Canterbury Local Plan

Canterbury Local Plan – Preferred Strategic Growth Local Plan Option

13 July 2022

Kent County Council

KCC

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Canterbury Local Plan

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Contents

Limitation Statement

The sole purpose of this technical report is to describe the processes by which the 2045 Canterbury Local Plan demand forecasts has been carried out using the Canterbury Local Transport Model. This report should be read in full with no excerpts out of context deemed to be representative of the report and its findings as a whole. This report has been prepared exclusively for Jacobs and Jacobs' end client (Kent County Council) and no liability is accepted for any use or reliance on the report by third parties.

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1. Introduction

1.1 Background

Canterbury City Council (CCC) has commissioned Jacobs to develop their preferred strategic growth Local Plan (LP) option. The main aims of the District Transport Strategy are to improve travel choices, travel awareness and road safety within the area, reduce traffic congestion and travel demand, improve journey time reliability, and reduce greenhouse gas emissions as a result of traffic congestion. The focus is on shifting the modes of transport used, promoting all possible transport choices including walking, cycling, the use of public transport and introduction of park and rides, and work on removing dependency on private car usage.

The objectives of the LP spatial assessments are to:

1) Assess the quality and capacity of transport infrastructure across the District and its ability to meet forecast demands;
2) Assess the cumulative impacts of the Canterbury Local Plan Review (LPR) development options on the District's transport network; and
3) Identify proposals and potential measures to mitigate the impacts of development to inform the infrastructure requirements associated with the LPR. This should include, but is not limited to:
    a) Identification of potential measures to enable and achieve higher levels of sustainable transport mode share across the District;
    b) Identification of the potential barriers to the utilisation of sustainable transport modes across the District; and
    c) Identification of potential intervention measures on the transport network.

Jacobs previously proposed three stages in which traffic modelling can be used to contribute towards the Local Plan Review evidence base:

d) Stage 1 (Initial Assessment): A review of existing (baseline) conditions to help identify current network "hotspots" (completed in January 2020);
e) Stage 2 (High-Level Spatial Assessment): High-level spatial option testing, which was initially planned to use the existing Canterbury traffic models. The base model (2008) has been updated to 2019, however the LPR options were not available by October 2020. So, at the request of CCC and Kent County Council (KCC), the further option testing couldn't progress for this stage using the existing Canterbury traffic models; and
f) Stage 3 (Spatial Assessment): A spatial option assessment using the emerging Countywide Kent Traffic Model (only highway base models have been completed at the time of writing[1]).

The previous Local Plan scenarios were developed for early decision making on the LPR using the Local Canterbury Model, for the forecast year of 2040. This forecast assessment was based on the 'Highway assignment' only and the five LPR option testing scenarios were used to understand the likely distribution and assignment patterns of LPR development's traffic on the network. Precise details of these scenarios have been confirmed with CCC and are made up of the following:

- Existing Local Plan Strategy;
- Coast with improved public transport;
- City with SWECO only – regarding signalisation of Ring road junctions;
- City with SWECO and relief roads; and

[1] Completed end of August 2020 and LMVR completed in January 2021

- City with Ghent and relief roads – regarding pedestrian and bikers friendly plans with reduced speed limits.

Canterbury City Council have now identified a preferred strategic growth Local Plan option and has commissioned Jacobs to proceed with a modelling assessment in line with those completed for the previously completed options. This modelling work should make use of the existing Canterbury cordoned model derived from the Countywide Model and previous "LPR Options 5 model" (as seen in the *Forecast Report*[2]) or "City with Ghent and relief roads" (as seen above) with updates considering the provided housing allocations and schemes. The forecast year has also been extended to 2045. The new option to be tested would be labelled as "Option 5V2".

A separate cycle propensity study and technical note are also prepared to provide an analysis of the potential modeshift to cycling due to Option 5 V2 interventions.

1.2 Purpose of this Document

This Forecast Report describes the principles, assumptions and methodology employed to develop the future testing spatial option using the Local Canterbury Model and specifically this of the previous "LPR Option 5" model. The testing option has been developed for the single forecast year of 2045. The forecast Baseline scenario has already been developed as part of previous commission and described in the Stage 3 Canterbury LP – Forecast Report. This includes a full identification of committed developments and transport schemes. Following the Baseline scenario, the local VISUM Transport Model was amended to create the Option 5V2 testing scenario to understand the likely distribution and assignment patterns of LPR development's traffic on the network.

The scope of work includes the following:

1. Collating the housing, employment and background growth to estimate 2045 growth for the Canterbury local model;
2. Adjusting the existing LPR Option 5 model network to reflect the planned infrastructure schemes; and
3. Running a 2045 LPR Option 5 V2 Canterbury Model with the housing and infrastructure information provided.

1.3 Related Documents

This report is accompanied by related documents:

- Kent Countywide Model - Base Model Development and Validation Report (Document Number 3.1)
- Kent Countywide Model - Base Model Development and Validation Report (Document Number 4.1).
- Stage 3 Canterbury LP - Local Model Validation Report (Document Number CLP3)
- Stage 3 Canterbury LP – Forecast Report (Document Number CLP4); and
- Propensity to Cycle Analysis - Canterbury.

1.4 Document Structure

Following this introduction, the structure of this report is as follows:

- **Chapter 2** – proposed Use of the Model and Key Model Design Considerations
- **Chapter 3** – provides an overview of the demand forecasting approach;
- **Chapter 4** – discusses the development of the future year network;

[2] Stage 3 Canterbury LP - Forecast Report_140521

- **Chapter 5** – describes the development of the forecast matrices for the future year scenario;
- **Chapter 6** – presents the forecast results for the future year scenario; and
- **Chapter 7** – provides a summary and conclusions.

2. Proposed Use of the Model and Key Model Design Considerations

2.1 Study Area

The Kent Countywide VISUM model has been cordoned for the development of the Canterbury Local Model as mentioned earlier. Due to the large strategic nature of the Kent model, it was not expected to meet local validation aspirations in all areas. As is standard practice, should a model be required for a specific study within the detailed model area (such as the Canterbury Local Plan review), then a cordoned model may need to be created and it is likely that additional data may need to be collected to refine the validation in the local area.

The network of the Canterbury Local Model has therefore been developed based on the cordoned network from the Kent County Model with necessary updates to ensure that the local network replicates base conditions. The cordon and model validation has been agreed with KCC Highways and National Highways. An example of the agreed approach is through the inclusion of M2 J6 within the assessment area along with a specific validation check on the traffic flows entering the network at this location. The details of this analysis can be found at Appendix A. Figure 2-1 shows the cordoned Canterbury local model study area:

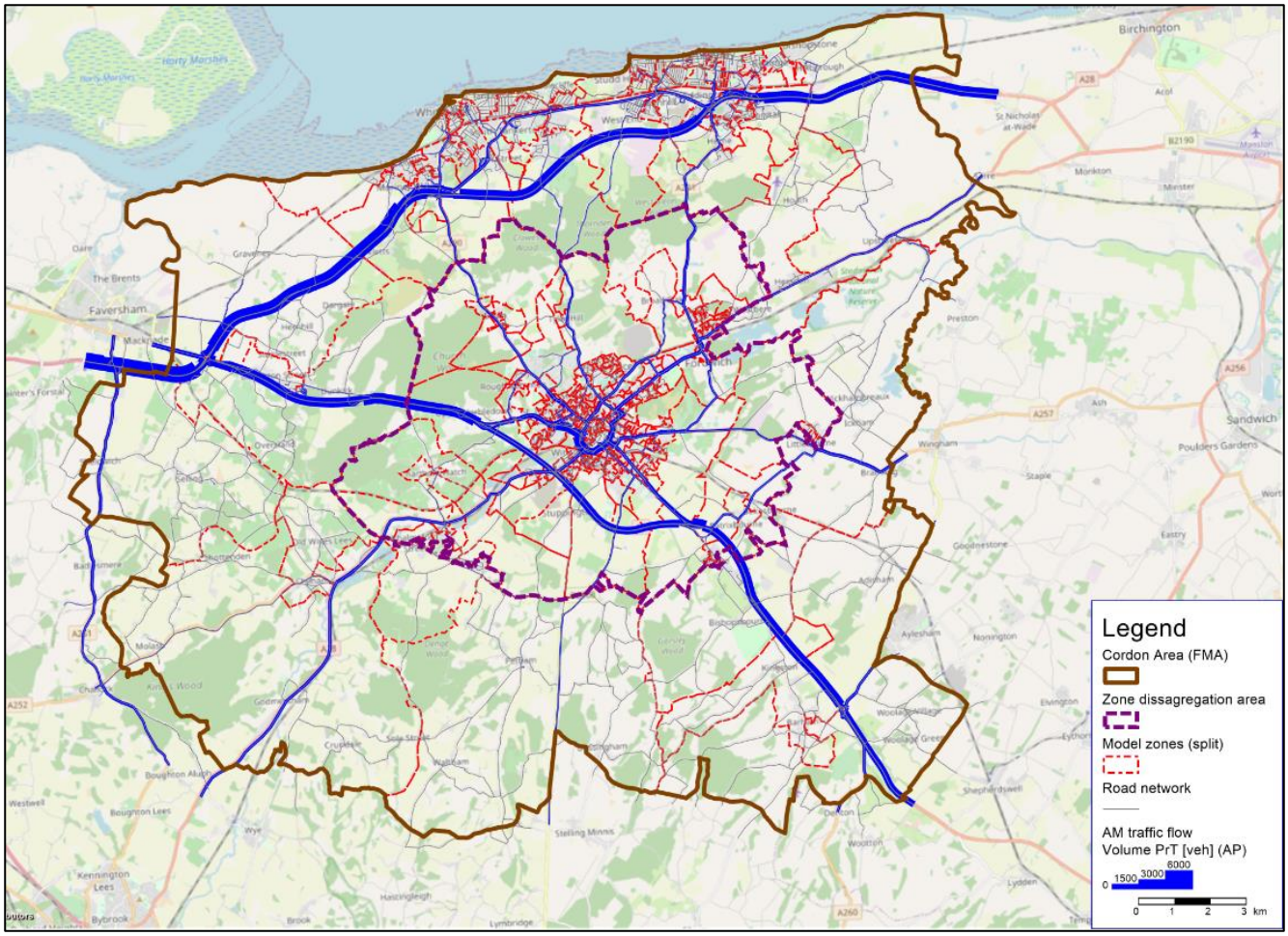


Figure 2-1 Canterbury Local Model Study Area

2.2 Proposed Use of the Model

The model has been developed for CCC to inform spatial assessments for early decision making on the Canterbury Local Plan Review (LPR). Relevant guidance has been followed as much as possible and as is feasible for model development of this type and scale.

2.3 Key Model Design Considerations

2.3.1 Software

PTV's VISUM2020 has been used as the software platform for the highway component of the model. This was also the same software used to develop the Kent Countywide Model. Recognised benefits of using PTV VISUM for this application are:

- The speed with which detailed highway networks can be coded in VISUM;
- The data-handling and visualisation capabilities of VISUM;
- Easy extraction of results to spreadsheet and database formats for analysis and checking;
- The possibility of semi-automatic extraction to interoperable corridor micro-simulation models in the related PTV VISSIM software platform; and
- The possible development of a "real-time" predictive modelling tool based on the VISUM network using the related PTV Optima Software.

TRACC software has been used to analyse the public transport and active travel time for the public transport and active mode accessibility assessment. The software has been used to produce isochrones showing the distances achieved by selected mode up to 30 minutes from each key centre, 30 minutes being chosen as an acceptable length of journey for most local journey purposes.

2.3.2 Base Year and Time Periods

The Local Canterbury Model base year is 2019. This is because the Kent Countywide VISUM model has been cordoned for the development of the Local Canterbury Model and at the time of model development, it was the latest year for which required data was available with which to build the model.

There is a need to provide assessment and forecasting capability to reflect the impact that the schemes have during the busiest parts of the day. Therefore, a morning peak and evening peak model have been developed to allow policy makers to understand local issues/impacts of developments, infrastructure improvements, and policy measures. The highway transport assignment model therefore represents an average 2019 weekday in the following two modelled time periods:

- AM peak hour (08:00 to 09:00); and
- PM peak hour (17:00 to 18:00).

The demand model, meanwhile, represents an average weekday in 2019 at the morning peak hour and evening peak hour level. The demand of the local model is also obtained from the Kent County Model. This considered cordoning initial demand (prior to matrix estimation) from the countywide model and undertaking a matrix estimation process for the local model to produce highway peak hour vehicle matrices required for the assignment.

This approach is consistent with the guidance set out in TAG Unit M3.1 and was deemed most appropriate for a robust demand matrix generation for the Canterbury Local Plan Review.

2.3.3 Highway Assignment Modelled Responses

The Local Canterbury Model is designed to take account of future district and local growth in population and employment and to be capable of predicting likely travel behaviour in terms of trip distribution of trips with one or both trip-ends within Canterbury over a temporal scale of a single peak hour. It is intended to allow for the strategic re-routing of the proposed schemes within the study area. The public transport, cycle and walk modes are not modelled explicitly, however impact of these elements are captured through vehicle trip rates.

No variable demand model is associated with the Local Canterbury Model development, and therefore highway demand remains fixed.

3. Approach to Forecasting

3.1 Overview

In accordance with TAG Unit M3.1 guidance, the forecasting approach for the Local Canterbury Model involves three basic elements:

- Development of a future year network;
- Derivation of future year demand; and
- Demand assignment.

A forecast year of 2045 has been modelled and the forecast assessment was based on the 'Highway assignment' only. Multi modal demand model was not developed for this assessment. However, Public Transport (PT) and active elements (cycle and walk) were captured through trip rates and bus priority corridors were modelled in the network to replicate any additional delays due to this.

3.2 Forecast Modelling Scenario

The LPR Option 5 V2 analysis contributes to possible updates to Local Plan. While the previously developed Forecast Baseline included committed schemes to be implemented on the transport network between the 2019 base year and 2040 future year, this Local Plan scenario was created additionally to the Forecast Baseline schemes and extended the forecast year to 2045.

The LPR Option 5 V2 network and demand assumptions are described in detail in section 4 and section 5 respectively. This option refines the residential and employment space locations from LPR Option 5 model, and focuses on testing potential development allocations supported by highways and sustainable transport infrastructure updates.

3.3 Treatment of Growth

3.3.1 Highway Private Car

The general method for forecasting future year car travel uses factors constrained to Trip End Model Presentation Program (TEMPro) 7.2 growth to update origin/destination for each zone and for each purpose. These factors are applied to the Baseline AM and PM peak hour OD demand matrices through a furnessing process to obtain a forecast demand matrix. The demand matrix was then factored to incorporate the potential change in car usage due to cycle mode share change, using the DfT's Propensity to Cycle Tool (PCT) data. The analysis can be found in Appendix B.

In order to consider development growth of the Local Plan scenario, the TEMPro alternative assumptions functionality was used to avoid double counting. The National Trip End Model (NTEM) model forecasts the growth nationwide which take into account national projection of population, employment, housing, car ownership and trip rates. The resulting proportional reduction in commuting Car Drivers has been provided for application in the car commuting, business and other trip matrices for use in the LP Option 5V2 model. No matrix adjustments were applied to the HGV and LGV trip matrices.

In order to calculate the TEMPro alternative assumptions and NTEM factors, the following steps were followed:

- Specific Development sites were modelled explicitly and hence discounted from TEMPro;
- Windfall and smaller development sites were modelled as background housing growth, spread over Canterbury district, according to the expected distribution;

- Similarly to previous work on LPR 2040, 2019 TEMPro employment assumptions were reduced proportionally to account job replacement;
- Residual employment between 2019 and 2045 was considered; and
- Growth in the remainder of the study area (i.e., outside of Canterbury district) was derived entirely from the NTEM growth (i.e., with no specific developments modelled).

3.3.2 Goods Vehicles

Demand growth in Light and Heavy Goods Vehicles have been produced by applying growth factors from the latest Road Traffic Forecasts (RTF) (2018) published by DfT. This growth was applied at an assignment (peak hour) matrix level. No matrix adjustments considering PCT were applied to the HGV and LGV trip matrices.

4. Forecast Network Development

4.1 Overview

A 2045 future year network has been prepared for the purposes of this Local Canterbury Model forecasts. The network for the forecast year was based on the LPR Options 5 model, developed for the purpose of Stage 3 Canterbury LP – Forecast Report, and includes additional schemes that may be in place by the forecast year.

A list of potential infrastructure projects based on this guidance was collated and confirmed, in consultation with Kent County Council (KCC) and Canterbury City Council (CCC), for inclusion in the transport network.

4.2 LPR Option 5V2 Schemes

LPR Option network has been developed using the LPR Options 5 model network with additional site-specific updates to accommodate the development growth and possible transportation policy changes. All network updates have been made in accordance with the consultation involving KCC and CCC. Tables below summarise the schemes included in the Local Plan Scenario network due to its impact on traffic flows:

ID	Local Plan Scenario Scheme	Description
	Canterbury City Area	
1.	UoK junction and links	Signalised junction between Whitstable Rd/Highfield Cl. and UoK link through Campus
2.	Harbledown junctions, Faulkners Lane	Coast bound on slip and London bound off slip
3.	Eastern movement corridor	Adaptable Road A class with 40 mph speed limit. South end realignment updated to join with signalised junction on A2050 Roman Road
4.	Bakesbourne realignment	Road realignment to provide access to LPR developments. Link with A257 and decongest junction between Eastern bypass and A257
5.	Wincheap Eastbound junctions	Coastbound on and off slip connecting as previously shown to Merton Park
6.	Thanington A28 link	Link from A28 Cockering Farm access to Hollow Lane as incl. in Saxon Fields assessments
7.	Modal filters on short cuts - "Blockers"	Roads to be closed to all motor traffic x 9 across all sectors (3 mph speed limit to simulate: reduced access for local residents only; to be monitored by ANPR camera)
8.	Reallocation of road space for active travel	High quality, segregated cycle lanes on Rheims Way, Pin Hill, Rhodaus Town, Upper Bridge Street, Lower Bridge Street and Tourtel Road. One lane of dual carriageway removal in each direction between London Road roundabout and St George's roundabout. Broad Street and Military Road - on road cycle lanes. New Dover Road, Sturry Road - on road cycle lanes.
9.	Additional road space for bus priority	Rheims Way London Road roundabout to St Peter's roundabout - provide new bus lane. Sturry Road bus lane from junction with new Sturry link road to Tourtel Road.
10.	Right-turn signals	Access into St Andrew's Close and Rhodaus Close (no modelling changes, rather management enforcement)
11.	CCTV	ANPR cameras at points where limited traffic will be permitted x 22 across all zones (no modelling changes, rather management enforcement)
	Coast Area	
1.	Whitstable Heights r/a	New fourth arm to existing Whitstable Heights roundabout
2.	South st. realignment	Street realignment for Brooklands Farm site access
3.	A299 Eastbound off and on slip	A299 Eastbound on and off slips located at Chestfield Road

Parking and P&R		
Reprovision of city centre car parks to out of centre locations or P&R. Car Park capacity (spaces)		
1.	New car park at Simmonds Road	350
2.	Castle Street MSCP	430
3.	West Canterbury P&R	400
4.	Station Road West MSCP	374
5.	St Radigunds	292
6.	Millers Field	43
7.	Riverside at Kingsmead	220
8.	Sturry Road P&R	576
9.	Holmans Meadow (new multi-storey)	400
10.	New Dover Road P&R	1000
11.	Longport	110
12.	Wincheap P&R	590
13.	St Johns Nursery	220

Table 4-1 Development Options Scheme description

The schemes described in Table 4-1 above can be classified as Road/ Infrastructure, City centre and Park and Ride schemes. Each of the categories are shown in Figure 4-1 and Figure 4-3.

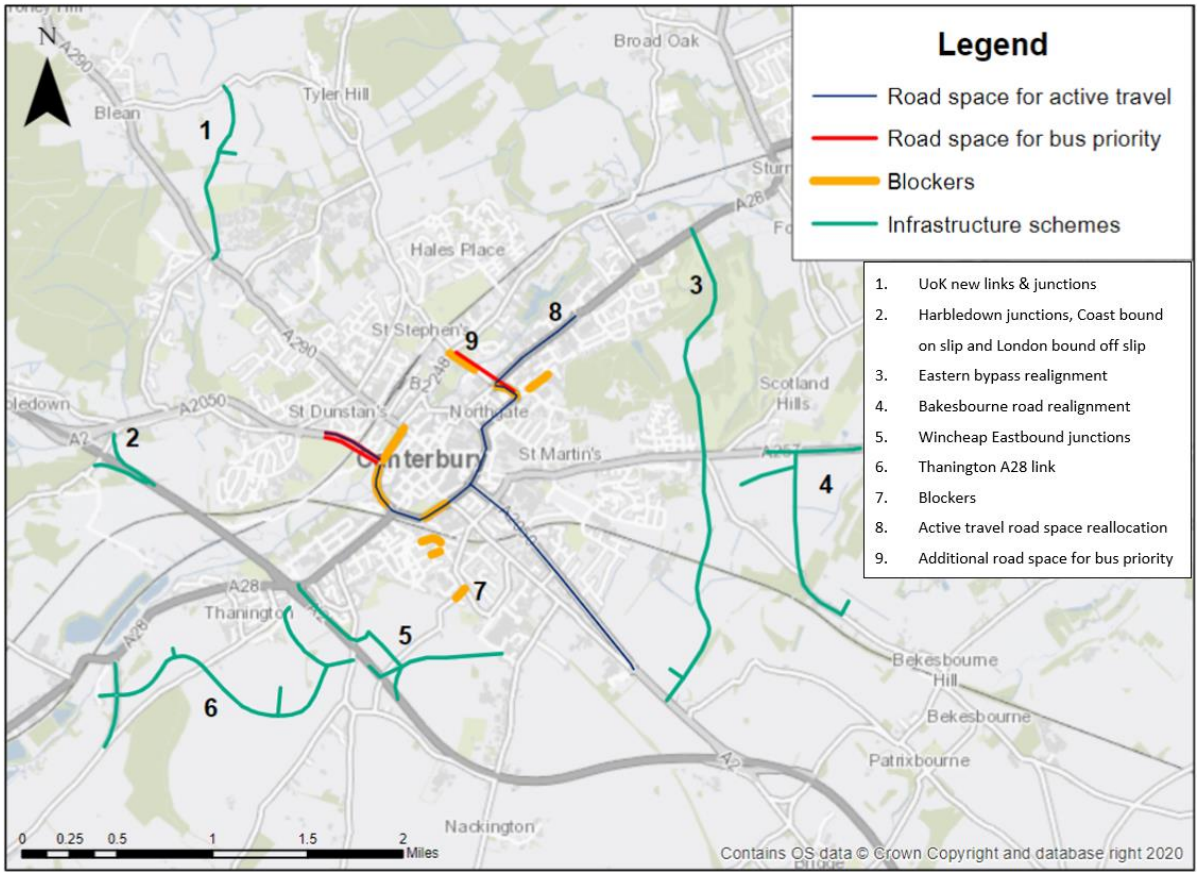


Figure 4-1 Road/ Infrastructure schemes – Canterbury City Area

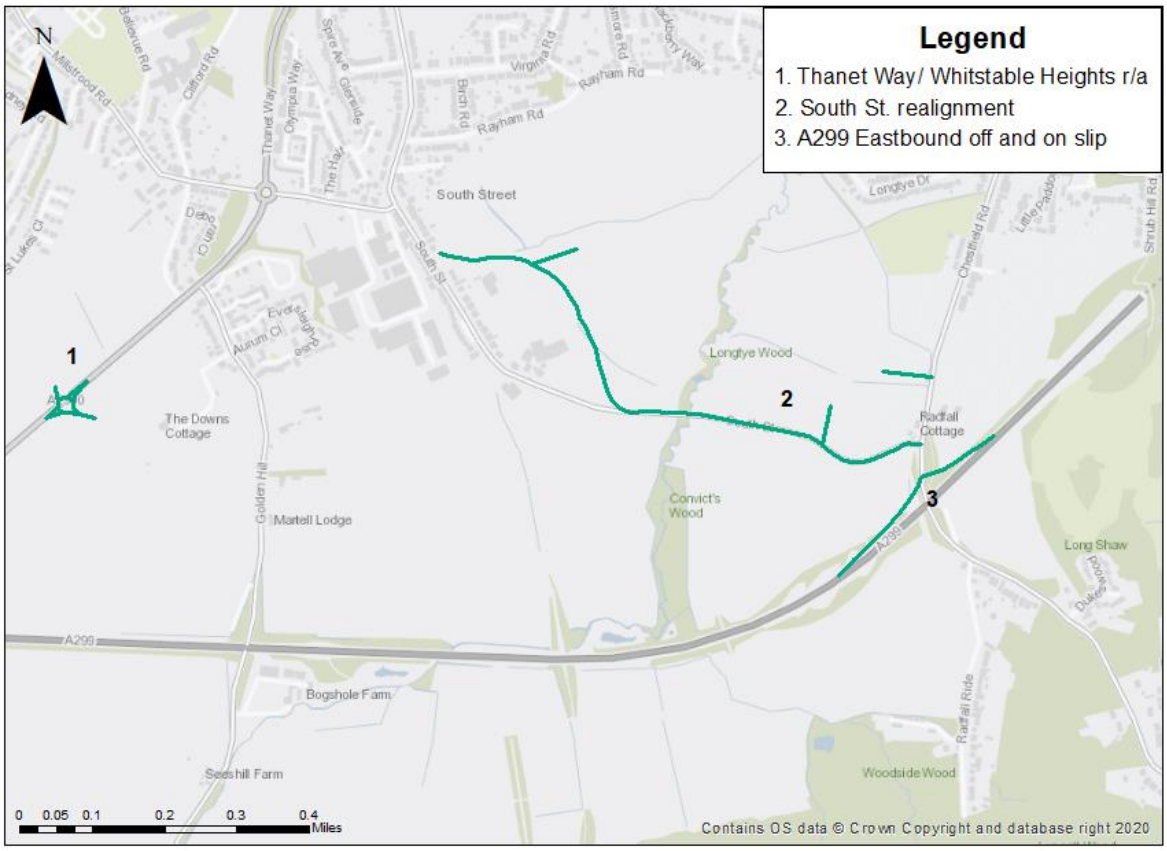
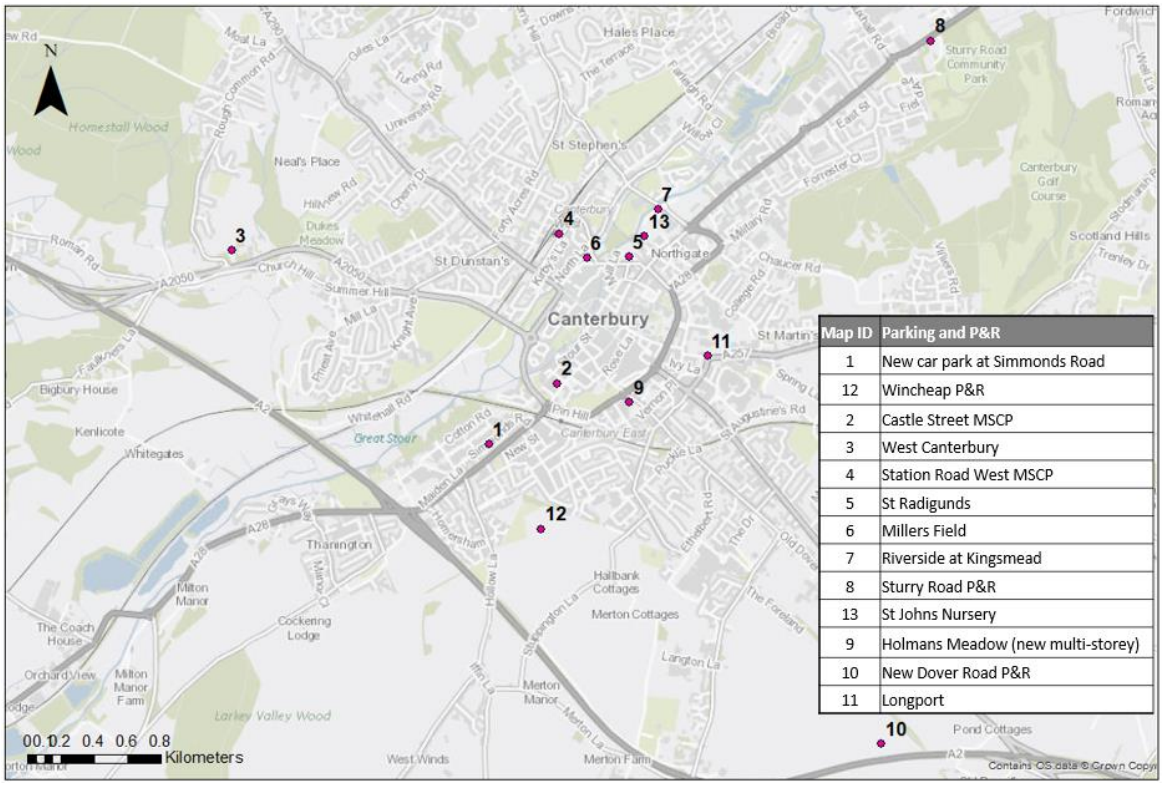


Figure 4-2 Road/ Infrastructure schemes – Coast Area



Map ID	Parking and P&R
1	New car park at Simmonds Road
12	Wincheap P&R
2	Castle Street MSCP
3	West Canterbury
4	Station Road West MSCP
5	St Radigunds
6	Millers Field
7	Riverside at Kingsmead
8	Sturry Road P&R
13	St Johns Nursery
9	Holmans Meadow (new multi-storey)
10	New Dover Road P&R
11	Longport

Figure 4-3 Park and Ride and Car Park schemes

Some City Centre schemes were still in the process of development at the time of model production and therefore modelled using the designs available at the time of network building. CCC has advised that no site has been identified for a West Canterbury P&R and that the preferred option may be to retain Wincheap P&R in addition to Merton Farm P&R so this scheme is unlikely to proceed. It is important to note that these designs may be subject to change.

4.3 Forecast Year Values of Time and Vehicle Operating Costs

The values of the pence per minute (ppm) as Value of Time (VoT) and pence per kilometre (ppk) as Vehicle Operating Costs (VOC) parameters used for the Local Canterbury Model highway assignment are based on the latest TAG Unit A1.3 guidance and Data Book available at the time of model development (May 2020 v1.13). Network average speed and OGV1/OGV2 proportions were inherited from the base model. The HGV Value of Time (VoT) values are doubled, which is consistent with the base model.

The final calculated values for highway VoT and VOC for the 2045 forecast year of the Local Canterbury Model are provided in Table 4-2.

The final input for implementation in VISUM is also shown in the table; the formats required being a coefficient for pence per metre (ppmetre) for VOC as a weighted ratio of the VoT pence per second (pps).

Time Period	User Class	2045 Forecast Year TAG Databook Value		2045 Forecast Year VISUM Units		2045 Forecast Year Final VISUM Coefficients	
		VoT (ppm)	VOC (ppk)	VoT (pps)	VOC (ppmetre)	VoT	VOC
AM	UC1 Car Commute	48.19	8.78	0.8031	0.0088	1	0.0109
	UC2 Car Business	32.32	4.25	0.5386	0.0043	1	0.0079
	UC3 Car Other	22.30	4.25	0.3716	0.0043	1	0.0114
	LGV	34.92	12.93	0.5820	0.0129	1	0.0222
	HGV (doubled VoT)	69.56	45.74	1.1593	0.0457	1	0.0395
PM	UC1 Car Commute	48.88	8.86	0.8147	0.0089	1	0.0109
	UC2 Car Business	32.43	4.28	0.5405	0.0043	1	0.0079
	UC3 Car Other	23.35	4.28	0.3891	0.0043	1	0.0110
	LGV	34.92	12.99	0.5820	0.0130	1	0.0223
	HGV (doubled VoT)	69.56	46.15	1.1593	0.0461	1	0.0398

Table 4-2 – Highway Generalised Cost Parameters

5. Forecast Matrix Development

5.1 Overview

This section describes how future year matrices have been developed using fixed trip demand forecasting techniques. A forecast year of 2045 has been modelled with the TEMPro growth and local growth assumptions. No other growth scenarios have been considered in the demand forecasting.

5.2 Forecast Demand Development

The general method for forecasting future year car travel uses factors constrained to TEMPro growth to update origin/destination for each zone for each purpose. These factors are applied to the validated Base AM and PM peak hour OD demand matrices through a furnessing process to obtain a forecast demand matrix.

To consider development growth of the Option 5V2 Local Plan scenario, the NTEM factors were calculated after discounting the specific development sites modelled explicitly (documented using an Uncertainty Log), using the TEMPro alternative assumptions functionality. Growth in Canterbury district was derived from the reduced background growth (i.e., NTEM growth after applying alternative planning assumptions) as well as site-specific developments modelled. For each site-specific development, a parent zone/donor zone was chosen to duplicate its trip pattern. As far as possible, the selected donor zone was the one that shared the same land use as the development zone, and it was located in reasonable proximity to the zone. This process was undertaken in order to accurately replicate the trip distribution of the developments' zones. This also enables future land use of zones to be robustly modelled, once matrix furnessing had been applied. Growth in the remainder of the study area (i.e., outside of Canterbury district) was derived entirely from the NTEM growth (i.e., with no specific developments modelled).

Demand growth in LGV and HGV has been produced by applying growth factors from the latest Road Traffic Forecasts (RTF) (2018) published by DfT. This growth was factored to account the potential impact of cycle mode share change on car usage (DfT's Propensity to Cycle Tool), and then applied to the car demand segments at an assignment (peak hour) matrix level.

5.2.1 Forecast OD Matrices Development

The forecast OD demand matrices were developed using fixed trip demand forecasting techniques. The following steps were considered to derive the future matrices for 2045 as shown in Figure 5-1:

- Identification of planning data (Uncertainty log);
- TEMPro background growth calculation using alternative planning assumptions for car trips;
- Development trip matrices calculation in OD format;
- Combine background growthed matrices with development trip matrices, and then furnessing the car trip matrices;
- Demand matrix factor to incorporate change in car usage due to potential cycle mode share change, using the DfT's Propensity to Cycle Tool (PCT) data;
- Calculate goods vehicle growth factors from the RTF18, and apply to the base goods vehicle matrices; and
- Creation of future year target trip ends by combining car trips and goods vehicles (LGVs and HGVs).

The above forecasting approach is consistent with TAG Unit M4 'Forecasting & Uncertainty'. Forecast demand for travel was generated by using national, regional and local data sets to inform the amount of travel growth that could be expected from the base year.

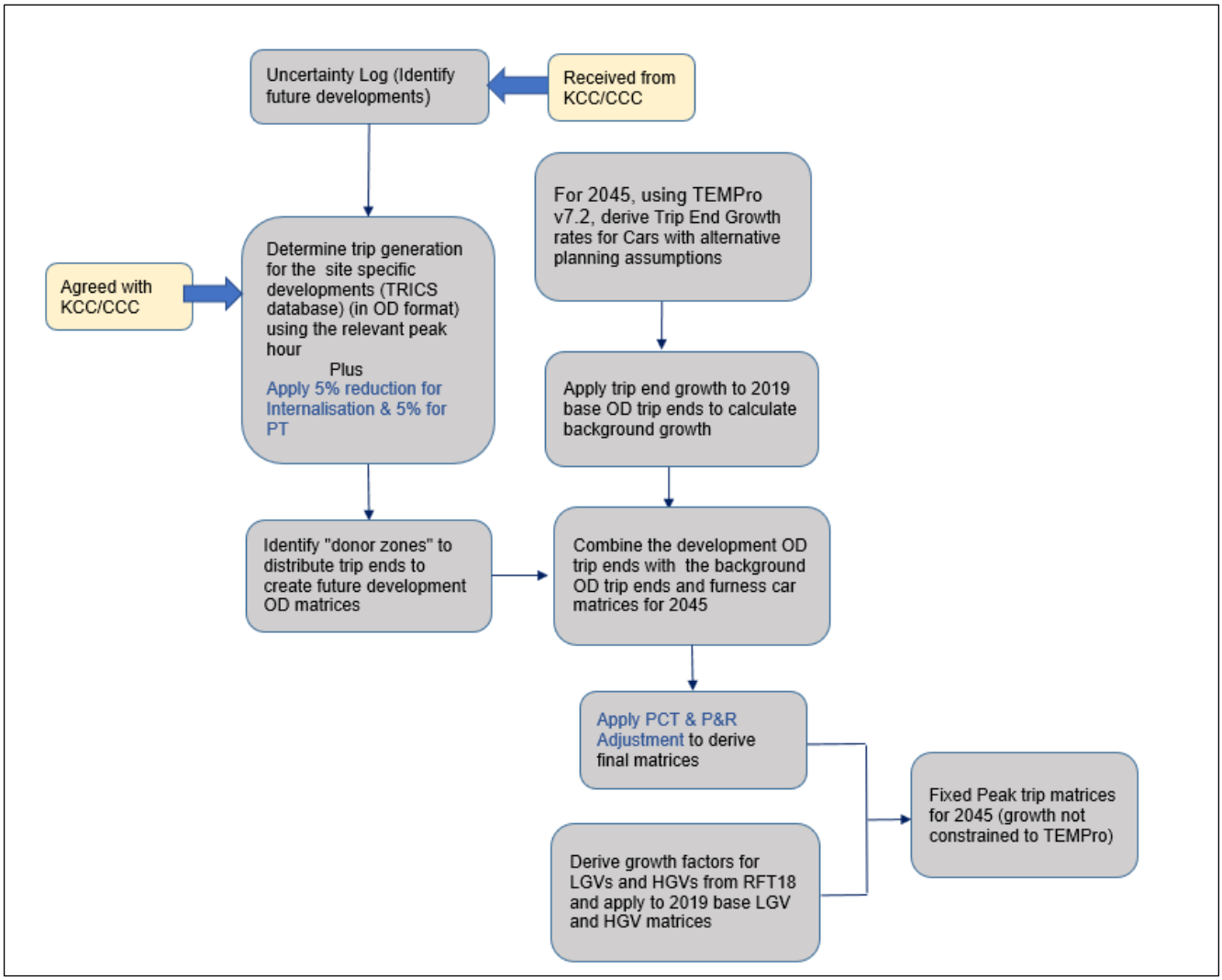


Figure 5-1 OD Matrices Development Flow Chart

5.2.2 Identification of Planning Data (Uncertainty Log Development)

The purpose of the uncertainty log is to identify a list of developments which are potentially included in the Local plan scenario. Planning data from CCC was used to identify the locations of new development, and the size and type of development proposed. The likelihood of each development was identified and recorded in an uncertainty log. Where these development sites were considered to generate substantial demand trips then instead of being included as background development, they were within the model as specific developments. This was done to ensure that the model is sufficiently well detailed to be able to model the impacts that these developments have on the local road network.

5.2.2.1 Committed Developments

Existing housing and employment allocations within the Canterbury district were based on planning data confirmed by Canterbury City Council (CCC) in summer 2020. For residential and employment land use developments in the study area, any development that exceeded the following limits in Table 5-1 were considered to be implemented on the transport network:

Land Use Type	Units	Size Threshold
Food Retail (A1)	Gross Floor Area (GFA)	> 800m2
Non-Food Retail (A2)	Gross Floor Area (GFA)	> 1,500 m2
Financial and Professional Services (A2)	Gross Floor Area (GFA)	> 2,500 m2
Restaurants and Cafes (A3)	Gross Floor Area (GFA)	> 2,500 m2
Drinking Establishments (A4)	Gross Floor Area (GFA)	> 600 m2
Hot Food Takeaway (A5)	Gross Floor Area (GFA)	> 500 m2
Business (B1)	Gross Floor Area (GFA)	> 2,500 m2
General Industrial (B2)	Gross Floor Area (GFA)	> 4,000 m2
Storage of Distribution (B8)	Gross Floor Area (GFA)	> 5,000 m2
Hotels (C1)	Bedrooms	> 100 bedrooms
Residential Institutions – Hospitals, Nursing Homes (C2)	Beds	> 50 beds
Residential Institutions – Residential Education (C2)	Students	> 150 students
Residential Institutions – Institutional Hostels (C2)	Residents	> 400 residents
Dwelling Houses (C3)	Dwelling Units	> 80 units
Non-Residential Institutions (D1)	Gross Floor Area (GFA)	> 1,000 m2
Assembly and Leisure (D2)	Gross Floor Area (GFA)	> 1,500 m2

Table 5-1 Uncertainty Log Developments Size Thresholds

The assumptions for the committed developments are summarised in Table 5-2 and they are depicted in Figure 5-2.

Dev No	Development Name	Households	Jobs
1	Broad Oak	456	40
2	Cockering Farm	400	161
3	Duncan Down	400	0
4	Chestfield Lidl	0	175
5	Grassmere Gardens	300	179
6	Greenhill	450	0
7	Herne Bay Golf Club	600	173

Dev No	Development Name	Households	Jobs
8	Hoplands Farm, Hersden	250	263
9	Howe Barracks	500	0
10	South Canterbury	4000	1565
12	Sturry	650	0
13	Hillborough	1200	670
14	Thanington Park	750	205
15	Station Road West Multi-storey	0	129
16	Strode Farm	800	0

Table 5-2 Committed Developments

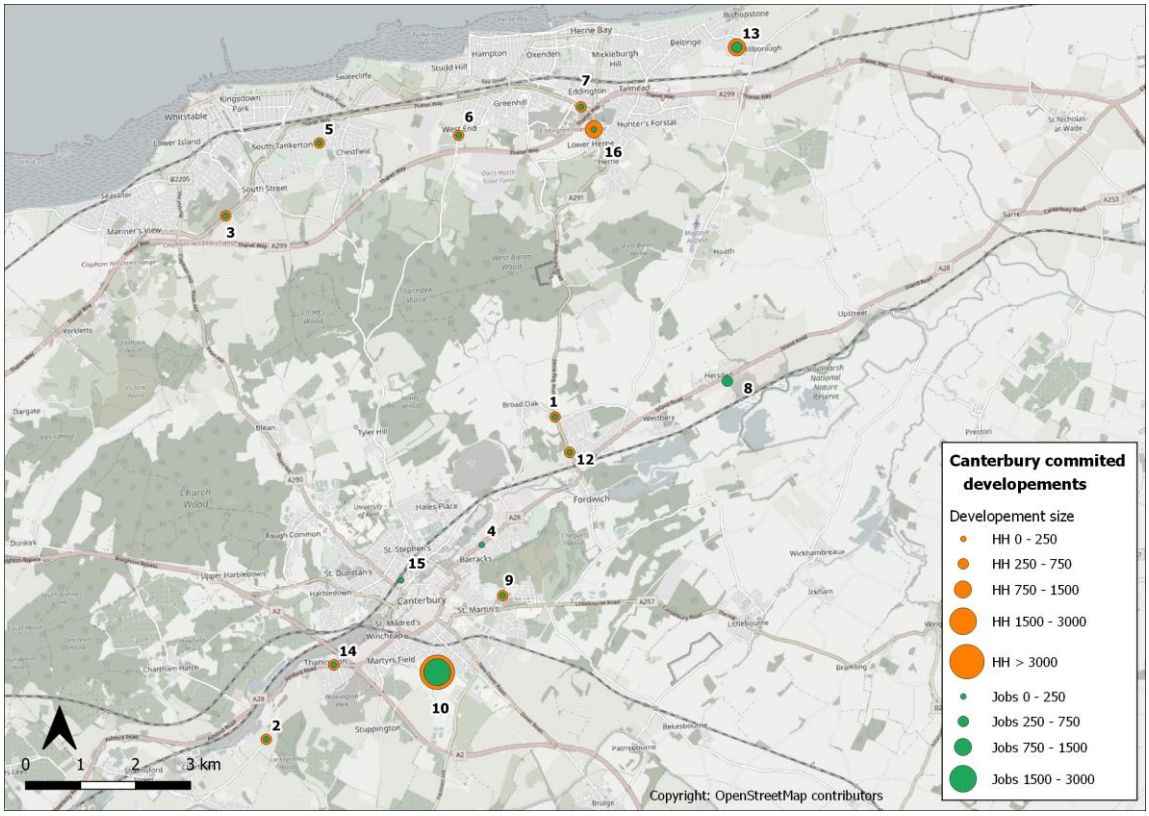


Figure 5-2 Committed Developments Locations

5.2.2.2 Local Plan Review - Potential new developments

The Local Plan scenario Option 5V2 considered additional housing and employment developments on top of the committed developments. In particular, Option 5V2 accounted for 15,991 HH (of which 11,260 were site specific and 4,731 were smaller sites) and 24,500 sqm employment space.

Table 5-7 and Figure 5-3 present the developments assigned with the location type which then determines the appropriate trip rates, regarding their location. Table 5-8 and Table 5-9 summarise the updated TRICS trip rates used in the trip generation process. Trip rates shown in tables of this note are for one-hour peak periods in the AM and PM.

Map ID	Name	Location type	HH	Empl. sqm
1	University of Kent Site B	Suburban	1200	3500
2	Merton Park	Edge of town centre	1580	3500
3	Land on the west side of Hollow Lane	Suburban	775	3500
4	Land South of Littlebourne Road (Hoath Farm)	Suburban	1660	3500
5	Land to the north of the railway line and south of Bekesbourne Lane	Suburban	733	3500
6	Land on Bekesbourne Lane at Hoath Farm	Suburban	97	0
7	Brooklands Farm, Whitstable	Suburban	1200	3500
8	Land at Golden Hill	Suburban	290	0
9	Land at Cooting Farm	Neighbourhood centre	1640	3500
10	Land west and East of Cooting Lane, Adisham	Neighbourhood centre	780	0
11	Land On the Southeast Side Of Cooting Lane, Adisham	Neighbourhood centre	250	0
12	Aylesham South	Neighbourhood centre	420	0
13	Land off The Hill, Littlebourne	Neighbourhood centre	300	0
14	Milton Manor House	Edge of town/Freestanding	80	0
16	Land South of Thanet Way	Suburban	255	0

Table 5-3 Development Log

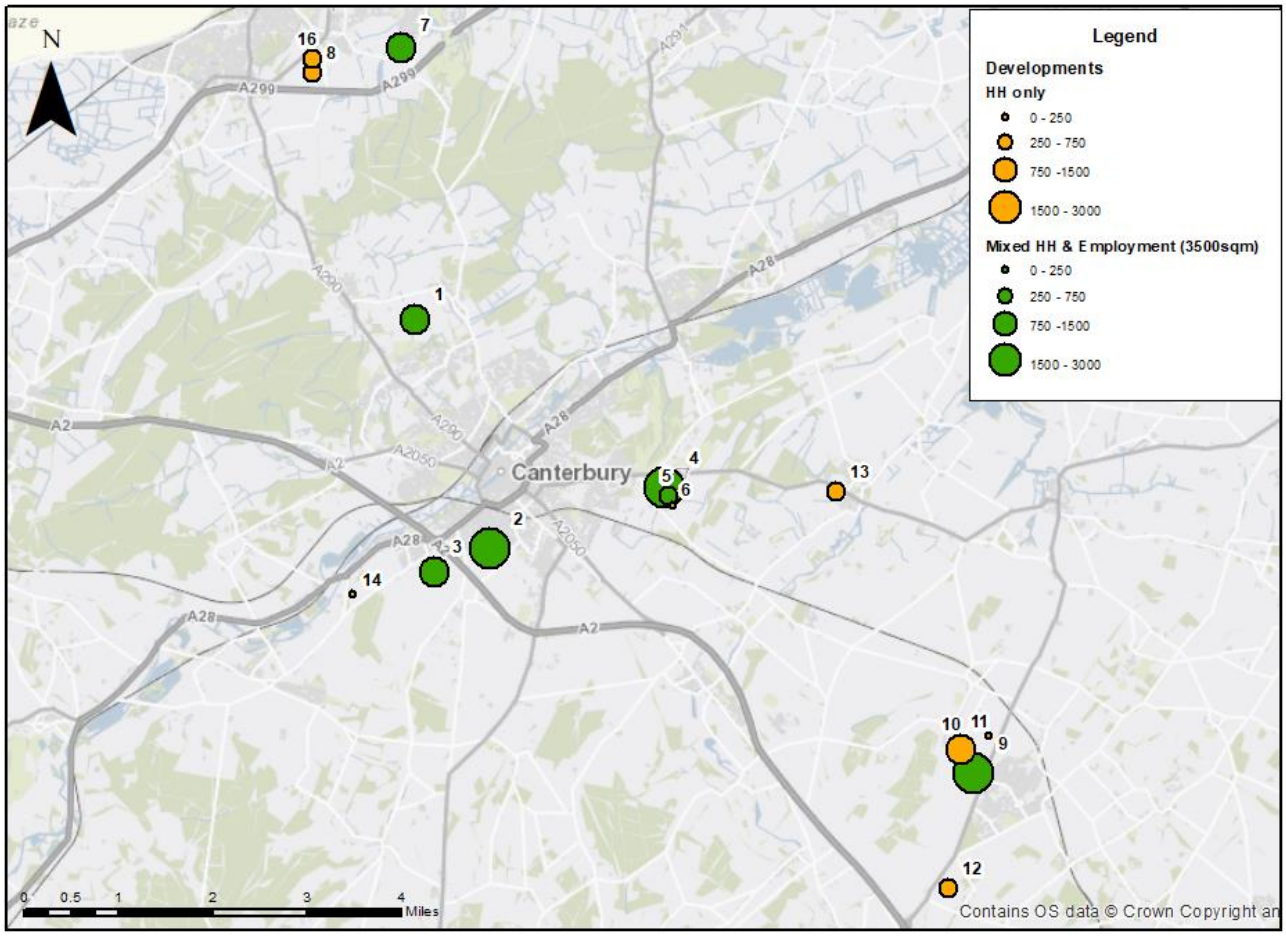


Figure 5-3 Development Location

The assumptions for the 2045 local plan scenario is summarised in Table 5-4 and. The full list of developments' assumptions is provided in Appendix C. Core developments are presented by type size (Dwellings and Jobs).

Description	Dwellings	Jobs
Housing target to 2045	15,507	-
Supply from LP Strategic development sites	11,260	830
Windfall allowance at 170dpa*	3,400	-
Small site allocations*	1,331	-
Committed Sites	10,756	1,075
Total Supply	**15,991**	**830**

Table 5-4 Local housing assumptions

5.2.3 Treatment of Committed and Site-Specific Development with TEMPro and Background Growth Calculation

TEMPro v7.2 datasets were used to calculate the background growth for 2045 forecast year at MSOA level and then split out to the VISUM zone system. The number of households or jobs associated with specific developments was subtracted from NTEM using the 'alternative planning assumptions' within TEMPro to produce factors for the NTEM-based background growth in trip ends. These factors were used to calculate the reduced background growth to avoid double-counting of the committed developments modelled explicitly.

Figure 5-4 visualises overall number of Households, and Figure 5-5 shows Employments included in LPR Option OPTION 5V2. In LPR Option OPTION 5V2, majority of the Household developments has been allocated to specific sites (11,260 HH for LP specific sites and 10,756 HH for committed sites) and small sites/windfalls have been distributed as background growth based on the specific percentage shown in Table 5-5.

Area	Growth Spread
Canterbury	40%
Whitstable	20%
Herne Bay	20%
Rural	20%

Table 5-5: Growth Spread Percentage

Similar to previous work on LPR 2040, 2019 TEMPro employment assumptions were reduced proportionally to account job replacement in LPR Option OPTION 5V2. Then the growth has been applied partially to specific sites locations and partially distributed evenly as background growth (see Figure 5-4 below).

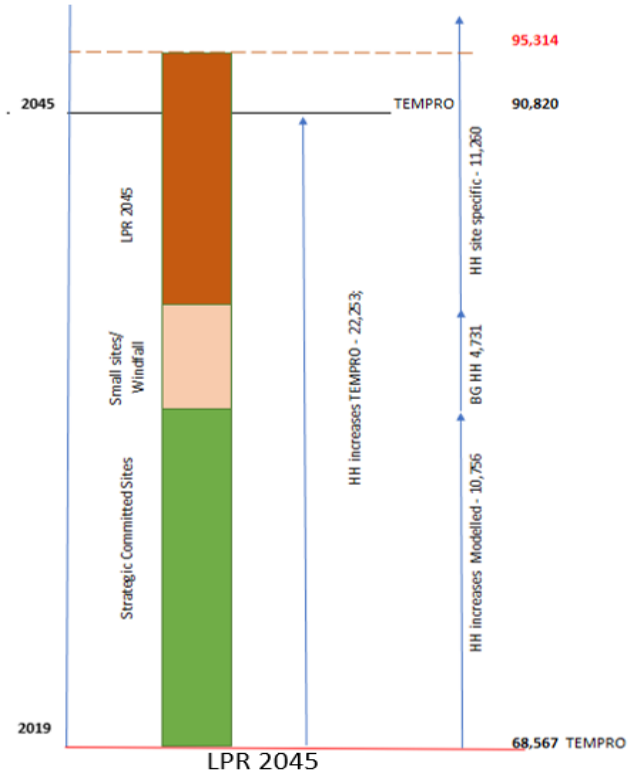


Figure 5-4 Housing growth

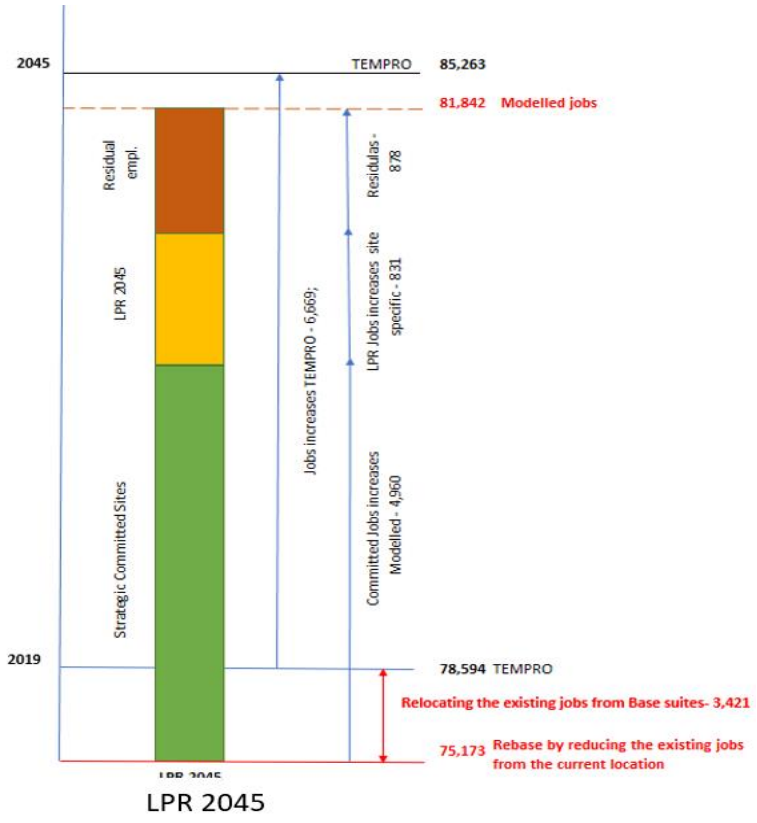


Figure 5-5 Employment growth

As shown on the figures, the housing growth is only slightly higher than TEMPro. On the other hand, Employment growth is lower than TEMPro in LPR Option5V2, based on the scenario assumptions.

Description	Year/Scenario	Households	Jobs
Default land uses (TEMPRO)	2019	68,567	78,594
	2045	90,820	85,263
New Developments	Option 5V2	26,747	5,791
Alternative land use (Background Growth)	Option 5V2	0	-2,543
Total increase (Background and development)	Option 5V2	95,314	81,842

Table 5-6: Base planning data (TEMPro) and planning data comparation and LPR Option5V2 for years 2019-2045

5.2.4 Site specific Development Trip Matrices

5.2.4.1 Development OD trip generation

For calculating trip generation for the site-specific developments, TRICS trip rates were derived from a recent version of the TRICS database (version 7.8.4) which includes surveys up to the pre-pandemic. For all trip calculations only sites in England, Wales and Scotland were included. London sites were not immediately removed by default, as some areas in outer London may be considered representative. Only sites with surveys on weekdays were included.

Table 5-7 and Figure 5-3 present the developments assigned with the location type which then determines the appropriate trip rates, regarding their location. Table 5-8 and Table 5-9 summarise the updated TRICS trip rates used in the trip generation process. Trip rates shown in tables of this note are for one-hour peak periods in the AM and PM.

Map ID	Name	Location type	HH	EMPL. SQM
1	University of Kent Site B	Suburban	1200	3500
2	Merton Park	Edge of town centre	1580	3500
3	Land on the west side of Hollow Lane	Suburban	775	3500
4	Land South of Littlebourne Road (Hoath Farm)	Suburban	1660	3500
5	Land to the north of the railway line and south of Bekesbourne Lane	Suburban	733	3500
6	Land on Bekesbourne Lane at Hoath Farm	Suburban	97	0
7	Brooklands Farm, Whitstable	Suburban	1200	3500
8	Land at Golden Hill	Suburban	290	0

Map ID	Name	Location type	HH	EMPL. SQM
9	Land at Cooting Farm	Neighbourhood centre	1640	3500
10	Land west and East of Cooting Lane, Adisham	Neighbourhood centre	780	0
11	Land On The South East Side Of Cooting Lane, Adisham	Neighbourhood centre	250	0
12	Aylesham South	Neighbourhood centre	420	0
13	Land off The Hill, Littlebourne	Neighbourhood centre	300	0
14	Milton Manor House	Edge of town/ Freestanding	80	0
16	Land South of Thanet Way	Suburban	255	0

Table 5-7 Development Location type

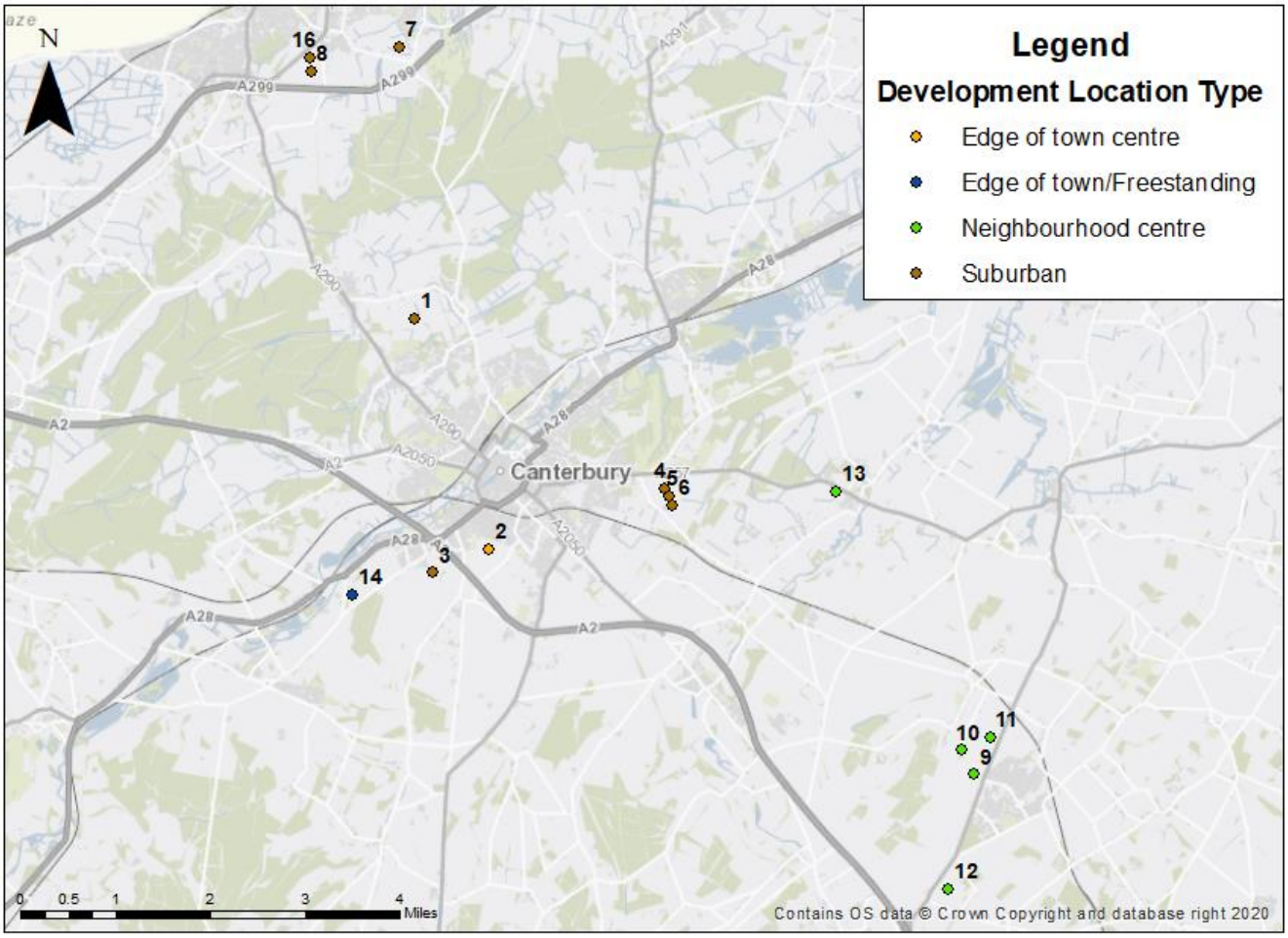


Figure 5-6 Development Location type

Residential			AM Peak		PM Peak	
Lookup string	Location	Unit	Arr	Dep	Arr	Dep
Residential, Edge of town centre, Affordable	Edge of town centre	Per Dwelling	0.098	0.147	0.154	0.14
Residential, Edge of town centre, Private	Edge of town centre	Per Dwelling	0.143	0.338	0.314	0.205
Residential, Suburban, Mixed	Suburban	Per Dwelling	0.109	0.317	0.293	0.145
Residential, Suburban adjusted, Mixed	Suburban (with P&R)	Per Dwelling	0.1	0.313	0.298	0.145
Residential, Edge of town/Freestanding, Mixed	Edge of town/ Freestanding	Per Dwelling	0.146	0.361	0.322	0.172
Residential, Neighbourhood centre, Mixed	Neighbourhood centre	Per Dwelling	0.139	0.383	0.348	0.177

Table 5-8 New housing TRICS Trip Rates per Time Period

Employment			AM Peak		PM Peak	
Lookup string	Location	Unit	Arr	Dep	Arr	Dep
Employment, Edge of town centre, B1	Edge of town centre	Per 100 sqm	1.28	0.169	0.183	1.195
Employment, Suburban, B1	Suburban	Per 100 sqm	1.508	0.143	0.205	1.001
Employment, Neighbourhood centre, B1	Neighbourhood centre	Per 100 sqm	2.678	0.204	0.101	2.839
Employment, Edge of town centre, B2	Edge of town centre	Per 100 sqm	0.128	0.071	0.2	0.185
Employment, Suburban, B2	Suburban	Per 100 sqm	0.367	0.149	0.095	0.289
Employment, Neighbourhood centre, B2	Neighbourhood centre	Per 100 sqm	0.154	0.06	0.045	0.145
Employment, Edge of town centre, B8	Edge of town centre	Per 100 sqm	1.194	0.133	0	1.194
Employment, Suburban, B8	Suburban	Per 100 sqm	0.062	0.065	0.062	0.079
Employment, Neighbourhood centre, B8	Neighbourhood centre	Per 100 sqm	0.197	0.13	0.106	0.219

Table 5-9 New employment TRICS Trip Rates per Time Period

TRICS reports are included at the end of this note as Appendix.

5.2.4.2 Trip internalisation

Trip internalisation is applied, during the trip generation stage, for developments with more than 1,000 households. A 5% internalisation factor is applied to capture: residential trips by active modes/short trips to local services provided in the development sites, and encouragement for live/work/teleworking. This relies on the delivery of a mix of land uses at each site and provide jobs and services to engender live/ work to reduce the need to travel. The developments considered of 5% trip internalisation are presented in Table 5-10 below.

Map ID	Name	Location type	HH	Empl. sqm
1	University of Kent Site B	Suburban	1200	3500
2	Merton Park	Edge of town centre	1580	3500
4	Land South of Littlebourne Road (Hoath Farm)	Suburban	1460	3500
7	Brooklands Farm, Whitstable	Suburban	1200	3500
9	Land at Cooting Farm	Neighbourhood centre	1640	3500

Table 5-10 Developments considered for trip internalisation

5.2.4.3 Trip reduction due to sustainability

5.2.4.3.1 Examples from Other Towns

In 2004, the Department of Transport launched the Sustainable Transport Towns (STT) in which three towns – Darlington, Peterborough and Worcester participated. It was a 5-year programme that was intended to reduce car use. The strategies included the developments of a strong brand link, travel awareness campaign, public transport promotion, cycling and walking promotion, school and workplace travel planning, and large-scale personal travel planning work. The figure below shows the changes in the number of trips between 2004 and 2008 for each of the towns.

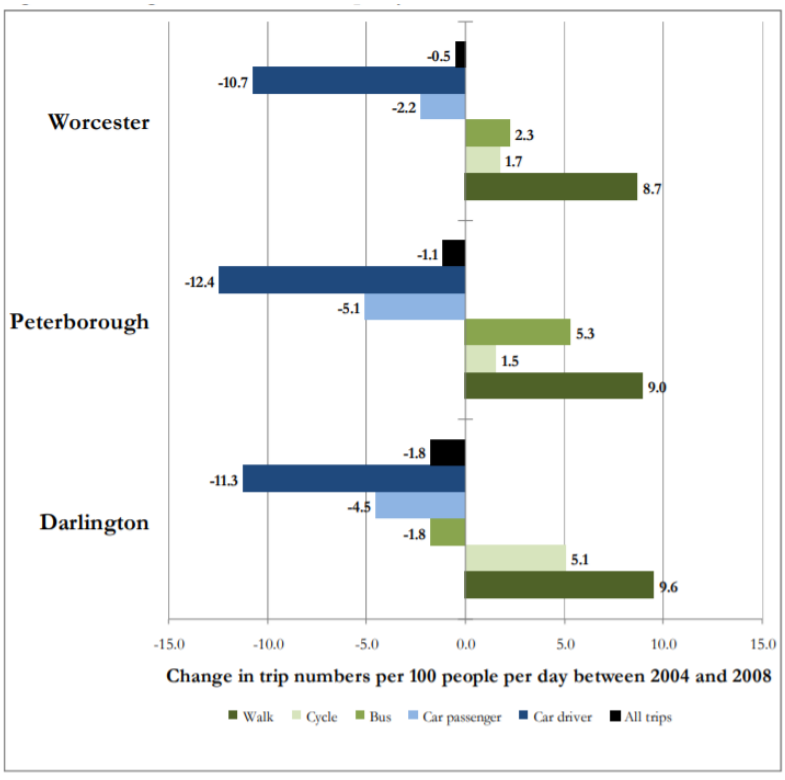


Figure 5-7 Sustainable Transport Towns (STT) - Changes in the Number of Trips Between 2004 and 2008

An average of an 11.5% reduction in car driver trips was observed in the three towns after the implementation of the programme. On the other hand, bus use increased by an average of 2%, walking 9%, and cycling 4%. To the above, Maidstone Local Plan for 2050 considered a 5% car trip reduction due to solely bus trip increase.

Based on the data presented above, the proposed approach for implementing sustainable transport within the Canterbury model is: **Reduction of car demand for development trips using bus corridors by 5%.** This reduction reflects routes likely to benefit from suitable public transport improvements, to capture reasonable modal shift from private vehicles to public transport along the following corridors (noting that no reduction has been made to trips elsewhere on the network). It should be noted that this is a high level analysis and hence no Variable Demand Model (VDM) or Public Transport model have been used to estimate in detail the mode shift . When considering the ambitions of Canterbury City Council for mode shift the modelling therefore represents a very conservative assessment. It is understood that Local Plan policies will seek to achieve far greater levels of mode shift similar to those of the SST's.

The developments considered of 5% trip reduction due to sustainability are presented in Table 5-11 below.

Map ID	Name	Location type	HH	Empl. sqm
1	University of Kent Site B	Suburban	1200	3500
2	Merton Park	Edge of town centre	1580	3500
3	Land on the west side of Hollow Lane	Suburban	775	3500
4	Land South of Littlebourne Road (Hoath Farm)	Suburban	1460	3500
5	Land to the north of the railway line and south of Bekesbourne Lane	Suburban	645	3500
7	Brooklands Farm, Whitstable	Suburban	1200	3500
8	Land at Golden Hill	Suburban	290	0
13	Land off The Hill, Littlebourne	Neighbourhood centre	300	0
16	Land South of Thanet Way	Suburban	255	0

Table 5-11 Development with their trips reduced due to sustainability

5.2.5 Trip generation

Based on the above assumptions, the development trip generation is presented in Table 5-12 and Table 5-13 below.

ID	Development Name	Land Use	Location	No reduction		Internalisation		Reduction due to PT	
				Arr	Dep	Arr	Dep	Arr	Dep
1	University of Kent Site B	Residential + Employment	Suburban	149	384	141	365	134	347
2	Merton Park	Residential + Employment	Edge of town centre	249	449	237	427	225	406
3	Land on the west side of Hollow Lane	Residential + Employment	Suburban	102	250	102	250	97	237
4	Land South of Littlebourne Road (Hoath Farm)	Residential + Employment	Suburban	177	467	168	443	160	421

ID	Development Name	Land Use	Location	No reduction		Internalisation		Reduction due to PT	
				Arr	Dep	Arr	Dep	Arr	Dep
5	Land north of the railway line and south of Bekesbourne Lane	Residential + Employment	Suburban	88	208	88	208	84	198
6	Land on Bekesbourne Lane at Hoath Farm	Residential	Suburban	9	27	9	27	9	27
7	Brooklands Farm, Whitstable	Residential + Employment	Suburban	149	384	141	365	134	347
8	Land at Golden Hill	Residential	Suburban	32	92	32	92	30	87
9	Land at Cooting Farm	Residential + Employment	Neighbourhood centre	279	560	265	532	265	532
10	Land west & east of Cooting Lane, Adisham	Residential	Neighbourhood centre	112	264	112	264	112	264
11	Land On The South East Side Of Cooting Lane, Adisham	Residential	Neighbourhood centre	36	85	36	85	36	85
12	Aylesham South	Residential	Neighbourhood centre	60	142	60	142	60	142
13	Land off The Hill, Littlebourne	Residential	Neighbourhood centre	43	101	43	101	41	96
14	Milton Manor House	Residential	Edge of town/Freestanding	11	27	11	27	11	27
16	Land South of Thanet Way	Residential	Suburban adjusted	36	86	36	86	35	82

Table 5-12 Trip generation and trip reduction for AM peak

ID	Development Name	Land Use	Location	No reduction		Internalisation		Reduction due to PT	
				Arr	Dep	Arr	Dep	Arr	Dep
1	University of Kent Site B	Residential + Employment	Suburban	355	187	338	178	321	169
2	Merton Park	Residential + Employment	Edge of town centre	444	319	421	303	400	288
3	Land on the west side of Hollow Lane	Residential + Employment	Suburban	231	125	231	125	219	119
4	Land South of Littlebourne Road (Hoath Farm)	Residential + Employment	Suburban	432	224	410	213	389	202
5	Land north of the railway line and south of Bekesbourne Lane	Residential + Employment	Suburban	193	106	193	106	183	101
6	Land on Bekesbourne Lane at Hoath Farm	Residential	Suburban	25	12	25	12	25	12
7	Brooklands Farm, Whitstable	Residential + Employment	Suburban	355	187	338	177	321	168
8	Land at Golden Hill	Residential	Suburban	35	17	35	17	33	17
9	Land at Cooting Farm	Residential + Employment	Neighbourhood centre	538	362	511	344	511	344
10	Land west & east of Cooting Lane, Adisham	Residential	Neighbourhood centre	245	160	245	160	245	160
11	Land On The South East Side Of Cooting Lane, Adisham	Residential	Neighbourhood centre	79	51	79	51	79	51
12	Aylesham South	Residential	Neighbourhood centre	132	86	132	86	132	86
13	Land off The Hill, Littlebourne	Residential	Neighbourhood centre	94	62	94	62	89	58
14	Milton Manor House	Residential	Edge of town/Freestanding	25	16	25	16	25	16
16	Land South of Thanet Way	Residential	Suburban adjusted	80	52	80	52	76	50

Table 5-13 Trip generation and trip reduction for PM peak

5.2.5.1 Development Trip Distribution

For each development zone, a donor zone from the base year was chosen to duplicate its trip pattern. As far as possible, the selected donor zone was the one that shared the same land use as the development zone, and it was located in reasonable proximity to the zone. This process was undertaken in order to accurately replicate the trip distribution of the developments' zones. This also ensured that the future land use of zones had robustly been modelled, once the matrix furnessing had been applied. The full list of donor zones is available in Appendix A. The AM and PM development OD trips developments were divided between purposes based on the donor zone purpose proportion.

5.2.6 Fuel-income adjustment

As the model uses fixed highway demand, it was necessary to adjust the matrices to take account of future changes in income and fuel price. The factors applied were derived in accordance with TAG, using the May 2020

TAG data book, published by DfT. The income adjustment factors for the base year 2019 and forecast year 2045 are given below in Table 5-14.

Factor	2019	2045
Fuel	1.0692356	1.1348689
Income	1.0184391	1.0856644
Overall fuel factor		1.0613834
Overall income factor		1.0660082
Growth adjustment		1.1314435

Table 5-14: Fuel and Income Adjustment Factors

5.2.6.1 Cycling

The Propensity to Cycle Tool (PCT) provides estimates of the government target for cycling and hence will be used to account the shift between private vehicle to cycle trips. The analysis is presented in Appendix B.

5.2.7 Future Year Target Trip Ends

The final matrices combined the reduced background growth (after applying alternative planning assumptions) with specific developments through a furnessing process to obtain a forecast year demand matrix for the 2045 forecast year as presented in Table 5-15. As the matrix totals combining developments and growthed trips had been differing slightly between origins (O) and destinations (D), in AM the destinations and in PM origins were re-scaled to have the same total as before furnessing.

Description	Scenario	AM	PM
Base (2019)	**Base**	36,587	40,255
2045 Unadjusted TEMPro		46,780	49,581
New Developments	Option 5V2	4,758	5,120
Alternative land use (Background Growth)	Option 5V2	38,201	42,011
Matrices Total (After Furnessing)	Option 5V2	44,141	46,842
Matrices Total (After PCT)	Option 5V2	43,829	46,474

Table 5-15: 2045 Forecast Matrices After Furnessing

The trip ends before and after the PCT discount are presented in Table 5-16 and Table 5-17 below.

ID	Development Name	Land Use	Location	Prior PCT		Post PCT		% Change	
				Arr	Dep	Arr	Dep	Arr	Dep
1	University of Kent Site B	Residential + Employment	Suburban	141	347	138	338	-2%	-3%
2	Merton Park	Residential + Employment	Edge of town centre	236	406	233	398	-1%	-2%
3	Land on the west side of Hollow Lane	Residential + Employment	Suburban	102	237	102	232	0%	-2%
4	Land South of Littlebourne Road (Hoath Farm)	Residential + Employment	Suburban	168	421	165	415	-2%	-1%
5	Land north of the railway line and south of Bekesbourne Lane	Residential + Employment	Suburban	88	198	86	193	-2%	-3%
6	Land on Bekesbourne Lane at Hoath Farm	Residential	Suburban	10	27	10	27	0%	0%
7	Brooklands Farm, Whitstable	Residential + Employment	Suburban	141	347	141	347	0%	0%
8	Land at Golden Hill	Residential	Suburban	32	87	32	87	0%	0%
9	Land at Cooting Farm	Residential + Employment	Neighbourhood centre	279	532	279	532	0%	0%
10	Land west & east of Cooting Lane, Adisham	Residential	Neighbourhood centre	117	264	117	263	0%	0%
11	Land On The South East Side Of Cooting Lane, Adisham	Residential	Neighbourhood centre	38	84	38	84	0%	0%
12	Aylesham South	Residential	Neighbourhood centre	63	142	63	142	0%	0%
13	Land off The Hill, Littlebourne	Residential	Neighbourhood centre	43	96	43	96	0%	0%
14	Milton Manor House	Residential	Edge of town/Freestanding	12	27	12	27	0%	0%
16	Land South of Thanet Way	Residential	Suburban adjusted	37	82	37	82	0%	0%

Table 5-16 Development trip ends - AM peak

ID	Development Name	Land Use	Location	Prior PCT		Post PCT		% Change	
				Arr	Dep	Arr	Dep	Arr	Dep
1	University of Kent Site B	Residential + Employment	Suburban	321	172	309	169	-4%	-2%
2	Merton Park	Residential + Employment	Edge of town centre	400	293	392	289	-2%	-1%
3	Land on the west side of Hollow Lane	Residential + Employment	Suburban	219	122	218	120	0%	-2%
4	Land South of Littlebourne Road (Hoath Farm)	Residential + Employment	Suburban	389	207	380	205	-2%	-1%
5	Land north of the railway line and south of Bekesbourne Lane	Residential + Employment	Suburban	183	103	177	101	-3%	-2%
6	Land on Bekesbourne Lane at Hoath Farm	Residential	Suburban	25	13	24	12	-4%	-8%
7	Brooklands Farm, Whitstable	Residential + Employment	Suburban	321	172	321	172	0%	0%
8	Land at Golden Hill	Residential	Suburban	80	41	80	41	0%	0%
9	Land at Cooting Farm	Residential + Employment	Neighbourhood centre	511	351	511	351	0%	0%
10	Land west & east of Cooting Lane, Adisham	Residential	Neighbourhood centre	245	163	245	163	0%	0%
11	Land On The South East Side Of Cooting Lane, Adisham	Residential	Neighbourhood centre	78	52	78	52	0%	0%
12	Aylesham South	Residential	Neighbourhood centre	132	88	132	88	0%	0%
13	Land off The Hill, Littlebourne	Residential	Neighbourhood centre	89	60	89	60	0%	0%
14	Milton Manor House	Residential	Edge of town/Freestanding	25	17	25	17	0%	0%
16	Land South of Thanet Way	Residential	Suburban adjusted	76	51	76	51	0%	0%

Table 5-17 Development trip ends - PM peak

Checks were carried out to compare the trip totals in all scenarios between the 2019 base year and 2045 to ensure that overall growth was in line with the proposed developments. Table 5-18 and Table 5-19 provide a summary of matrix trip totals at the AM and PM peak hour level for each trip purpose for the full matrix and the percentage change between base and forecast scenarios totals.

Purpose		Base Year	Option 5V2
AM	Commute	12,281	16,844
	Business	2,954	4,177
	Other	10,879	17,036
	LGV	2,981	4,581
	HGV	993	1,191
	Total	**30,089**	**43,829**
PM	Commute	11,354	15,068
	Business	2,966	4,065
	Other	15,375	22,921
	LGV	2,430	3,687
	HGV	609	735
	Total	**32,734**	**46,476**

Table 5-18: Base Matrix Totals Comparison with Forecast Matrices

Purpose		Option 5V2
AM	Commute	1.37
	Business	1.41
	Other	1.57
	LGV	1.54
	HGV	1.2
	Total	**1.46**
PM	Commute	1.33
	Business	1.37
	Other	1.49
	LGV	1.52
	HGV	1.21
	Total	**1.42**

Table 5-19 : Forecast Matrix Growth Compared to Base Matrix

5.3 Goods Vehicle Growth

Growth in LGV and HGV demand has been produced by applying growth factors from the Road Traffic Forecasts (RTF) (2018) published by DfT. The RTF produces forecasts to a horizon year of 2045 in 5-year intervals. For the purposes of this work, the RTF Scenario 1 was adopted, namely the "central" macroeconomic assumption, a positive and declining income relationship, and using historic averages for trip rates.

The South East England 2045 RTF forecasts were extracted for LGV and HGV to obtain a growth factor for 2045 from 2019. The resulting growth rates were applied to the entire demand matrix. Table 5-20 shows the % changes calculated between base year and 2045 from the RTF data for goods vehicles for South East England:

Region/Area	Vehicle Class	2019 to 2045 Growth
South East England	LGV	1.36
	HGV	1.15

Table 5-20 : LGV and HGV Growth Factors

6. Forecast Results

6.1 Overview

This section describes the forecast results for the updated 2045 LPR Option 5V2 Scenario. A forecast year of 2045 has been modelled with the use of combined TEMPro growth assumptions in the neighbouring districts and trip rates from TRICs agreed with National Highways to create the following assignment scenarios:

- Option 5V2 – includes the Forecast baseline assumptions plus potential local plan developments to be included on the transport network between the 2019 base year and 2045.

A set of output plots has been produced to show the flows, node level of service and change in travel time in order to help identify key areas of constraint arising from additional development in the Option 5V2 scenario.

6.1.1 Flow Plots

Flows have been produced to allow the overview of the total network volume and its distribution. This will help analyse the potential development allocations, network restrictions and sufficiency for local transport needs.

6.1.2 Flow Change Plots

Flow Changes have been reviewed as a means to monitor scheme impact on the total network. This will help analyse the potential development allocations, network restrictions and sufficiency for local transport needs.

6.1.3 Level of Service Plots

Level of service (LOS) plots provide a qualitative measure of how good the present traffic situation is on a given junction, from the driver's perspective. As actual flow will vary for different days and different times in a day, LOS relates the traffic service quality to a given flow rate of traffic. VISUM defines the LOS based on the mean delay experienced by each vehicle. VISUM has the capability to calculate LOS for all types of junctions (priority, roundabouts, and signalised junctions). Table 6-1 defines the LOS by six levels ranging from level A to level F.

LOS Level	Description
A	Level A represents the best quality of traffic where the driver has the freedom to drive with free flow speed.
B	Level B represents good traffic quality where driver can reasonably maintain free flow speed and maneuverability within the traffic stream is slightly restricted.
C	Level C represents stable traffic flows, at or near free flow. Ability to manoeuvre through lanes is noticeably restricted and requires awareness.
D	Level D represents almost unstable traffic flows. Speeds slightly decrease as traffic volume slightly increase. On this level driver comfort decreases.
E	Level E represents unstable traffic flows, operating at capacity. Driver's level of comfort becomes poor.
F	Level F represents the worst traffic quality with forced or breakdown traffic flows. Travel time cannot be predicted, with generally more demand than capacity.

Table 6-1: Level of Service Description

Link flow plots as well as LOS plots are presented in following sections and included in Appendix D and Appendix E respectively.

6.2 2045 LPR Option 5V2

LPR Option 5V2 has been developed to continue the pattern of the existing Local Plan Strategy[3] which aims to provide well-designed communities, good access to jobs and services and protect sensitive landscapes. Housing is planned to meet local housing need and support economic growth.

6.2.1 Option 5V2 Flow Plots

The actual flows in vehicles for AM and PM are shown in Figure 6-1 and Figure 6-2.

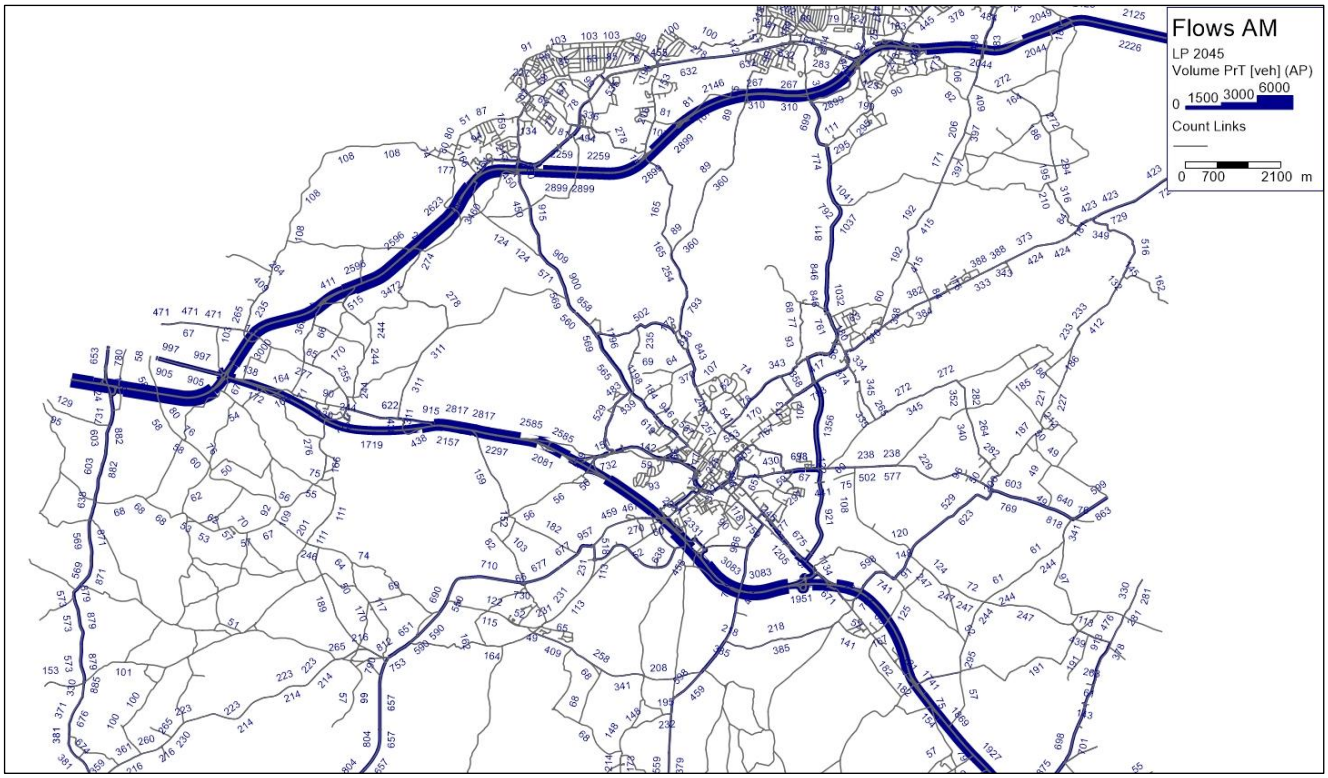


Figure 6-1: 2045 LPR Option 5V2 AM Flows

[3] Canterbury District Local Plan (July 2017)

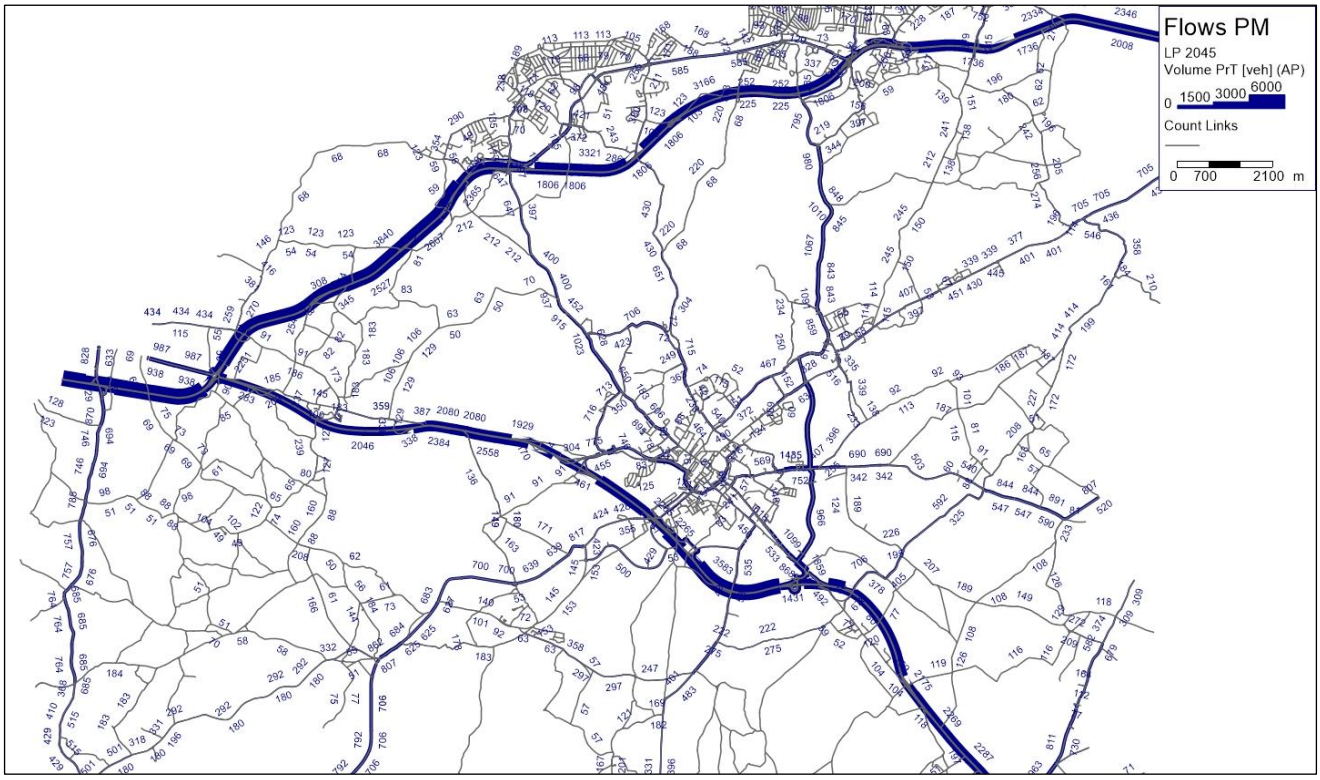


Figure 6-2: 2045 LPR Option 5V2 PM Flows

In the AM, the largest traffic flows are on the two major corridors and specifically north in the A299 Thanet Way and south in the A2 Dover Rd which range from 2,000 to 3,600 vehicles per hour for each direction. These are followed by corridors in the east such as Canterbury Road and then Herne Bay Road and Eastern bypass which range from 700 to 1,400 vehicles per hour. Significant flows are found on Whitstable Road and A28 Canterbury Road (northwest and southwest respectively) with flows between 600 and 1,200 vehicles per hour.

In Canterbury City Centre, traffic flows are considerable reduced due to the proposed strategy. After the introduction of blockers on the Ring Road and specifically on the north and east part flows are restricted compared to the south and west of city centre. Indeed, main city centre entries from north and east direct inbound traffic from Chaucer Road and Military Roundabout and Old Dover Road, respectively, with approximately 500 vehicles per hour on each approach. On the contrary, the south entry from Wincheap road accumulates almost 1,000 vehicles per hour on the inbound. The A2050 Rheims Way remains the main city access with almost 1,200 vehicles per hour concentrating flows from the A2 and Whitstable Road which is restricted on St Peter's Place. Car parks around the Ring Road concentrate some of the inbound traffic which is not however determinant to the overall traffic flows in the city centre.

The traffic flows in the PM are similar to that of the AM.

6.2.2 City centre flow change

Changes in traffic flows between the current situation (represented by 2019 Base models) and the proposed 2045 Option 5V2 are illustrated in Figure 6-3 and Figure 6-4. Similarly changes between the committed growth scenario, without any Local Plan proposals (represented by 2040 Baseline models) and the preferred Local Plan Option 5V2 (represent 2045 Strategic Growth scenario) are seen in Figure 6-6. These comparisons show a general reduction in traffic through the city centre. This results mainly from the transport schemes proposed in the preferred option (Table 4-1) that provide city centre alternative (i.e. The Eastern movement corridor). City centre schemes supporting pedestrians and cyclists also restrict car space further contributing to car traffic discount on the around the ring road.

In both AM and PM peak, car traffic flow is restricted across the ring road as well as along the main city centre accesses. This pattern is consistent in Option 5V2 comparison with either the current situation and the

committed growth scenario. Indeed, there is a notable traffic flow restriction on corridors where specific schemes are proposed. Tourtel Rd as well as St. Peter's Pl where blockers are proposed in Option 5V2 scenario suggest high flow reductions. Between London roundabout and St George's roundabout traffic is restricted due to car space restrictions by allocating road space to active travel. Despite the shift of car traffic to alternative routes suggested from the transport schemes, the city centre schemes further discourage inbound flows with traffic discounts around the ring road.

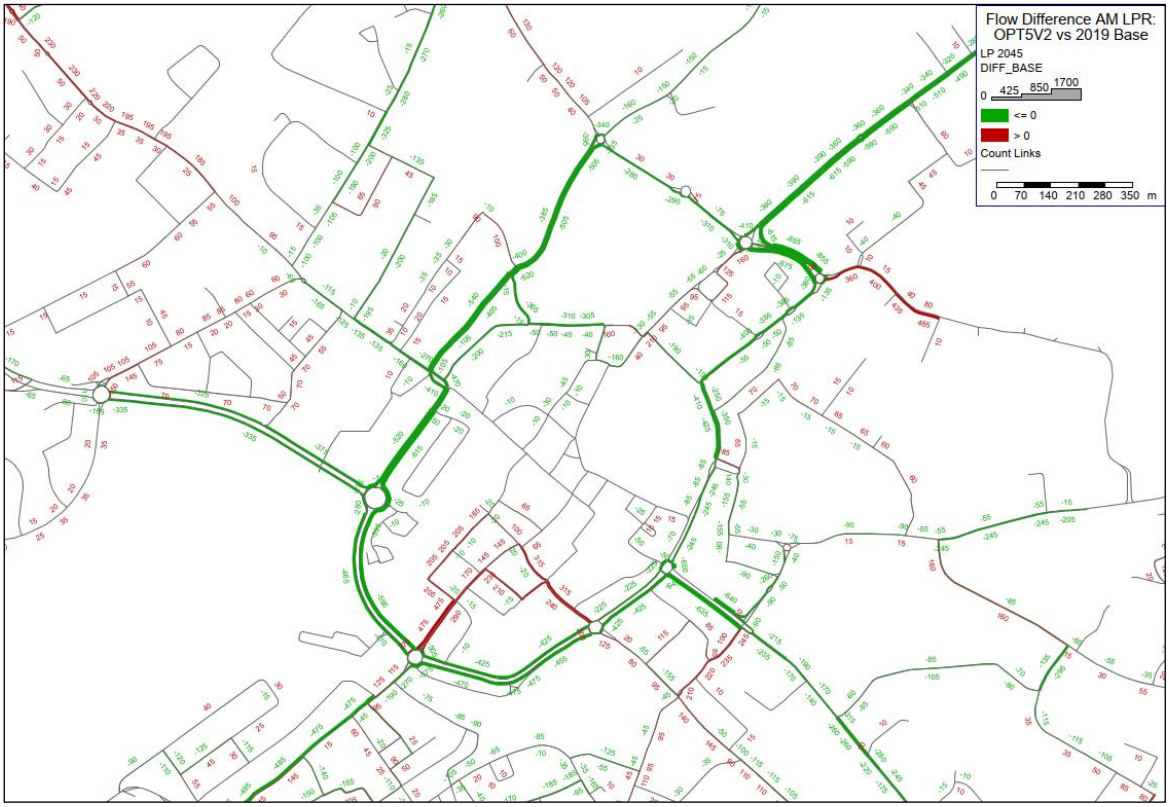


Figure 6-3 Flow change: 2019 Base to 2045 Option 5V2 AM

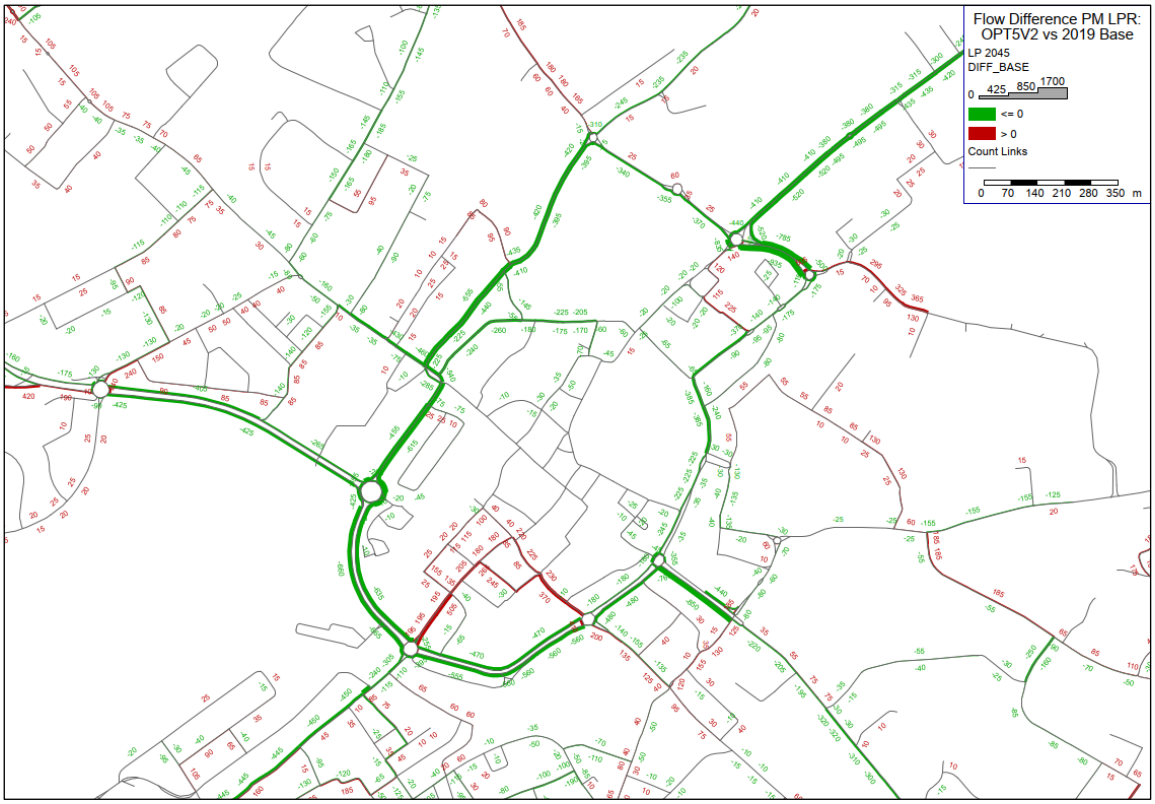


Figure 6-4 Flow change: 2019 Base to 2045 Option 5V2 PM

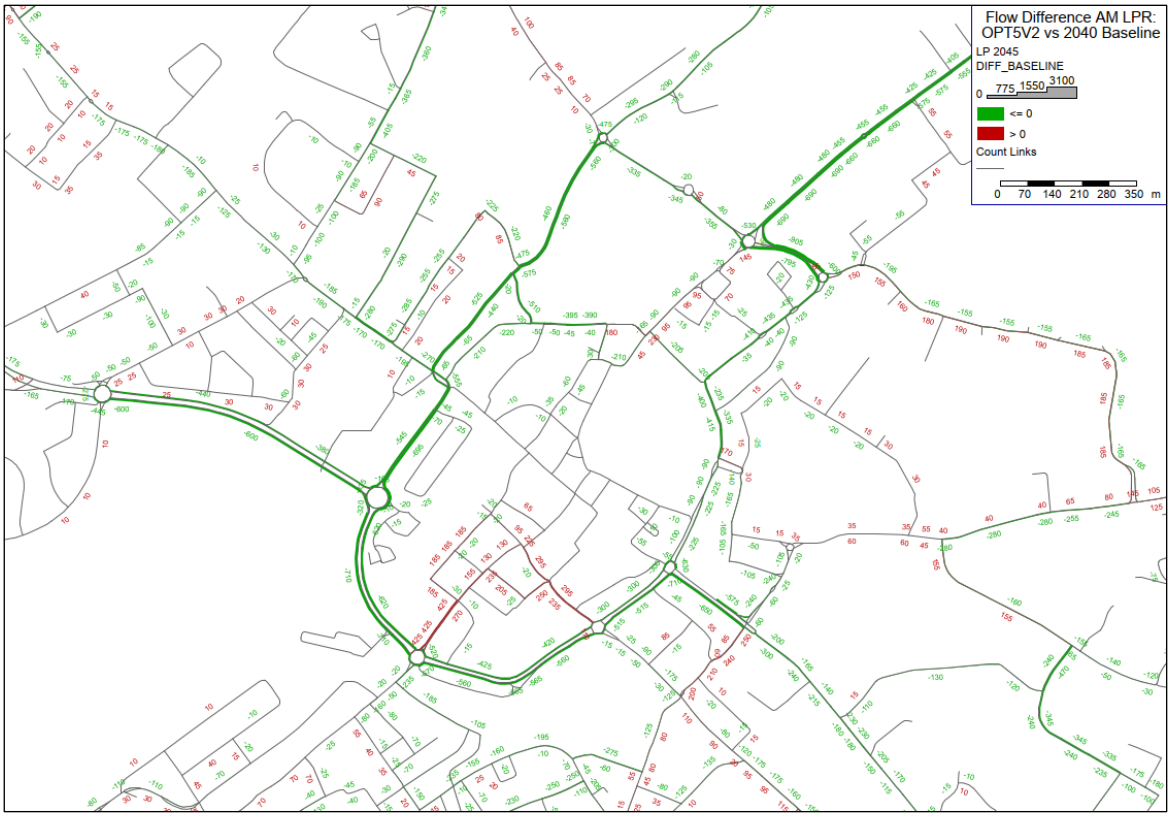


Figure 6-5 Flow change: 2040 Baseline to 2045 Option 5V2 AM

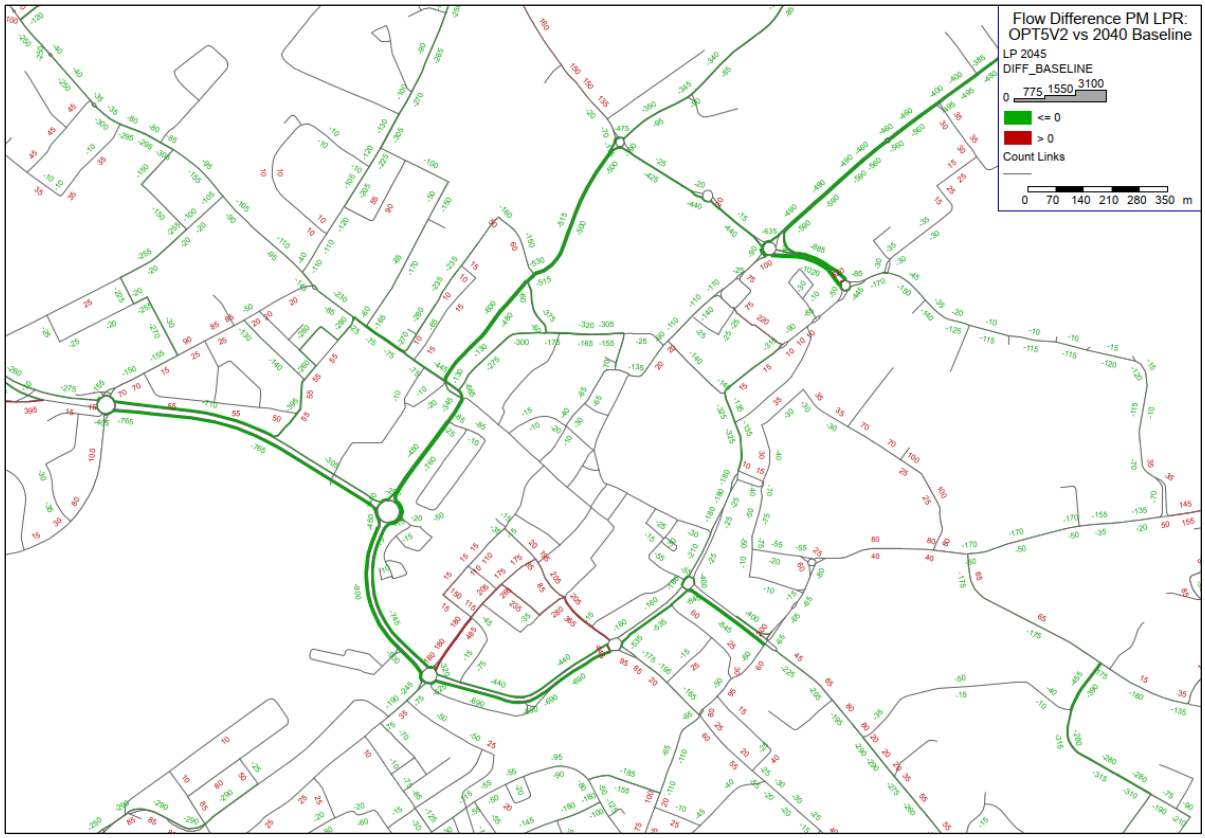


Figure 6-6 Flow change: 2040 Baseline to 2045 Option 5V2 PM

Wider network changes in traffic flow can be found in Appendix G.

6.2.3 Option 5V2 LOS Plots

Figure 6-3 and Figure 6-4 show the junction level of service in 2045 Reference case for the AM and PM peak periods.

The level of service in the AM displayed severe delays with class F junctions north of the city centre in proximate with the University of Kent. This is a result of the new link, through the campus, providing an alternative route from Hackington Rd towards the city centre. South and east of the city centre significant delays were observed with class E nodes on Old and New Dover Road, the A2/A28 junction as well as adjacent to Merton Park and Saxon Fields areas. Class D nodes are observed mostly on the coastal area as well as south and east of the Ring Road on the Old Dover Rd junction, due to the Eastern bypass realignment, and the Wincheap Gyratory junction. Minor delays of class C and B are detected around the Ring Road as well as on the Eastern bypass as a result of Bekesbourne Rd realignment that decongested the A257 junction. Class B nodes are also present in the coastal area and the northeast corridors. It should be highlighted that roundabouts have not been modelled as main nodes rather they were assessed as single nodes. This results in individual nodes of class B located in Stephen's Hill roundabout.

The level of service during the PM peak improves around the city centre while delays around the coastal area increase mainly Thanet Way.

Where junctions are shown to be exceeding capacity further design work will be necessary to improve performance.

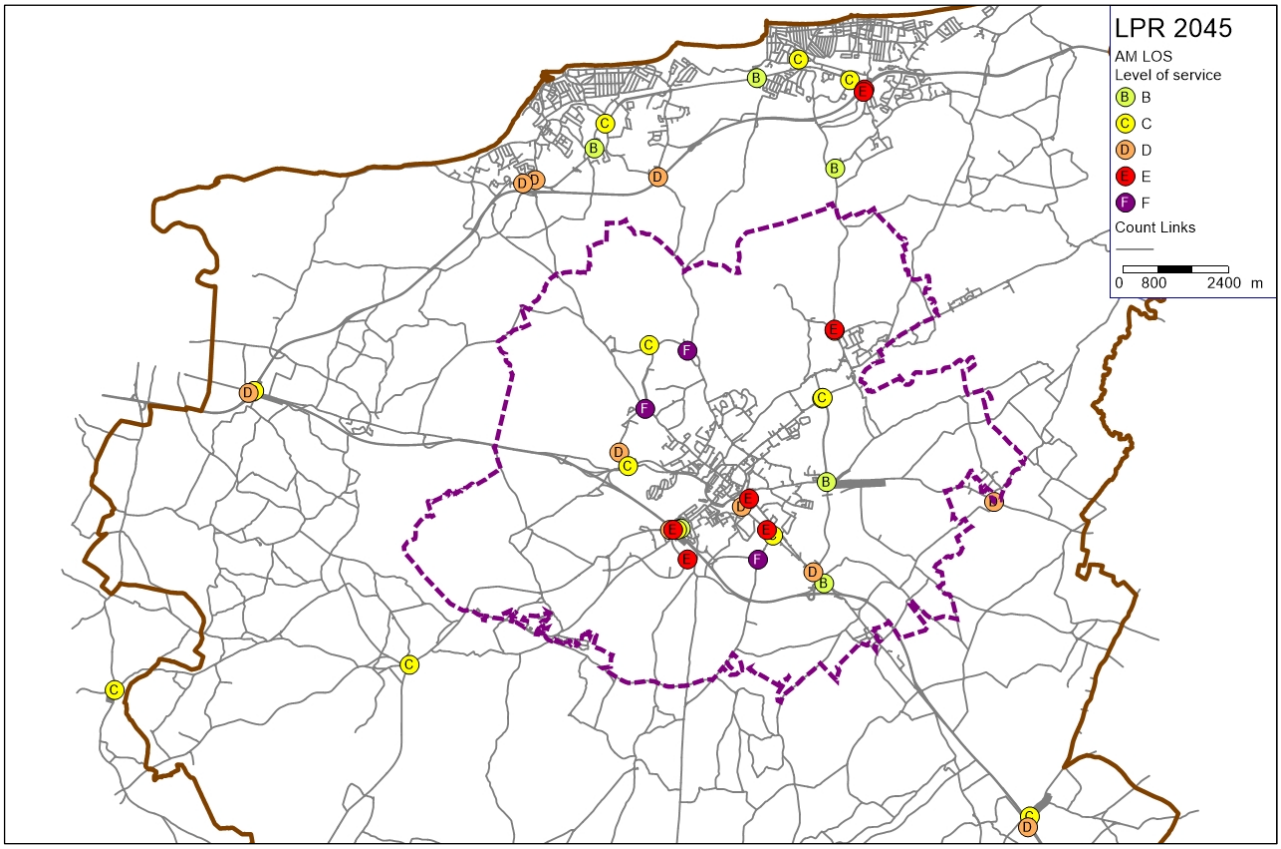


Figure 6-7: 2045 LPR Option 5V2 AM LOS

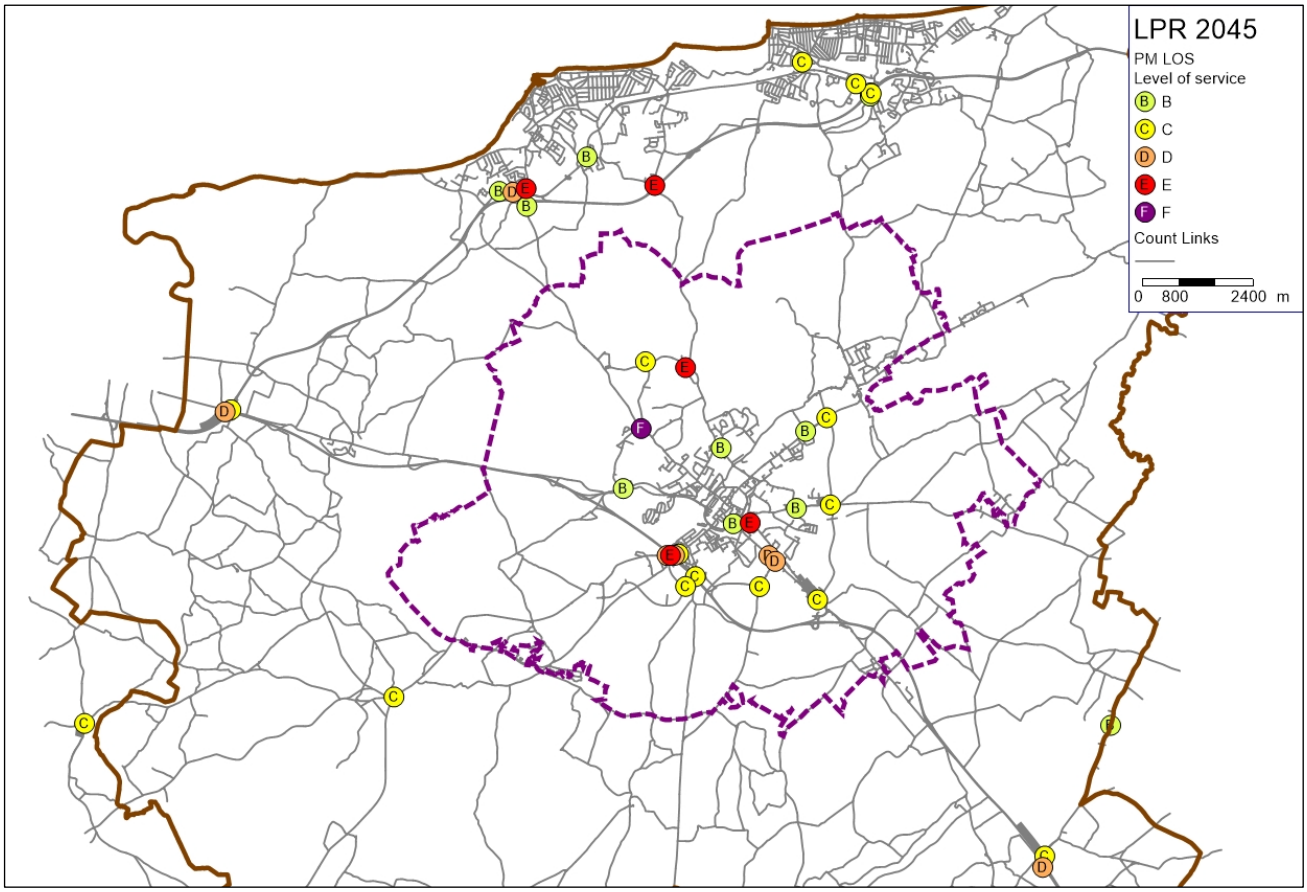


Figure 6-8: 2045 LPR Option 5V2 PM LOS

6.2.4 Option 5V2 Journey Time

This section focuses on the predicted journey times of local routes in Canterbury in LPR Option 5V2. The routes used for the analysis are shown in Figure 6-9 and the modelled journey times, for each time period in LPR Option 5V2, are presented in Table 6-2.

Route 1 along Wincheap road, results in less than 10 minutes in the AM and PM peak. Along the route, highest delays are experienced on the A2 junction (E class in both peaks). However, overall journey time for Route 1 accounts for an almost 2-minute decrease compared to current journey time due to the schemes proposed to bypass the city centre in order to access either the Kent and Canterbury Hospital or the Old Dover Rd and Eastern bypass. Route 2 follows Rheims Way concluding in approximately 4 minutes and 3 minutes in the AM and PM peak, respectively. Bus priority lanes and segregated cycle lanes along the route between London roundabout and St. Peter's roundabout propose to restrict car space without however having a negative impact on route journey time that sees minor increase compared to current situation. Route 3 along St. Stephen's Hill results in less than 10 minutes and 8 minutes in the AM and PM peak respectively. Route 4 on Sturry road shows a 2.5-minute journey time across both peaks. As a result of the active travel measures and the blockers proposed on Tourtel Road between Northgate and Chaucer roundabout, Route 4 shows more than 1-minute decrease in journey time compared to current case. Route 5 follows the A257 Littlebourne Road with almost 10- and 4-minute journey times for the AM and PM peak experience no significant delays throughout the day. Route 6 and Route 7 on New and Old Dover Road respectively, saw similar journey times in the PM peak, while Old Dover Road concluded in 3 minutes higher delays compared to New Doer Road in the AM peak. Route 8 along Whitstable Road achieved 6 minute and 4-minute journey times in the AM and PM peak respectively. This is a result of the traffic being diverted through the Rough Common Road before the start of Route 8 and, along the route, through London Road, restricting the overall journey time of the route to 1 minute compared to current case. Finally, Route 9 in 23 and 13 minute journey time for AM and PM respectively, mainly due to the adjacent

developments (south of A257) as well as the junction delays on the southern end of the bypass. As this relates to proposed development further work will be required to improve junction performance.

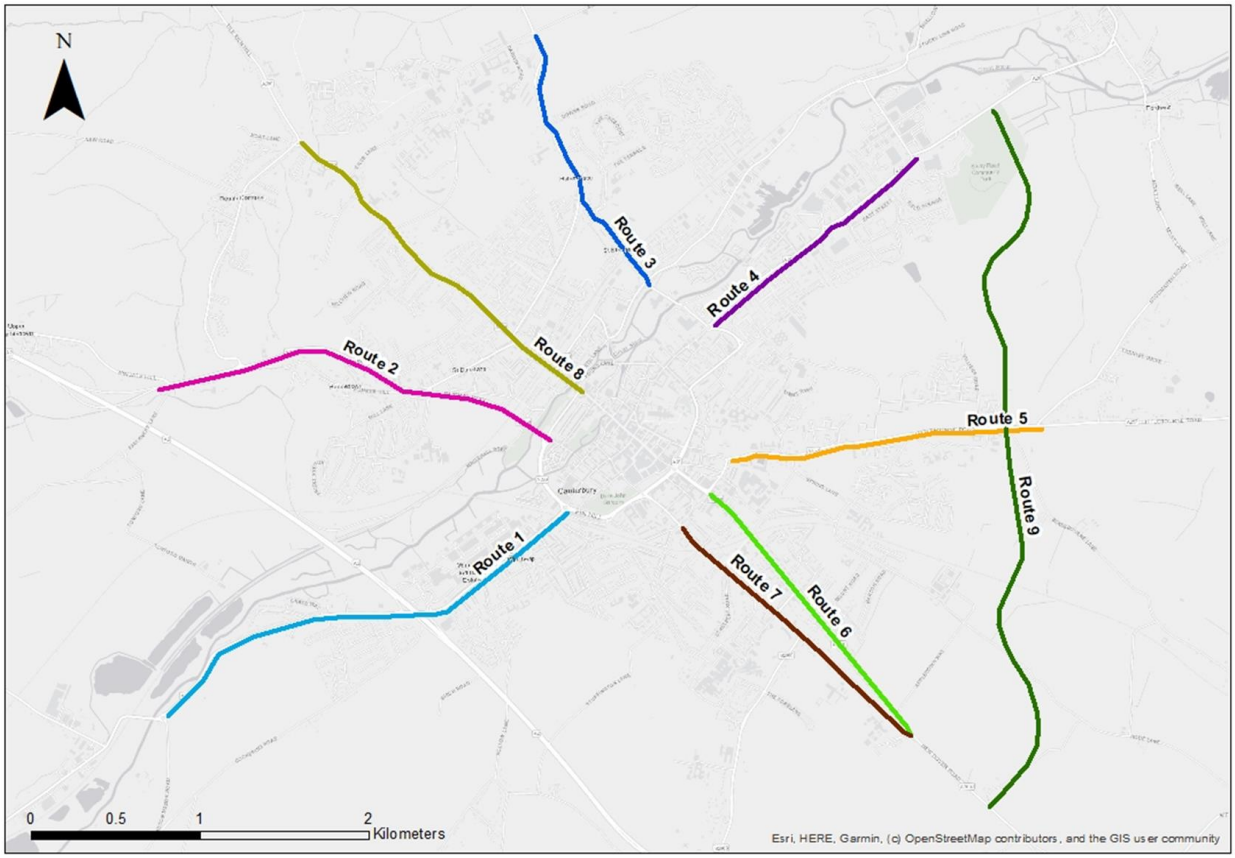


Figure 6-9: Journey Routes Used for Assessment

	2019 Base Year				2045 OPTION 5V2				Comparison OPTION 5V2 vs Base			
	AM		PM		AM		PM		AM		PM	
	JT	Avg. Speed (km/h)	JT	Avg. Speed (km/h)	JT	Avg. Speed (km/h)	JT	Avg. Speed (km/h)	JT	Avg. Speed (km/h)	JT	Avg. Speed (km/h)
Route 1	10:54	14.7	09:29	16.9	09:10	19.0	07:24	23.6	-01:44	4.3	-02:05	6.7
Route 2	03:43	37.2	02:56	47.2	04:24	31.4	03:05	44.8	00:41	-5.8	00:09	-2.4
Route 3	04:32	22.3	03:41	27.4	09:22	10.8	07:50	12.9	04:50	-11.5	04:09	-14.5
Route 4	04:15	21.5	03:28	26.3	02:34	35.5	02:24	38.0	-01:41	14.1	-01:04	11.7
Route 5	04:27	24.6	02:59	36.7	09:55	11.1	03:48	28.9	05:28	-13.5	00:49	-7.7
Route 6	04:24	24.3	03:39	29.3	05:53	18.4	02:55	37.2	01:29	-5.9	-00:44	7.9
Route 7	05:57	19.0	04:51	23.3	08:54	12.3	05:18	20.7	02:57	-6.6	00:27	-2.5
Route 8	04:44	28.6	04:18	31.5	05:46	23.5	03:50	35.3	01:02	-5.1	-00:28	3.8
Route 9					23:22	12.4	13:38	21.2				

Table 6-2: 2045 Option 5V2 Modelled Total Travel Time

7. Conclusions and Recommendations

This Report provides a comprehensive description of the methodologies used and the 2045 forecasts provided by the Canterbury Transport Local Model.

The previous Local Plan scenarios were developed for early decision making on the Canterbury Local Plan Review (LPR) using the Local Canterbury Model, for the forecast year of 2040. This forecast assessment was based on the 'Highway assignment' only and the five LPR option testing scenarios were used to understand the likely distribution and assignment patterns of LPR development's traffic on the network. Precise details of these scenarios have been confirmed with CCC and are made up of the following:

- Existing Local Plan Strategy;
- Coast with improved public transport;
- City with SWECO only – regarding signalisation of Ring road junctions;
- City with SWECO and relief roads; and
- City with Ghent and relief roads – regarding pedestrian and cyclists friendly plans with reduced speed limits.

Canterbury City Council have now identified a preferred strategic growth Local Plan option and has commissioned Jacobs to proceed with a modelling assessment in line with those completed for the previously completed options. This modelling work should make use of the existing Canterbury cordoned model and previous "LPR Options 5 model" (as seen in the *Forecast Report*[4]) or "City with Ghent and relief roads" (as seen above) with updates considering the provided housing allocations and schemes. The forecast year has also been amended to 2045. The new option to be tested would be labelled as "Option 5V2". A separate cycle propensity study and technical note are also prepared to demonstrate the differences of an LP strategy with and without the proposed LP option 5 V2 interventions.

The 2045 Option 5V2 scenario shows high traffic flows on the two main corridors, A2 on the south and A299 north, which range from 2,000 to 3,600 vehicles per hour for each direction. Significant flows are observed along the Eastern movement corridor and Herne Bay Road which directs traffic through the north and east city centre accesses. Despite the growth implied from the planned developments of the preferred option as well as the background growth, car traffic volumes in the city centre showed significant decreases compared to previously suggested options and the current situation. This effect is highlighted across the ring road where blockers are suggested in combination with schemes that promote bus services and cycling.

In terms of the junction level of service, high delays of class F and E junctions were observed outside of the city centre, close to the University of Kent and on Old and New Dover Road, the A2/A28 junction as well as adjacent to Merton Park and Saxon Fields areas. This is further reflected to the journey times with Route 6 and 7 passing through these junctions. Shorter journey times are seen in Route 1, Route 2 and Route 4 where road space is restricted by bus priority lanes and blockers respectively. These restrictions led to short journey times due to traffic diversion to alternative paths.

Recommendations are suggested for further junction design improvements through the evolution of the associated proposed development areas as highlighted above.

[4] Stage 3 Canterbury LP - Forecast Report_140521

Appendix A. Model Validation – Junction 6 example

This section has been written to detail to the changes in relation to M2 Junction 6 as a result of cordoning the Kent Countywide Model for use in the assessment of the Canterbury Local Plan. Within the cordoned Local Plan model, M2 Junction lies at the edge of the cordon and so actual flows have been extracted along the main links and the on and off slips to ascertain the changes in demand as a result of the cordoning process.

Model Flows

The actual flow on links within the vicinity of M2 junction 6 during the AM peak are shown in Figure 17 and Figure 18 for the Kent Countywide Model and Canterbury Local Plan model respectively.

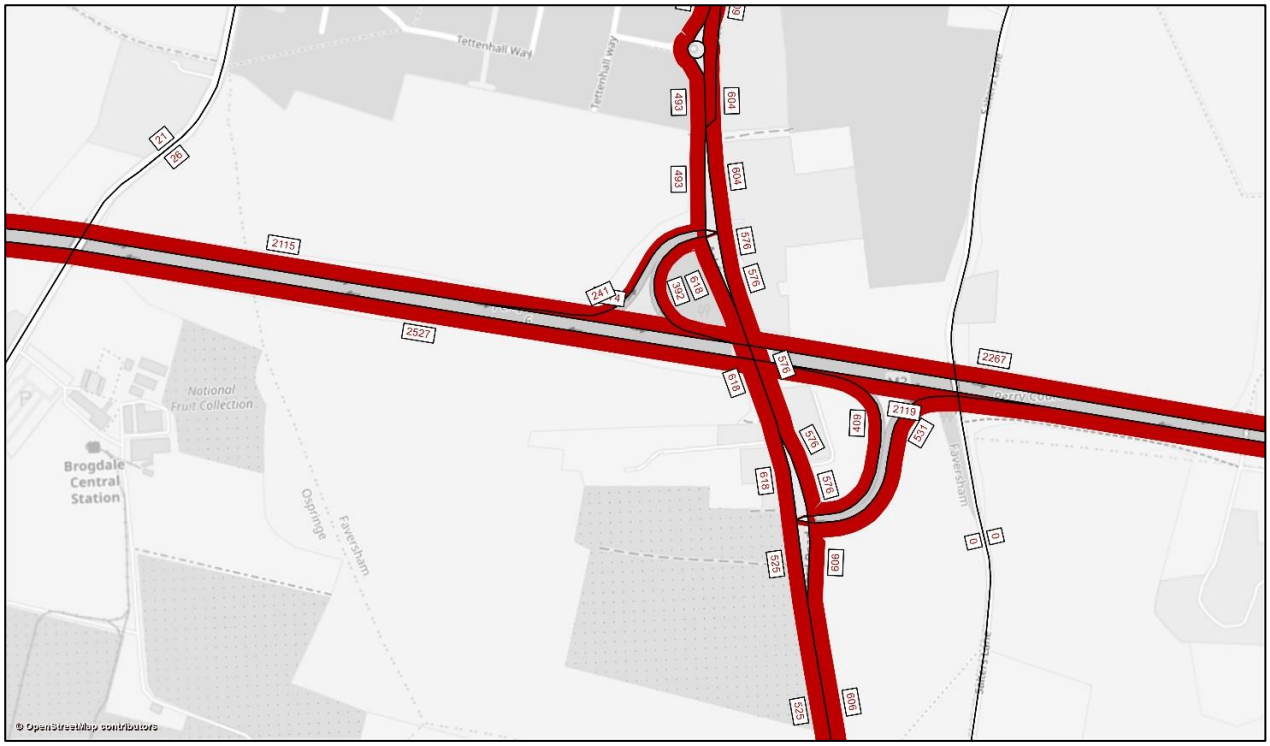


Figure 17: M2 Junction 6, Kent Countywide Model, AM Peak, Actual Flow

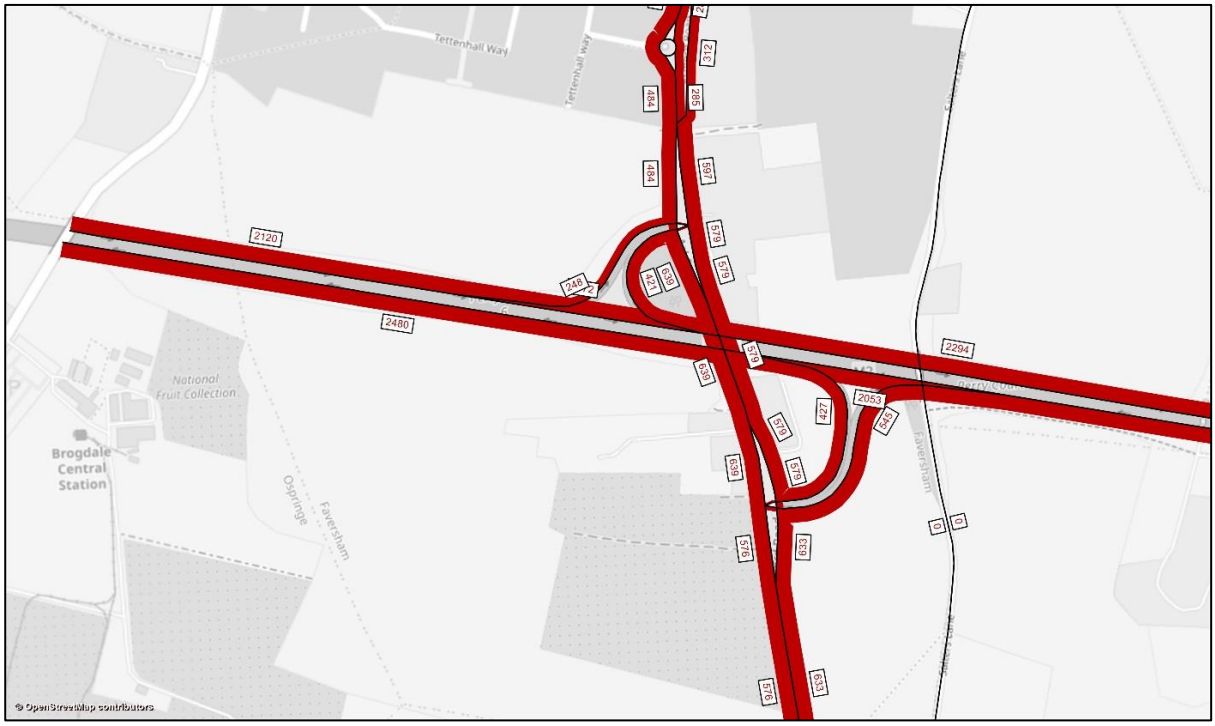


Figure 18: M2 Junction 6, Canterbury Local Plan Model, AM Peak, Actual Flow

The actual difference and percentage difference between the M2 junction 6 link flows in the Kent Model and the Canterbury Cordon during the AM peak are analysed in detail within Table 23. The maximum actual difference in link flow is approximately 66 Veh (3.11%) on the M2 WB flow-through, between the off-slip and on-slip; the maximum % difference is shown on M2 EB on-slip, with a reduction of approximately 7.4% (29 Veh) between the Kent Model and the Canterbury Cordon.

Table 23: M2 Junction 6, Model Comparisons, AM Peak, Actual Flow (Veh)

	AM Peak			
	Kent Model	Canterbury Cordon	Actual Difference	% Difference
M2 EB (west of J6)	2115	2120	-5	-0.24%
M2 EB off-slip	241	248	-7	-2.90%
M2 EB through-flow	1874	1872	2	0.11%
M2 EB on-slip	392	421	-29	-7.40%
M2 EB (east of J6)	2267	2294	-27	-1.19%
M2 WB (east of J6)	2650	2597	53	2.00%

M2 WB off-slip	531	545	-14	-2.64%
M2 WB through-flow	2119	2053	66	3.11%
M2 WB on-slip	409	427	-18	-4.40%
M2 WB (west of J6)	2527	2480	47	1.86%

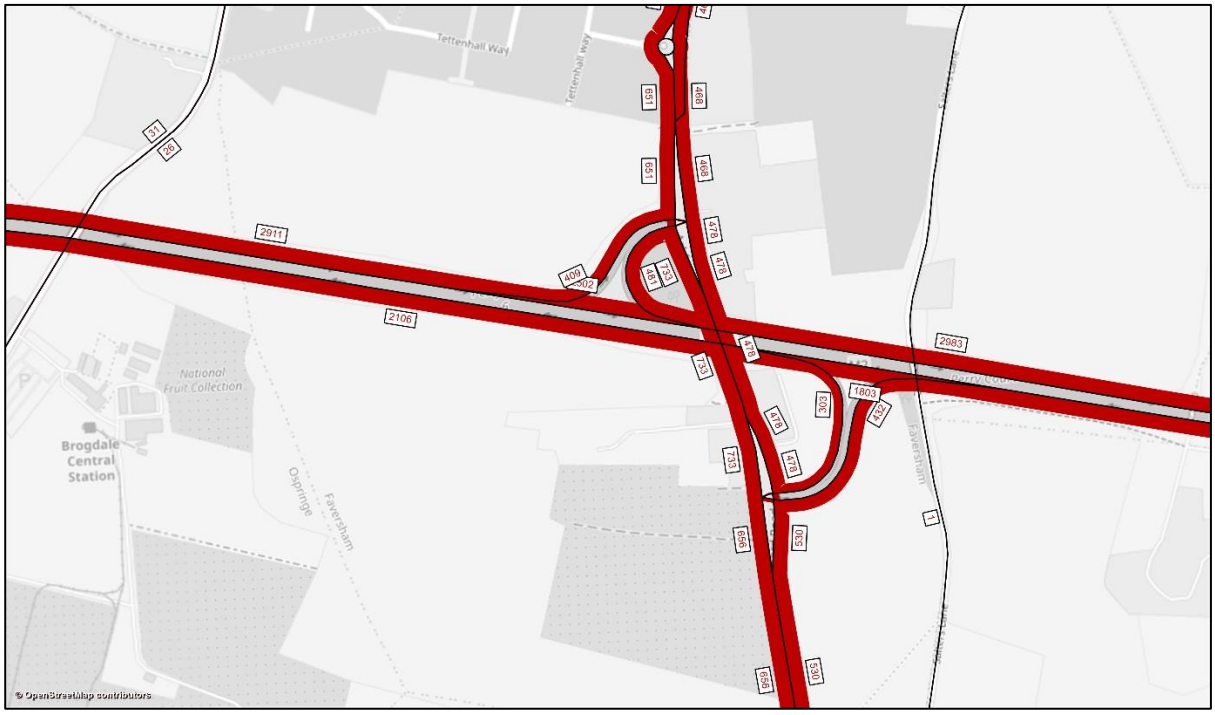


Figure 19: M2 Junction 6, Kent Countywide Model, PM Peak, Actual Flow

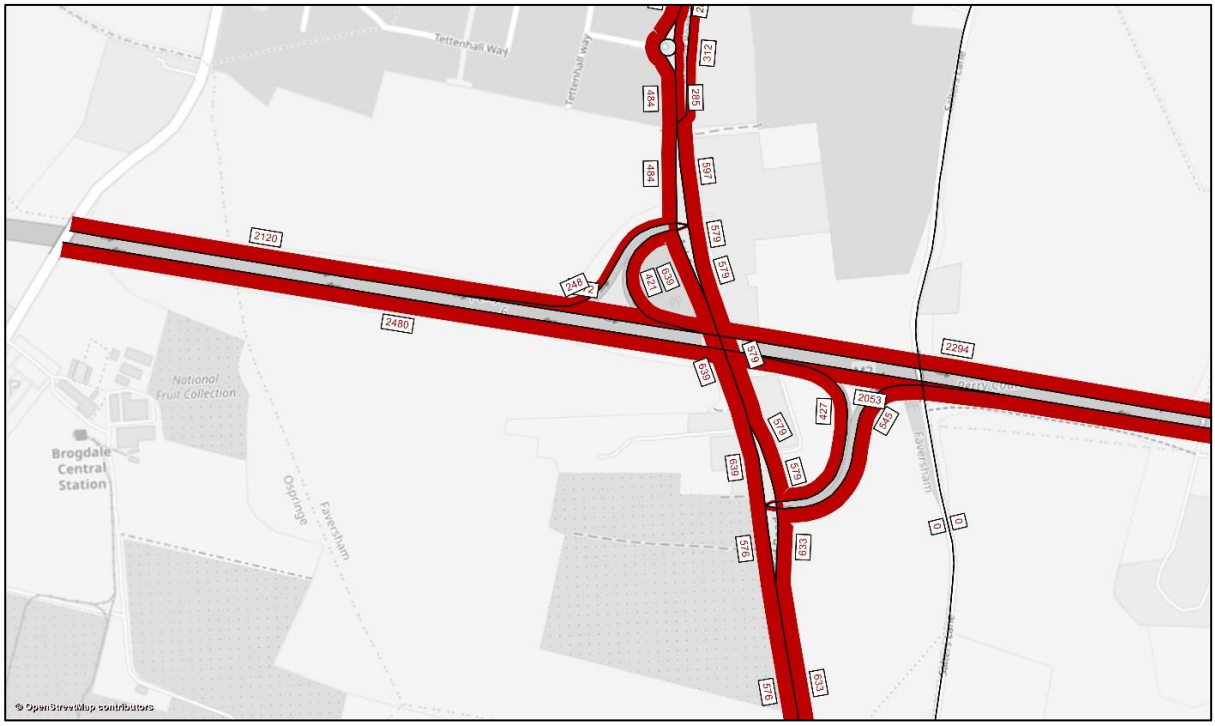


Figure 20: M2 Junction 6, Canterbury Local Plan Model, PM Peak, Actual Flow

The actual difference and percentage difference between the M2 junction 6 link flows in the Kent Model and the Canterbury Cordon during the PM peak are analysed in detail within Table 24. The maximum actual difference in link flow is approximately 66 Veh (3.66%) on the M2 WB flow-through, between the off-slip and on-slip; the maximum % difference is shown on M2 WB on-slip, with a reduction of approximately 8.91% (27 Veh) between the Kent Model and the Canterbury Cordon.

Table 24: M2 Junction 6, Model Comparisons, PM Peak, Actual Flow (Veh)

	PM Peak			
	Kent Model	Canterbury Cordon	Actual Difference	% Difference
M2 EB (west of J6)	2911	2917	-6	-0.21%
M2 EB off-slip	409	419	-10	-2.44%
M2 EB through-flow	2502	2498	4	0.16%
M2 EB on-slip	481	496	-15	-3.12%
M2 EB (east of J6)	2983	2994	-11	-0.37%
M2 WB (east of J6)	2235	2185	50	2.24%

M2 WB off-slip	432	448	-16	-3.70%
M2 WB through-flow	1803	1737	66	3.66%
M2 WB on-slip	303	330	-27	-8.91%
M2 WB (west of J6)	2106	2067	39	1.85%

Summary

The analysis presented within this note shows that there are negligible differences in flow between the Kent Countywide Model and the Canterbury Local Plan cordon model in both the AM and PM peak, with changes ranging between -27 and 66 in both peaks, and % changes of no more than 9% on a single link.

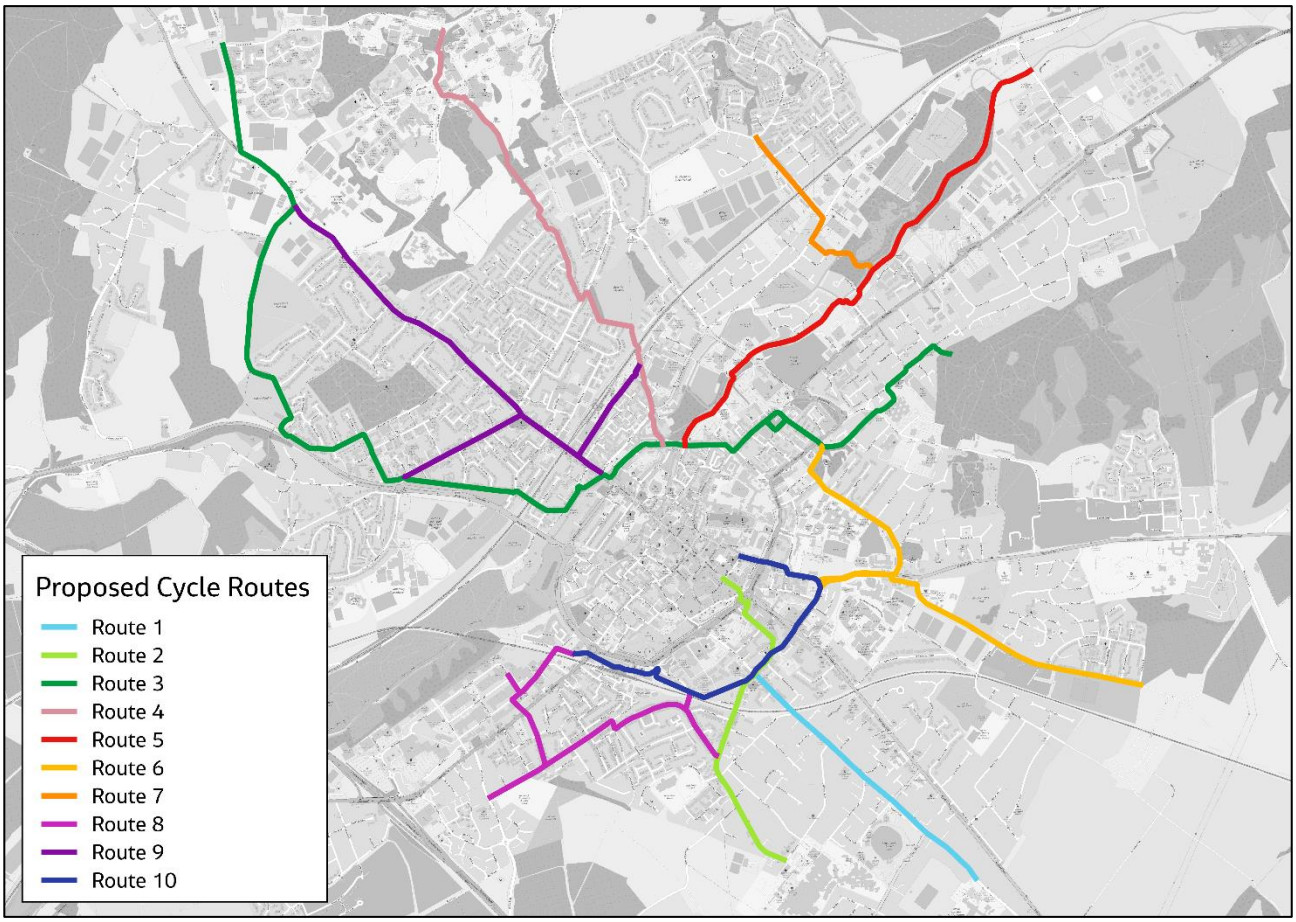
Appendix B. Propensity to Cycle Analysis

Jacobs has been commissioned by Canterbury City Council (CCC) to develop their preferred strategic growth Local Plan (LP). As part of the wider strategic highway modelling to inform this local plan, updates have been applied to the existing LPR Option 5 model network and demand matrices to reflect the planned cycle routes and the resulting impact of potential cycle usage increase on car usage.

In the absence of cyclists representation in local demand and assignment models, it has not been possible to forecast the impact of the proposed cycle interventions on cycle demand and mode shares. Therefore, this task aims to understand the potential cycling levels could be achieved under various future scenarios and what the impact on car mode shares could be as a result of this mode-shift, using the using the using the DfT's Propensity to Cycle Tool[5] (PCT).

A series of proposed cycle routes in Canterbury have been specified and provided by Kent County Council, these are shown in Figure 21.

Figure 21: Canterbury Proposed Cycle Routes



Methodology

The methodology for this task has consisted of three key components: the extraction of data from the Propensity to Cycle Tool (PCT), the identification of origin and destination pairs for this analysis task, the analysis of cycle propensity and mode shares, and the highway trip matrices adjustment. Mode share analysis has been undertaken for all four of the PCT scenarios identified in section 2.1, however only the Government Target (near market) car driver mode share reductions have been applied within the highway demand matrices.

[5] Propensity to Cycle Tool: Welcome to the Propensity to Cycle Tool (PCT)

Propensity to Cycle Tool Data

Data extracted from the DfT's Propensity to Cycle Tool has formed the basis of this analysis. LSOA-level regional commuting data for four PCT scenarios have been extracted for the wider Kent region. These scenarios are as follows:

1. **2011 Census** - Number of cyclists observed in the 2011 census.
2. **Government Target (equality)** - Doubling of national cycling levels.
3. **Government Target (near market)** - Doubling of national cycling levels, accounting for various sociodemographic and geographical characteristics.
4. **Go Dutch** - This scenario represents what would happen if English and Welsh people were as likely as Dutch people to cycle a given trip.

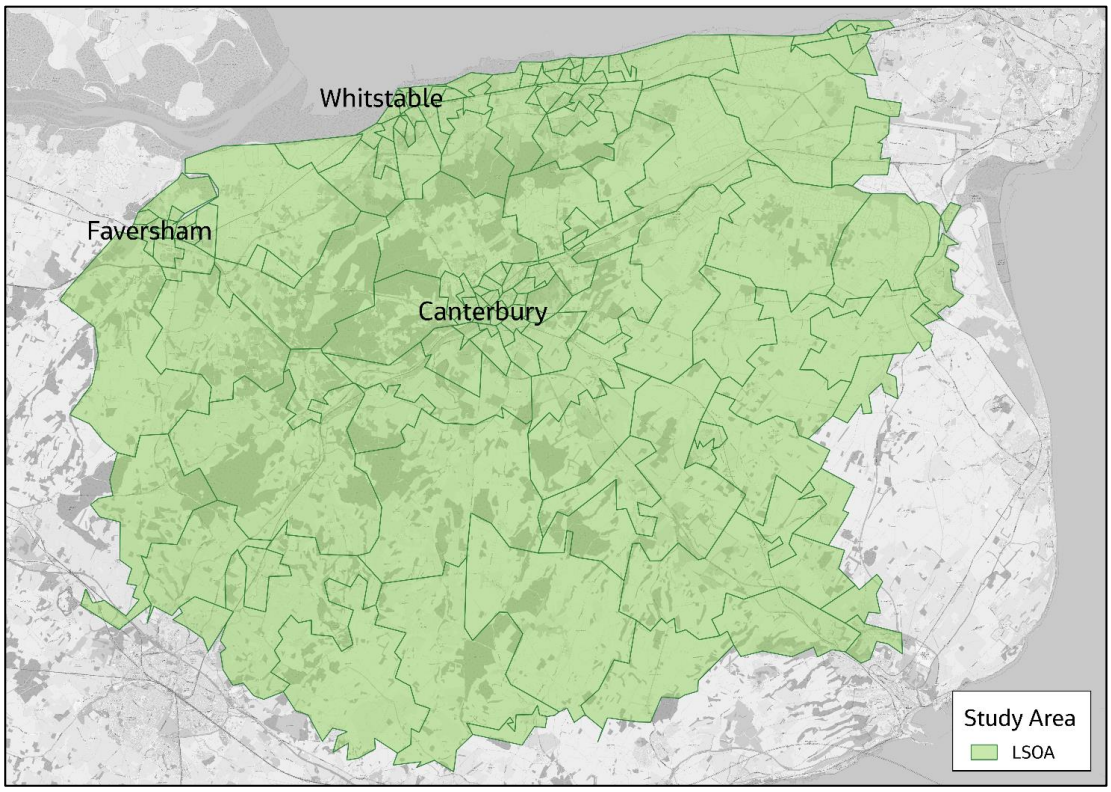
Please note that these are off-the-shelf PCT scenarios, which show potential cycling levels that could be achieved under certain conditions and are not to be considered as cycle demand forecasts.

O-D Pairs Identification

Lower Layer Super Output Area (LSOA) zones[6] have been used to define a study area for this analysis, to ensure consistency with the zoning system used within the PCT. The study area has been defined such that origin-destination pairs within Kent are captured, for which cyclists making trips between these zones may make use of, part or all of the proposed cycle routes presented in Figure 21.

An initial GIS exercise was undertaken to identify the LSOA zones in the study area, shown in Figure 22, consisting of 142 zones and 20,164 origin-destination pairs in total.

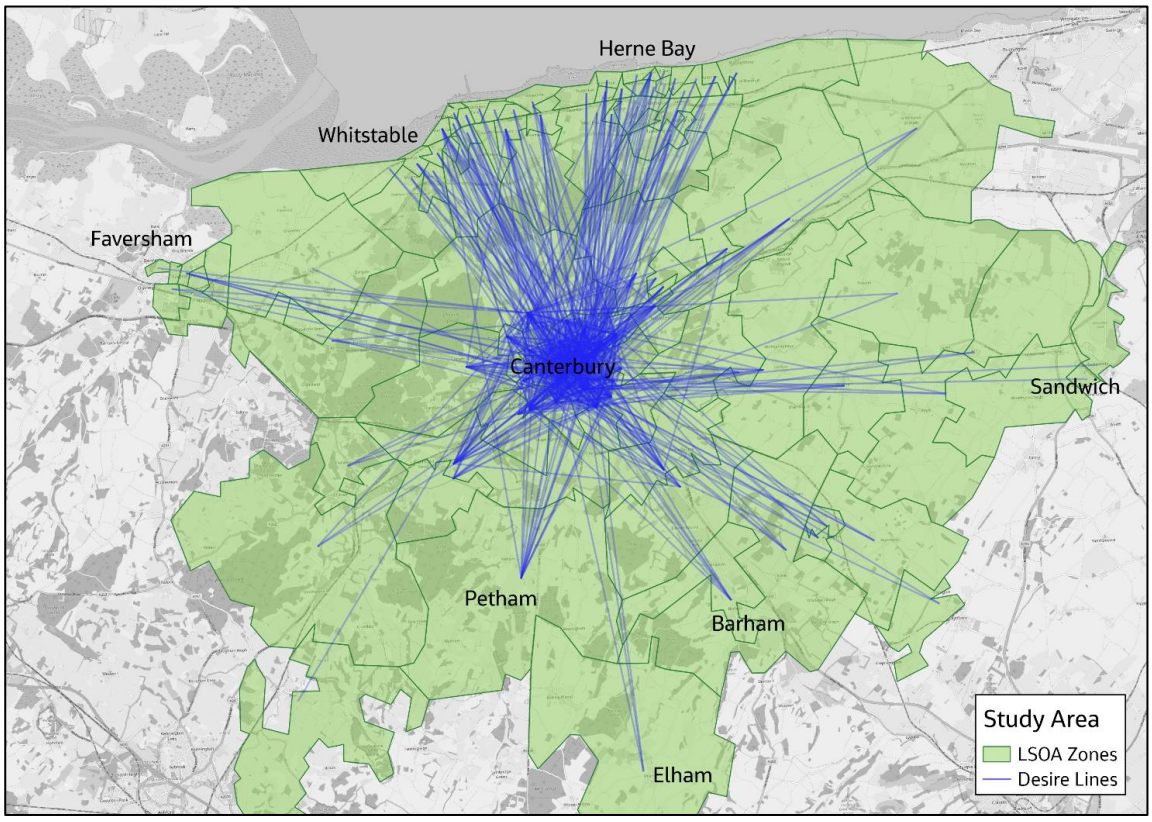
Figure 22: Study Area - LSOA Zones



[6] LSOA Zones: Lower Layer Super Output Area (LSOA) boundaries - data.gov.uk

A further GIS exercise has been undertaken to identify and filter the dataset to include LSOA zones of interest encompassing the Canterbury district area and all potential O-D pairs which could make use of the ten proposed cycle routes, shown in Figure 21. Combinations of O-D pairs with no cyclists or whose routes could not make use of the proposed cycle routes have been excluded from this analysis. Desire lines for the resulting 672 O-D pairs are presented in Figure 23.

Figure 23: Filtered O-D Pairs - Desire Lines



Analysis

Analysis for this task has focussed on understanding the potential uplift in cycle propensity across the three aspirational PCT scenarios identified in *Propensity to Cycle Tool Data* section, using LSOA O-D level PCT data that has been extracted for the O-D pairs identified in section *O-D Pairs Identification*.

The PCT applies an uplift in cycling levels between each O-D pair, regardless of the individual routes taken between each O-D pair, therefore by nature of the PCT this analysis assumes that all cyclists between each of the identified O-D pairs will choose routes which make use of part or all of the proposed cycle infrastructure. Individual analysis for each of the proposed routes' associated O-D pairs will not be reported on separately as part of this task.

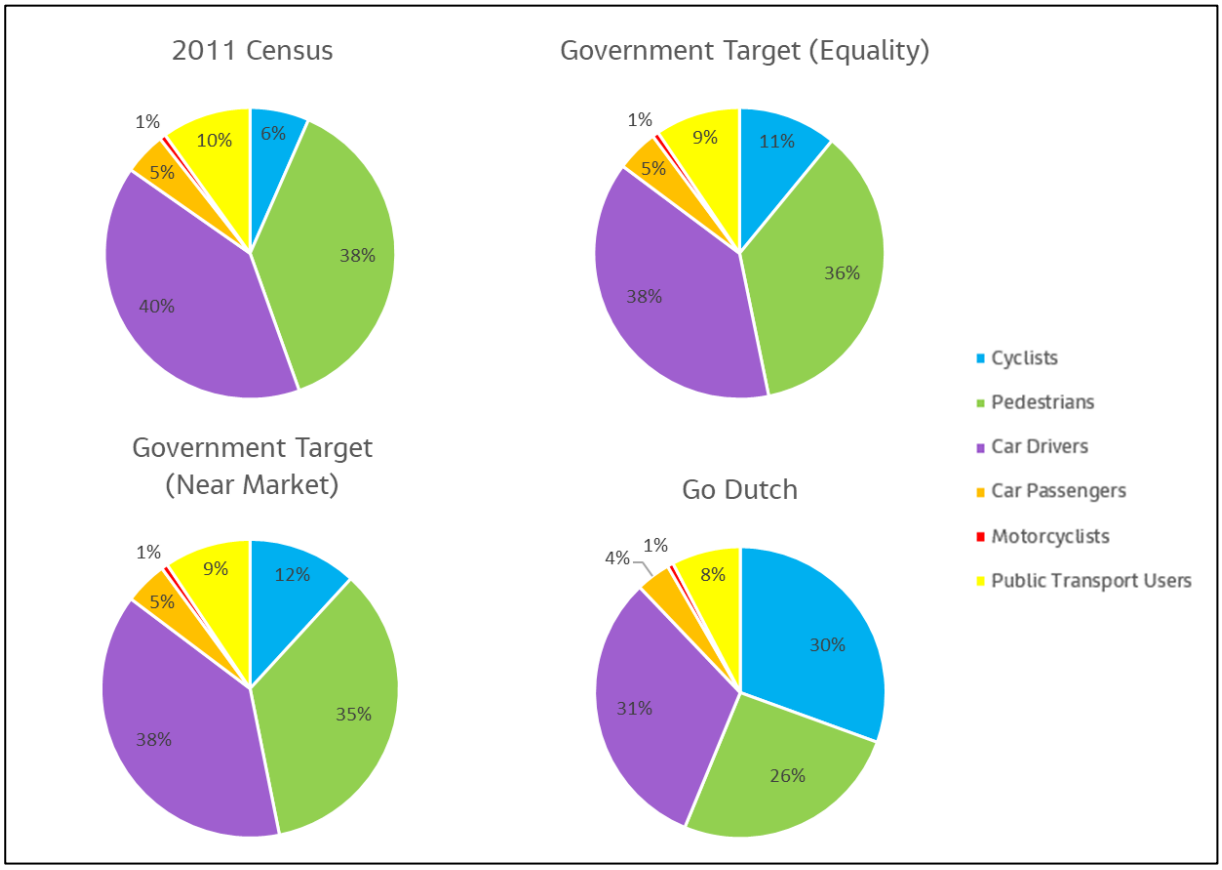
Cyclist and Car Driver mode shares have been calculated for each O-D pair and a high-level summary is presented in Table 7-3.

Table 7-3: PCT Data

Filtered O-D Pairs Totals	2011	Government Target		Go Dutch
		Equality	Near Market	
Cyclists	1,812	3,026	3,267	8,465
Pedestrians	10,466	9,908	9,685	7,126
Car Drivers	11,082	10,622	10,623	8,770
Car Passengers	1,292	1,288	1,288	1,060
Motorcyclists	190	190	190	184
Public Transport Users	2,734	2,613	2,597	2,121
Total Trip Makers	27,718	27,647	27,651	27,726
Average Car Driver Mode Share	40%	38%	38%	32%
Average Cyclist Mode Share	7%	11%	12%	31%

Figure 17 shows the overall commuter mode shares for 2011 census, Government Target (equality and near market) and Go Dutch PCT scenarios, for all identified O-D pairs.

Figure 17: Commuting Mode Shares



The uplift in cycle propensities in the Government Target and Go Dutch scenarios results in a reduction of users of all other modes, most notably the number of pedestrians and car drivers. The 2011 Census and Government Target PCT scenarios estimate that internal Canterbury movements have a cycle mode share of up to 40% and 51%, respectively and see the biggest increases in cycle mode share across scenarios. Other key cycle corridors including between Canterbury and Whitstable, and Canterbury and Herne Bay also see increases in the number of Cyclists and a resulting reduction in Car Driver mode share.

Highway Demand Matrices Adjustment

The Government Target (near market) scenario has been used to derive Commuting Car Driver mode share adjustments at an LSOA O-D pair level basis and provided for application in the LP option 5 V2 model. LSOA zones were assigned to model zones to apply the car mode share reductions as zonal pair-level adjustments to the Car Commuting, Business and Other forecast trip matrices. No matrix adjustments were applied to the HGV and LGV trip matrices. The overall trip matrix totals for the car trip matrices pre- and post-adjustment are presented in Table 7-4.

Table 7-4: Car Trip Matrix Adjustments

Car Trips		Pre-adjustment	Post-adjustment	% Trip Reduction
AM	Commuting	16,964	16,844	-0.71%
	Business	4,218	4,177	-0.97%
	Other	17,188	17,036	-0.88%
	Total	38,370	38,057	-0.82%
PM	Commuting	15,167	15,068	-0.65%
	Business	4,105	4,065	-0.97%
	Other	23,148	22,921	-0.98%
	Total	42,420	42,054	-0.86%

Further information regarding the development of forecast highways demand matrices for use in the Option 5V2 Local Plan scenario highway modelling is outlined in section 5 of the Preferred Strategic Growth Local Plan Option v2 documentation.

Further Work

Analysis has been undertaken for O-D pairs which may make use of part or all of one or more of the proposed cycle routes. Further work could be undertaken to understand the potential Cyclist and Car Driver mode share changes which could be achieved, considering each route individually. This analysis can be expanded further to account for any additional proposed cycle routes in the Whitstable and Herne Bay areas. A revised study area would be identified, and analysis undertaken on a revised set of O-D pairs.

Potential further work includes the development of a bespoke PCT scenario to reflect specific county-wide target cycle demand uplifts and to understand the resulting impact on cycle and car usage within the study area.

Appendix C. Donor zones

Development Zone	Description	Donor Zone
200001	Broad Oak	119069
200002	Cockering Farm	119167
200003	Duncan Down	102035
200004	Chestfield Lidl	118984
200005	Grasmere Gardens	102022
200006	Greenhill	102011
200007	Herne Bay Golf Club	102025
200008	Hoplands Farm, Hersden	102047
200009	Howe Barracks	118771
200010	South Canterbury	118765
200011	Sturry	119080
200012	Hillborough	102006
200013	Thanington Park	119162
200014	Station Road West Multi-storey	119014
200015	Strode Farm	102026
200101	Broad Oak (added jobs)	119065
200108	Hersden (added jobs)	102047
200110	Mountfield Park (SC added jobs)	118767
200112	Hillborough (added jobs)	102006
200210	SC Schools	118761
600001	Merton Park	118766
600002	Land on the west side of Hollow Lane	118790
600004	Milton Manor House	162916
600005	Land South of Littlebourne Road (Hoath Farm)	118786
600006	Land to the north of the railway line and south of Bekesbourne Lane	118942
600007	Land on Bekesbourne Lane at Hoath Farm	118768
600008	University of Kent Site B	118960
600009	Brooklands Farm, Whitstable	118861

Development Zone	Description	Donor Zone
600010	Land South of Thanet Way	102020
600011	Land at Golden Hill	102030
600012	Land on western side of Bogshole Lane	102040
600013	Land at Cooting Farm	102028
600014	Land west and East of Cooting Lane, Adisham	102080
600015	Land On The South East Side Of Cooting Lane, Adisham	102080
600016	Aylesham South	102080
600017	Bekesbourne Farm	102080
600018	Land off The Hill, Littlebourne	118960
600001	Merton Park	102046

Appendix D. Link Flows

Flows AM

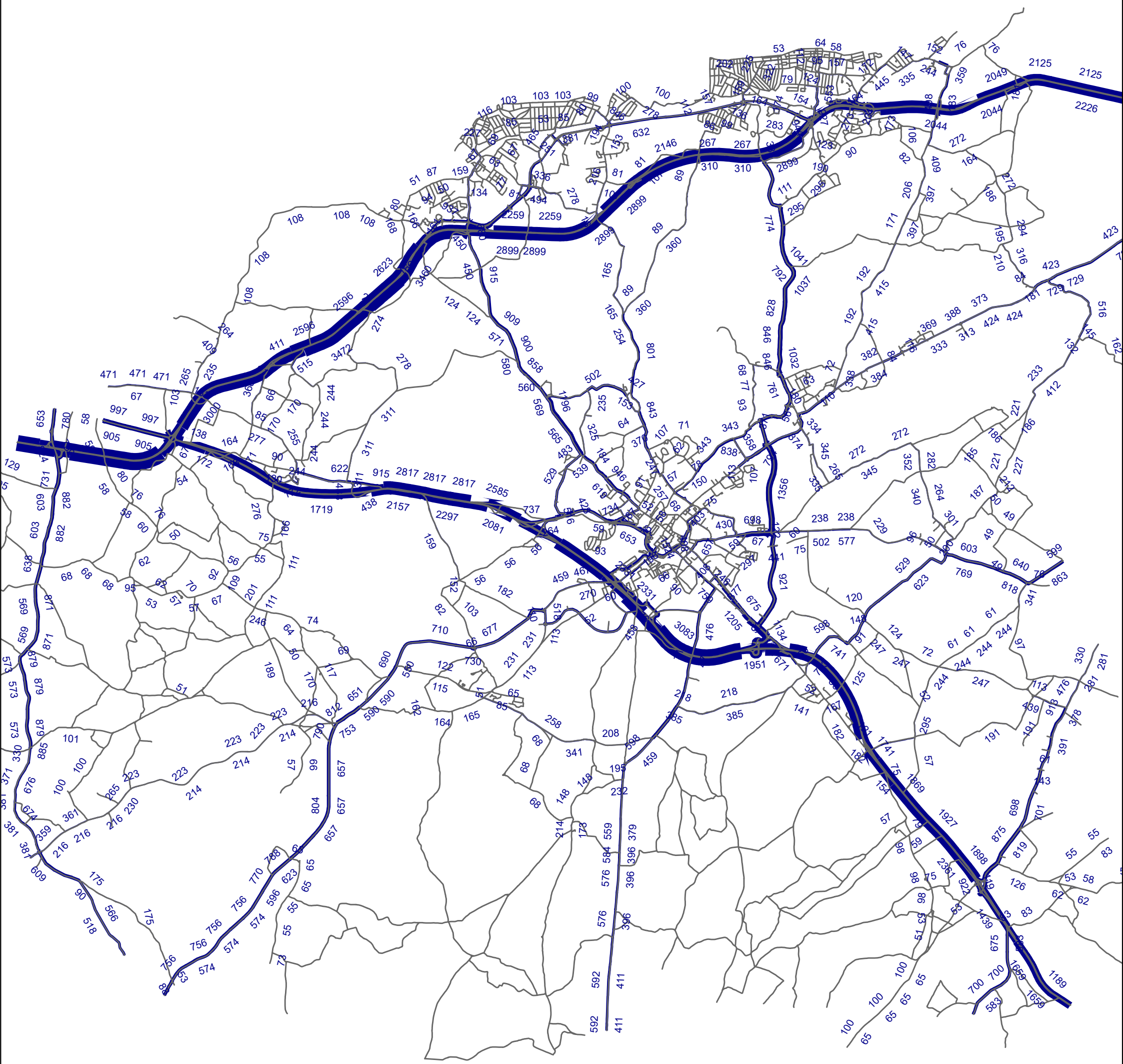
LP 2045

Volume PrT [veh] (AP)

0 1500 3000 6000

Count Links

0 800 2400 4000 m



VISUM 20.01 PTV AG	Cant_2045_AM_v12c.ver	erstellt am: 07.06.2022

Flows PM

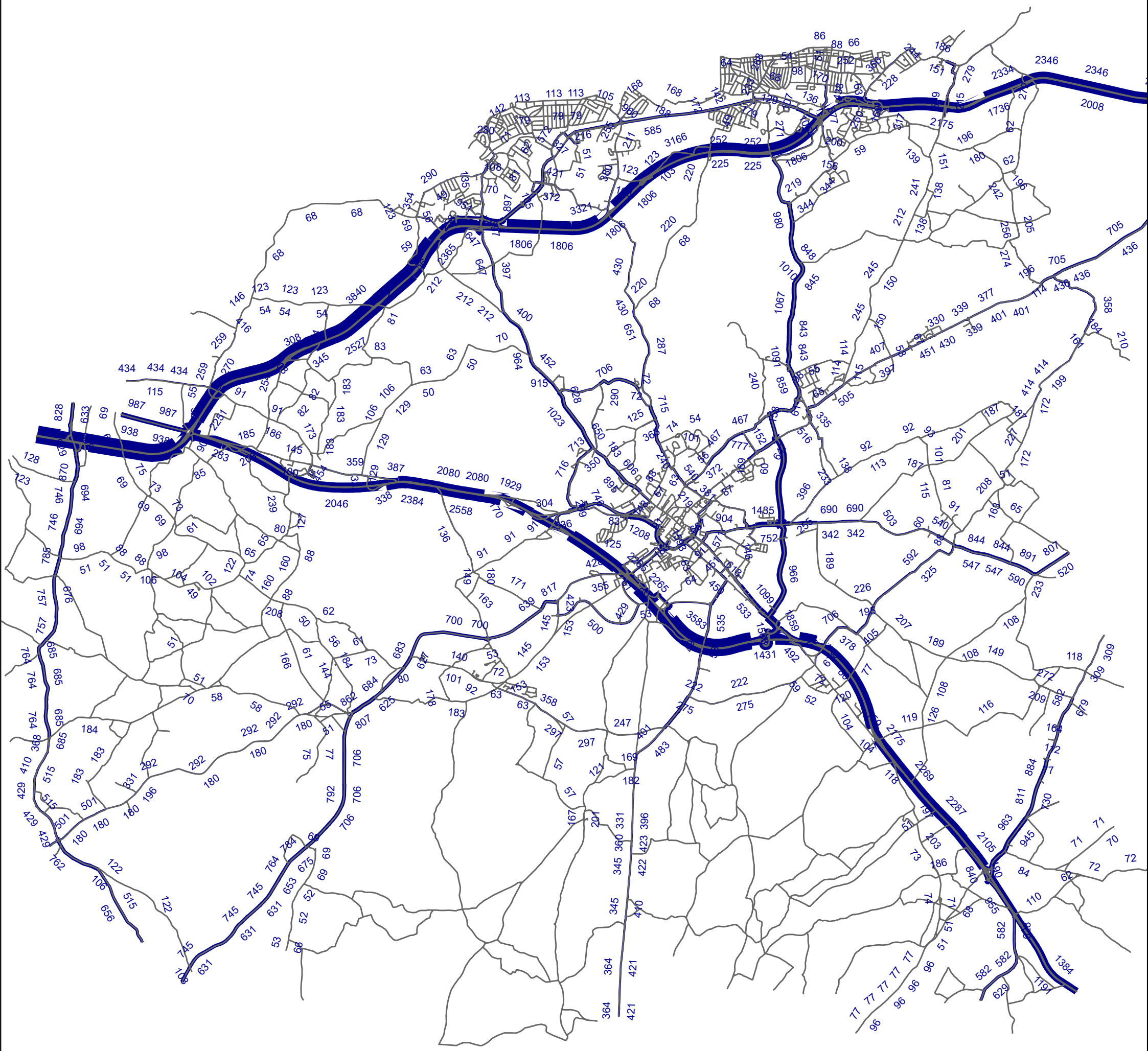
LP 2045

Volume PrT [veh] (AP)

0 1500 3000 6000

Count Links

0 800 2400 4000 m



VISUM 20.01 PTV AG	Cant_2045_PM_v12c.ver	erstellt am: 07.06.2022

Appendix E. LOS Plots

LPR 2045

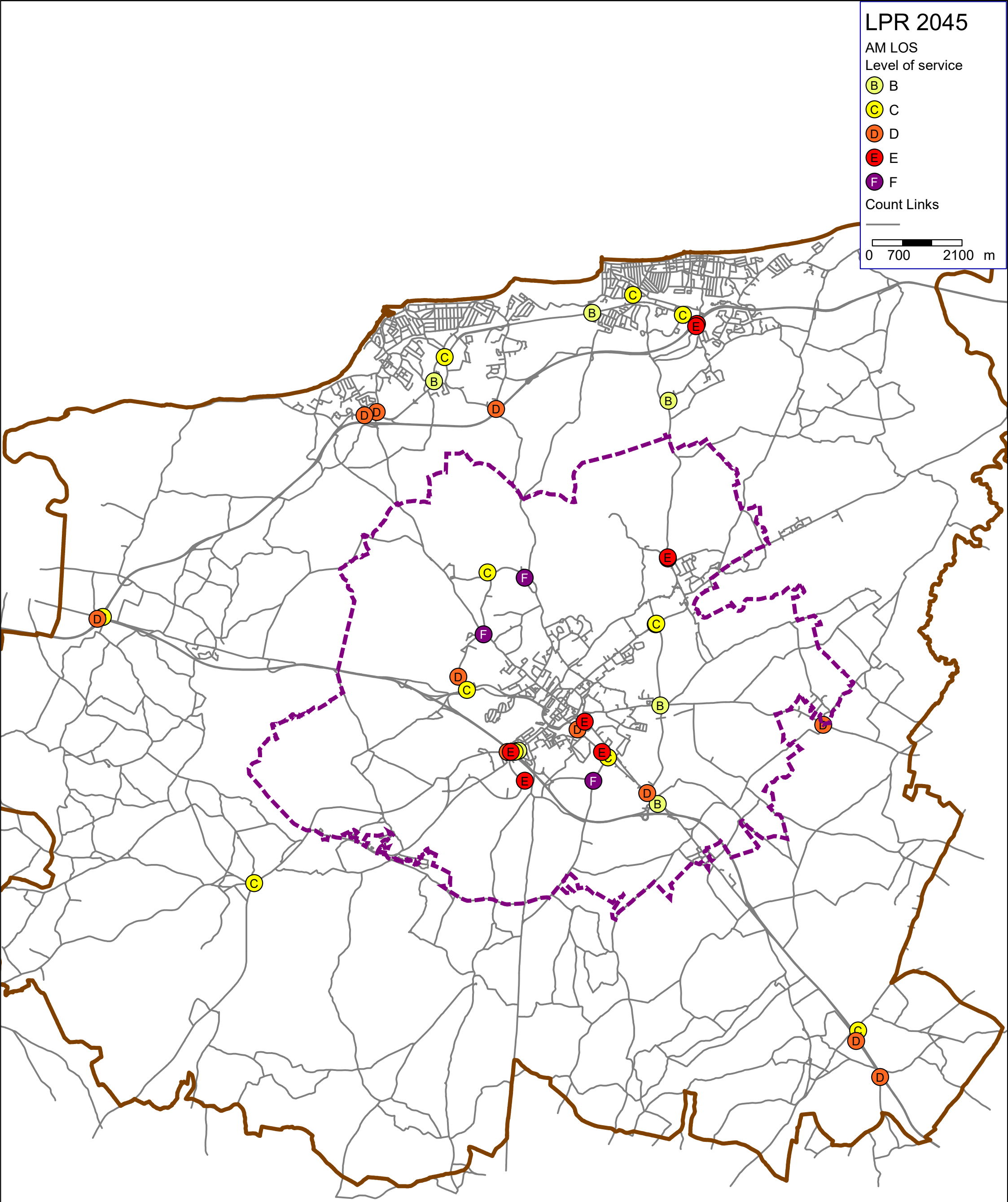
AM LOS

Level of service

- B B
- C C
- D D
- E E
- F F

Count Links

0 700 2100 m



VISUM 20.01 PTV AG	Cant_2045_AM_v12c.ver	erstellt am: 16.06.2022

LPR 2045

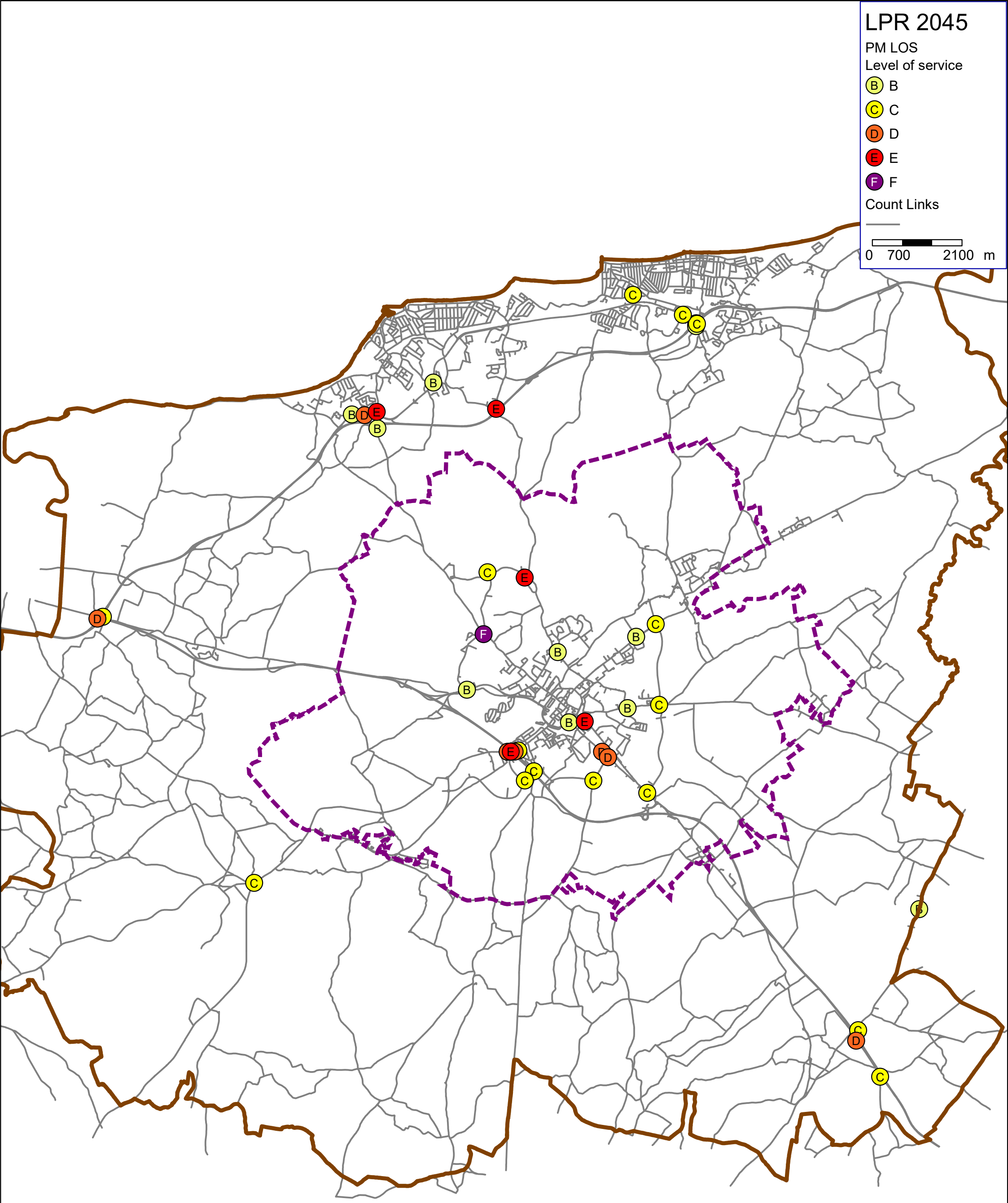
PM LOS

Level of service

- B B
- C C
- D D
- E E
- F F

Count Links

0 700 2100 m



VISUM 20.01 PTV AG	Cant_2045_PM_v12c.ver	erstellt am: 16.06.2022

Appendix F. Flow difference – City centre

Flow Difference AM LPR: OPT5V2 vs 2019 Base

LP 2045

DIFF_BASE

0 425 850 1700

<= 0

> 0

Count Links

0 70 140 210 280 350 m

Flow Difference PM LPR: OPT5V2 vs 2019 Base

LP 2045

DIFF_BASE

0 425 850 1700

<= 0

> 0

Count Links

0 70 140 210 280 350 m

Flow Difference AM LPR: OPT5V2 vs 2040 Baseline

LP 2045
DIFF_BASELINE

0 775 1550 3100

<= 0

> 0

Count Links

0 70 140 210 280 350 m

Flow Difference PM LPR: OPT5V2 vs 2040 Baseline

LP 2045
DIFF_BASELINE

0 775 1550 3100

<= 0

> 0

Count Links

0 70 140 210 280 350 m

Appendix G. Flow difference – Networkwide

Flow Difference AM LPR: OPT5V2 vs 2019 BASE

LP 2045

DIFF_BASE

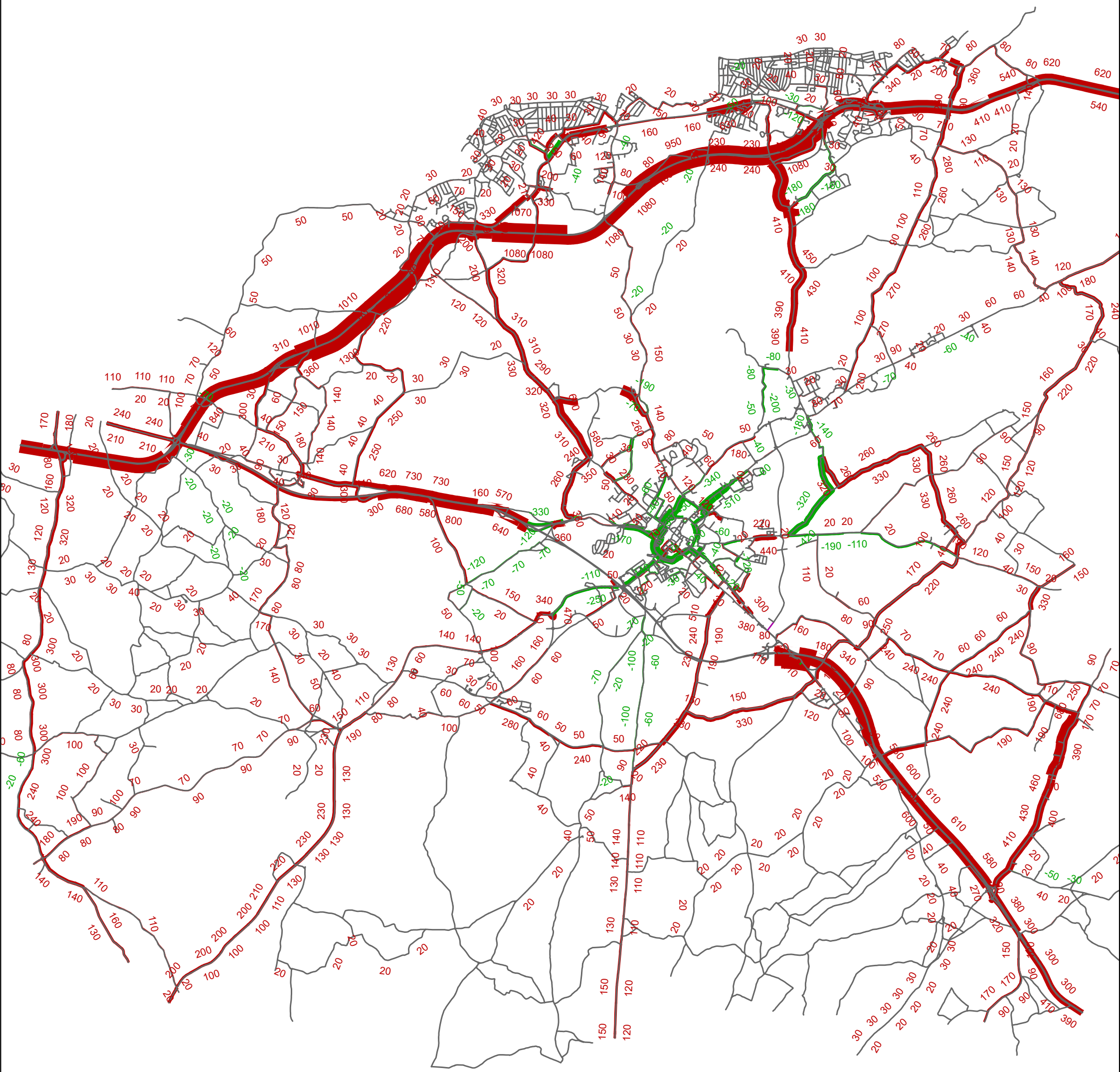
0 425 850 1700

<= 0

> 0

Count Links

0 800 2400 4000 m



VISUM 20.01 PTV AG	Cant_2045_AM_v12c.ver	erstellt am: 16.06.2022

Flow Difference PM LPR: OPT5V2 vs 2019 BASE

LP 2045

DIFF_BASE

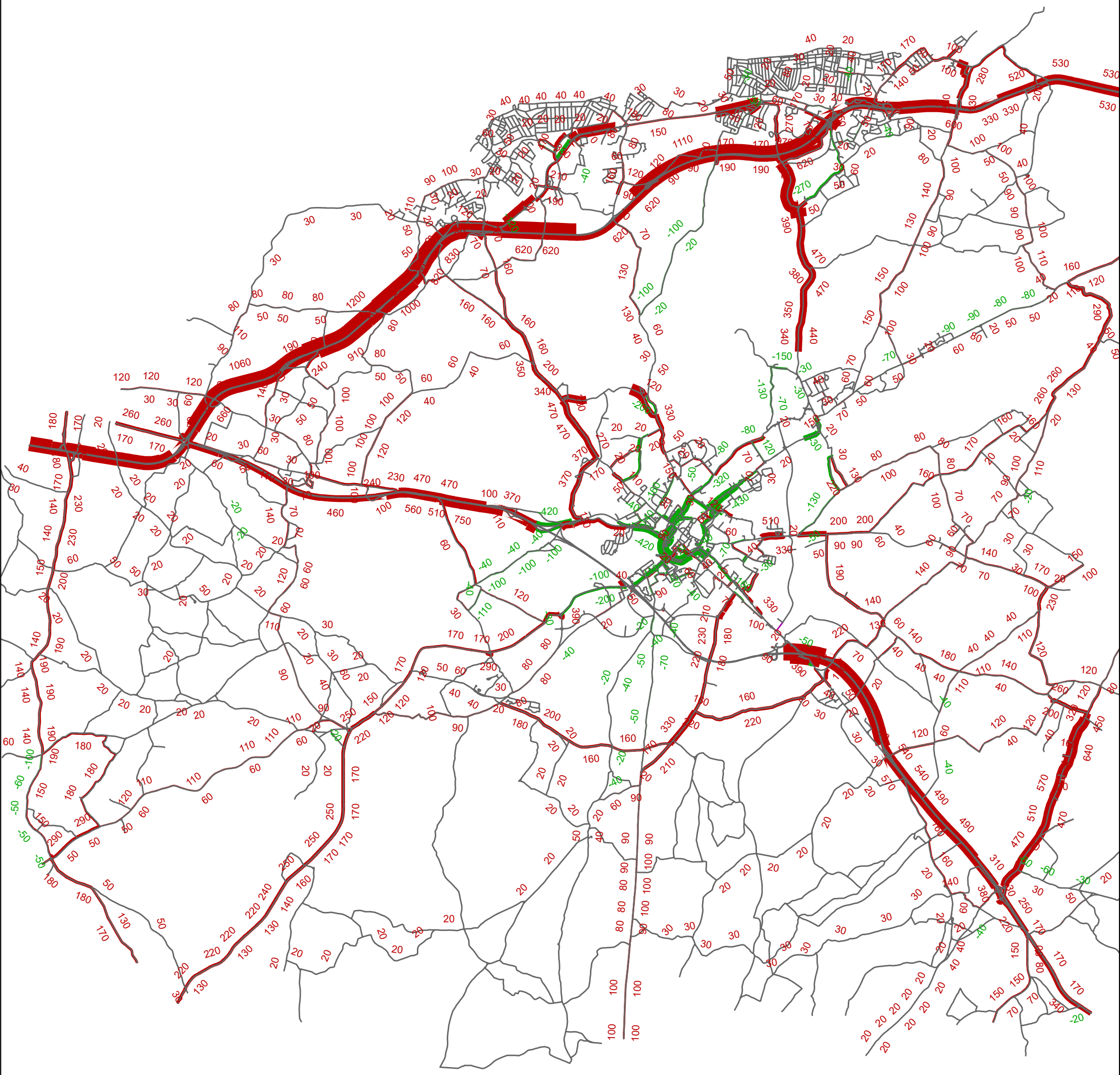
0 425 850 1700

<= 0

> 0

Count Links

0 800 2400 4000 m



VISUM 20.01 PTV AG	Cant_2045_PM_v12c.ver	erstellt am: 16.06.2022

Flow Difference AM LPR: OPT5V2 vs 2040 BASELINE

LP 2045

DIFF_BASELINE

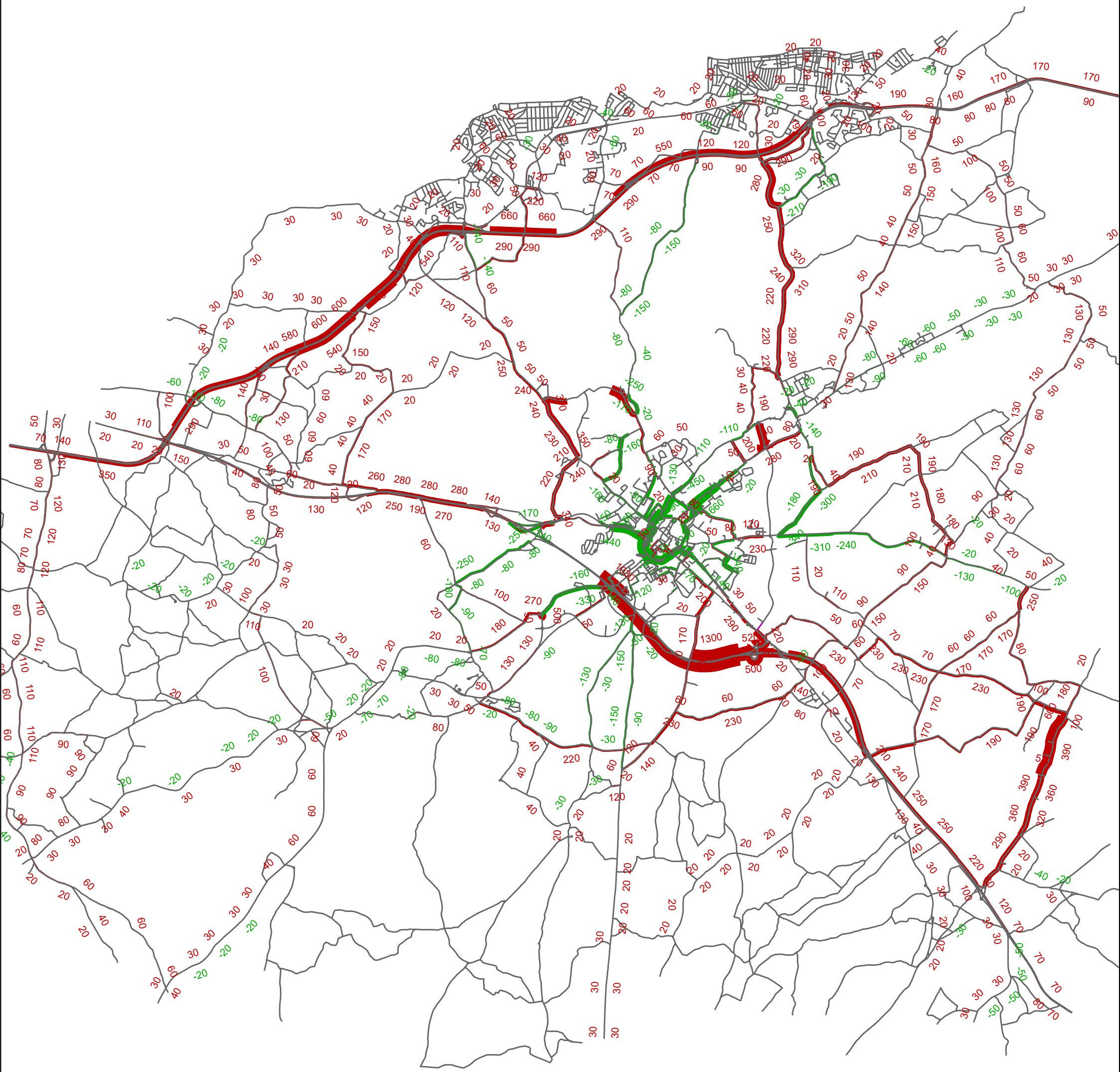
0 425 850 1700

<= 0

> 0

Count Links

0 800 2400 4000 m



VISUM 20.01 PTV AG	Cant_2045_AM_v12c.ver	erstellt am: 16.06.2022

Flow Difference PM LPR: OPT5V2 vs 2040 BASELINE

LP 2045

DIFF_BASELINE

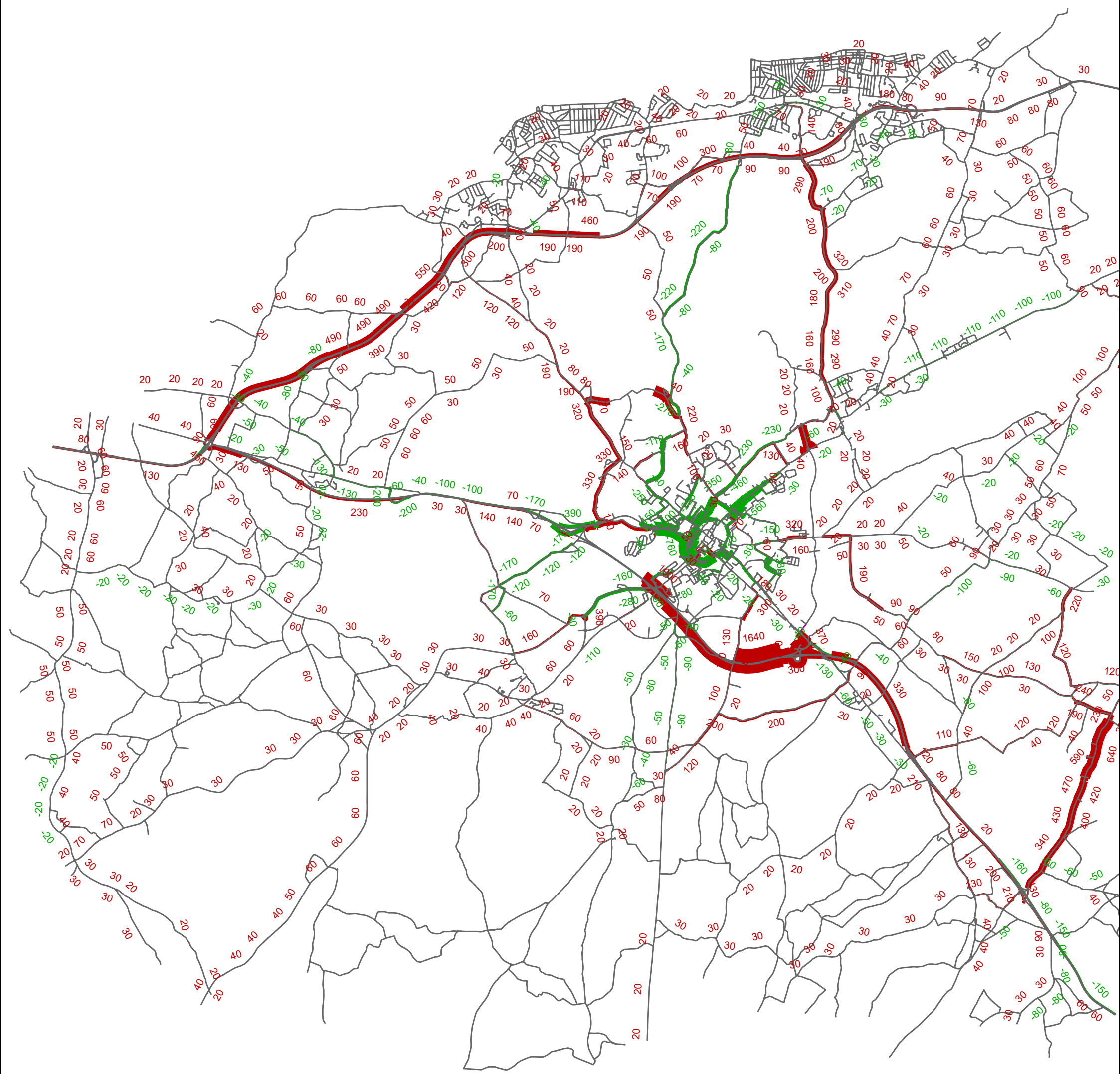
0 425 850 1700

<= 0

> 0

Count Links

0 800 2400 4000 m



VISUM 20.01 PTV AG	Cant_2045_PM_v12c.ver	erstellt am: 16.06.2022