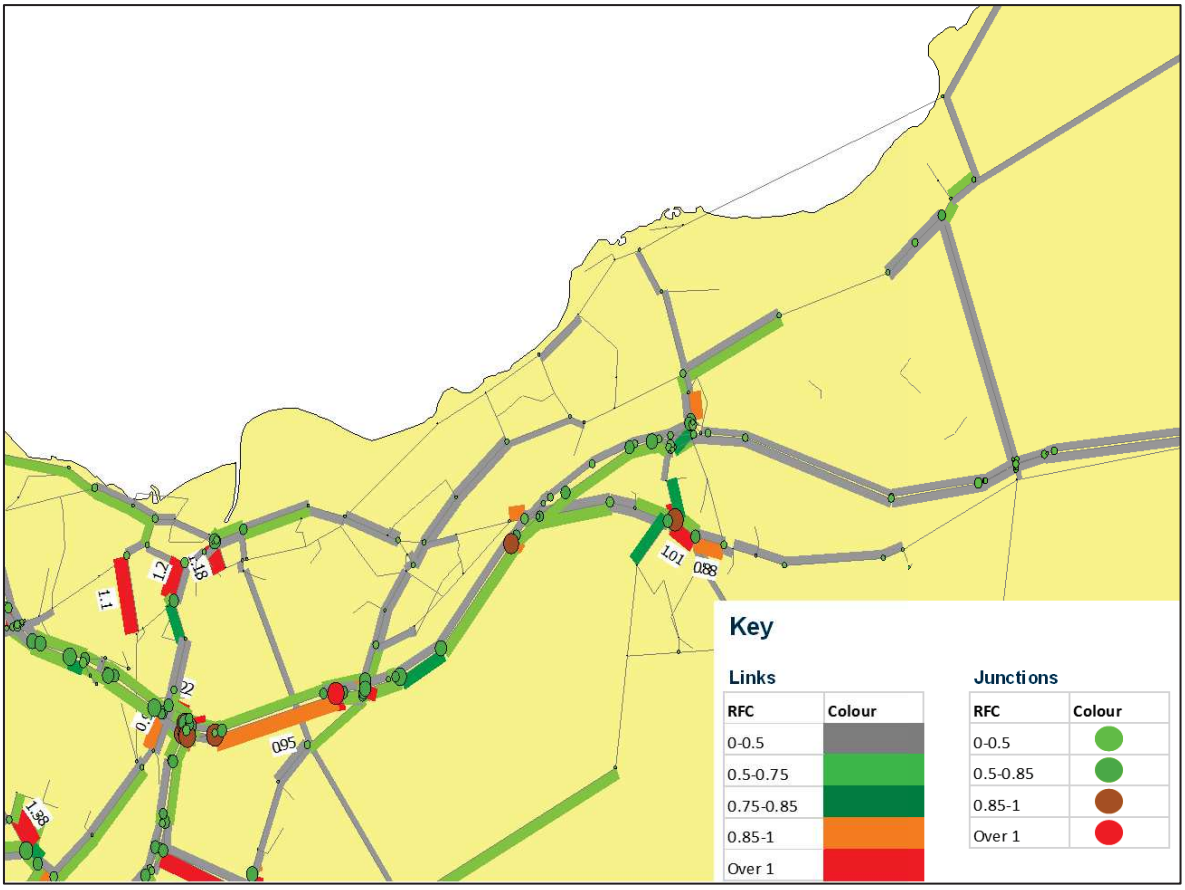

Figure D.1 2037 GBD 'Do Minimum' Network Performance – AM Peak Hour

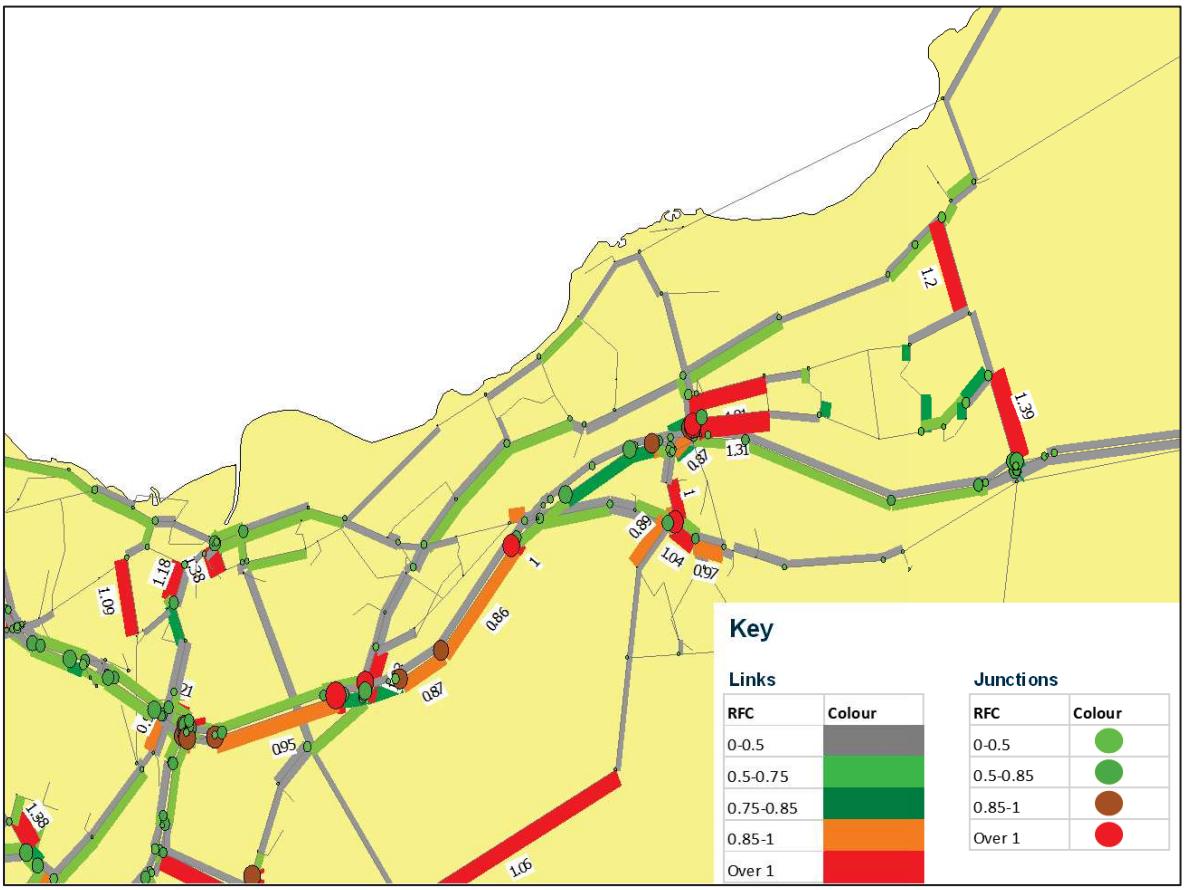

Figure D.2 2037 GBD 'Reference Case' Network Performance – AM Peak Hour

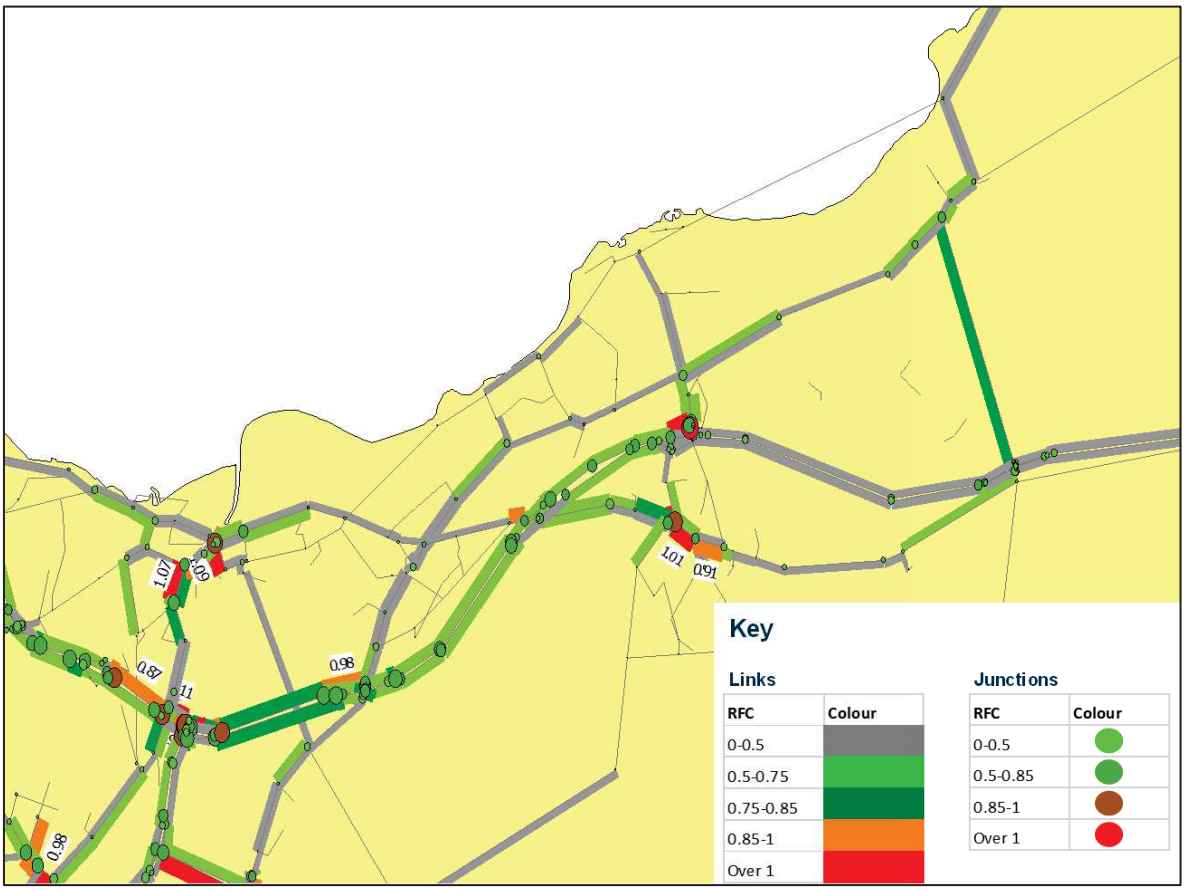

Figure D.3 2037 GBD 'Do Minimum' Network Performance – PM Peak Hour

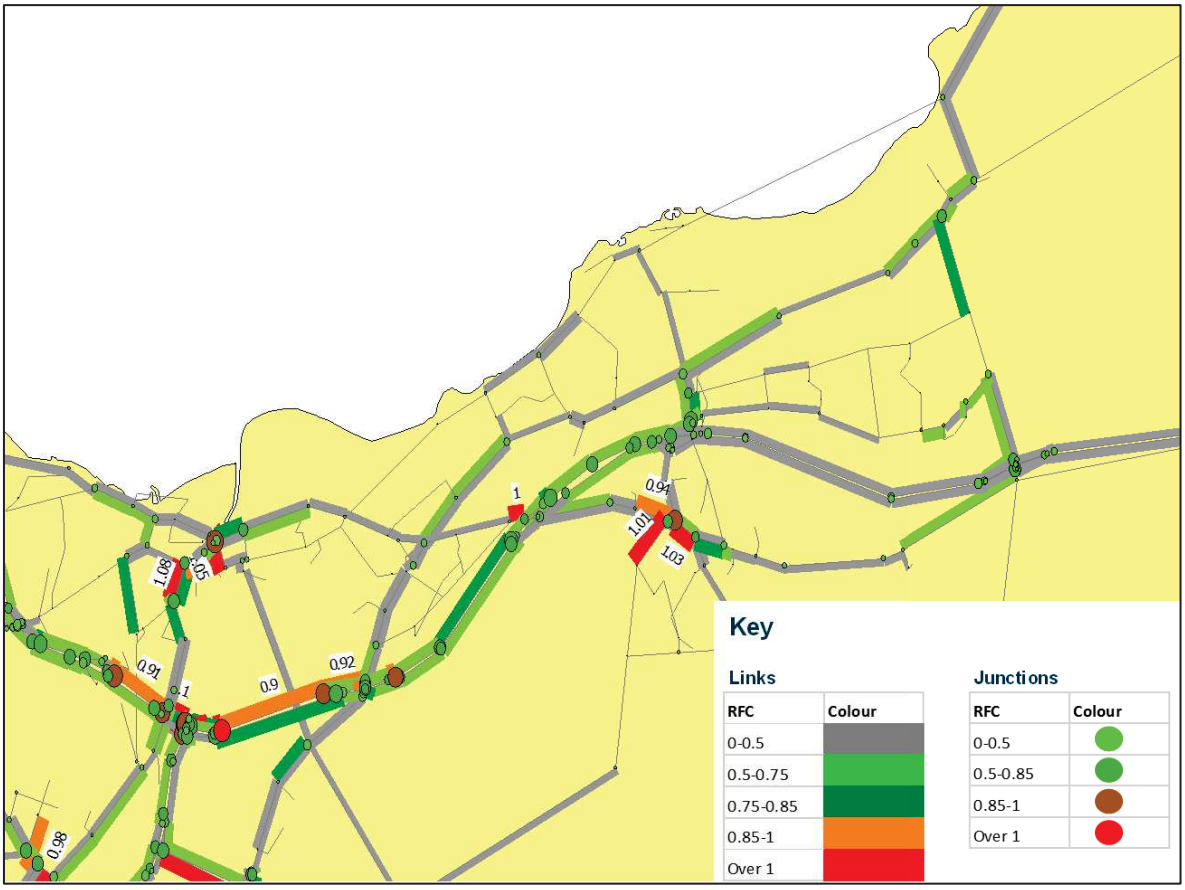

Figure D.4 2037 GBD 'Reference Case' Network Performance – PM Peak Hour