Calderdale Core Strategy Transport Study

Appraising the Approaches to Future Development

Report

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1 Introduction

1.1 Steer Davies Gleave (SDG) was commissioned by Calderdale Metropolitan Borough Council (CMBC) in September 2009 to undertake a study investigating the transport impacts of a number of proposed approaches to land-use allocations within the borough.

1.2 As part of CMBC's ongoing production of the Core Strategy of the Local Development Framework (LDF), three approaches for the spatial pattern of land allocations have been proposed as representing possible development strategies up to 2026. Each approach, whilst having common elements, has a distinct spatial strategy:

- Approach 1: East Calderdale Focus;
- Approach 2: Enhanced Role for Todmorden;
- Approach 3: Business-As-Usual.

1.3 In this commission the key aim is to compare and contrast the transport impacts of the three approaches. The results of the study will be used as part of the transport evidence base for the Core Strategy submission, and also to provide independent transport advice to feed into the later development of the Preferred Option.

1.4 This report describes the process by which the transport impacts of the three Core Strategy approaches were assessed, and provides a summary of our findings and our recommendations for how this work is used to inform the development of the Core Strategy Preferred Option.

1.5 The structure of this report is as follows:

- Chapter 2 sets out the policy background used to inform the study;
- Chapter 3 describes the overall methodology used for the study;
- Chapter 4 details the development of each Core Strategy scenario;
- Chapter 5 describes the development of the Network Conditions Model;
- Chapter 6 presents our appraisal of each option;
- Chapter 7 gives our recommendations and final conclusions from the study.

2 Policy Background

2.1 In this section we briefly describe the relevant policy and how it sets the context for the study, and more specifically, how it sets the context for our proposed methodology.

National Planning Policy

2.2 At a national level, the UK Government has produced a number of Planning Policy Guidelines (PPGs) which are in the process of being updated and replaced by Planning Policy Statements (PPSs). These documents are prepared following public consultation to explain statutory provisions and provide guidance on planning policy to local authorities and other interested parties.

2.3 The national planning policies which have a particular impact on the shaping of highways and public transport networks within the context of local planning are as follows:

- PPS1: Delivering Sustainable Development (with its supplement Planning and Climate Change);
- PPS12: Local Spatial Planning; and
- PPG13: Transport.

2.4 In general, the plans encourage regional and local planning bodies and authorities to ensure that all development contributes to global sustainability through policies which reduce energy use and emissions. There is also a focus on inclusion and accessibility to break down unnecessary barriers.

2.5 PPS12 describes the spatial planning process and specifically sets out the government policy on the Local Development Frameworks (LDF). The development plan is made up of the Regional Spatial Strategy (RSS) which covers the whole region and a number of Development Plan Documents (DPD) including the Core Strategy which are produced by local authorities. The Core Strategy sets out how much development is intended to happen where, when and by what means and is subject to independent examination to ensure that it is "sound" through being "justified, effective and consistent with national policy."

2.6 The Planning Advisory Service has produced an "Evidence Based Tool" in order to assist in the examination of the "soundness" of the Core Strategy whereby evidence should be given to support answers to a number of questions asked of the strategy.

2.7 It is important, therefore, to ensure that development options put forward in the Core Strategy have been engineered using a thorough, transparent and robust methodology which is defensible and understandable to a variety of audiences.

2.8 Delivering a Sustainable Transport Strategy (DaSTS) is the latest stage in the Government's approach to longer term strategic transport planning and helps to set transport in a wider context, considering how it contributes to wider outcomes.

- Originates from Eddington study in 2006 that considered the long term links between transport and economic productivity;
- Also in 2006 the Stern report considered the economics of climate change;
- Government's response to both studies was "Towards a Sustainable Transport System" (TaSTS) in 2007;
- Following consultation Government produced "Delivering a Sustainable Transport System" (DaSTS) in 2008;
- DaSTS set out five goals for transport which will be key to both transport planning and development of schemes over the short, medium and long term;
- Transport schemes should be developed as a direct response to a specific problem, rather than problems being retrofitted to schemes to provide justification for them.

2.9 The five goals are as follows but in reality they are focusing on the challenge of delivering strong economic growth while at the same time reducing greenhouse gas emissions:

- to support national economic competitiveness and growth, by delivering reliable and efficient transport networks;
- to reduce transport's emissions of carbon dioxide and other greenhouse gases, with the desired outcome of tackling climate change;
- to contribute to better safety, security and health and longer life expectancy by reducing the risk of death, injury or illness arising from transport, and by promoting travel modes that are beneficial to health;
- to promote greater equality of opportunity for all citizens, with the desired outcome of achieving a fairer society; and
- to improve quality of life for transport users and non-transport users, and to promote a healthy natural environment.

2.10 DfT is dealing with the national networks and the regions are dealing with the city and regional networks. The region has confirmed its priorities in advice to DfT earlier in the summer. Through consensus our region has identified (and agreed) a total of six challenges it faces as a priority:

- Contribute to the reduction in transport related carbon dioxide emissions;
- Reduce lost productive time including maintaining or improving the reliability and predictability of journey times on key regional and city region routes for business, commuting and freight;
- Improve the connectivity and access to labour of key business centres;
- Support the delivery of sustainable housing through the provision of transport;
- Enabling social inclusion and the regeneration of deprived or remote areas by enabling disadvantaged people to connect with employment opportunities, key

local services, social network and goods through improving accessibility, availability, affordability and acceptability;

- Reduce risk of death due to transport accidents.

2.11 The Guidance on Transport Assessments (GTA) document produced by the Department for Transport sets out a framework for assessing the transport impacts of developments which is consistent with the April 2009 'refresh' of New Approach To Appraisal (NATA) and the emerging challenges and objectives identified in the regional DaSTS research.

2.12 The GTA and NATA set out five main objectives against which transport impacts of development should be assessed:

- Environment – involves reducing the direct and indirect impacts of transport facilities on the environment of both users and non-users;
- Safety – is concerned with reducing the loss of life, injuries and damage to property resulting from transport incidents and crime;
- Economy – is concerned with improving the economic efficiency of transport.
- Accessibility – is concerned with the ability with which people can reach different locations and facilities by different modes;
- Integration – aims to ensure that all decisions are taken in the context of the Government's integrated transport policy.

2.13 Although the GTA document is principally used in relation to assessing the transport impacts of individual developments, guidance on preparing LDF submissions suggests that the principles of the GTA are applicable to testing Core Strategy Options.

Regional Planning Policy

2.14 In 2008, the Government Office for Yorkshire and The Humber published "The Yorkshire and Humber Plan Regional Spatial Strategy to 2026" (YHRSS). The spatial strategy sets out the Secretary of State for Communities and Local Government's policies in relation to the development of land within the region. The Plan embodies the Regional Transport Strategy and must be taken into account by local authorities in preparing their Local Development Frameworks and Local Transport Plans.

2.15 The plan works towards the achievement of sustainable development focussing on regeneration, economic growth, protection of environmental resources, the limiting of environmental threats, and ensuring that transport management and investment decisions support the YHRSS.

2.16 The Regional Transport Strategy included within the plan supports a modal shift from use of the car in order to reduce congestion and focuses on improving public transport and accessibility. It lists a number of "Transport Investment and Management Priorities" as outcomes to be progressed by first maximising use of existing infrastructure, and then potentially by schemes and projects as necessary at later stages. The priorities provide a regional and sub-regional context for Local

Transport Plans and a policy framework for the identification of priorities that will be included in individual authorities' LTPs.

2.17 It will be important in this study to ensure that any emerging options and/or supporting infrastructure found necessary for development fit into this regional policy framework. In particular it is likely that an emphasis on sustainable public transport and options designed to encourage modal shift, rather than significant new highway infrastructure, will help achieve the wider objectives in the RSS.

2.18 The Leeds City Region Partnership comprises of eleven local authorities - Barnsley, Bradford, Calderdale, Craven, Harrogate, Kirklees, Leeds, Selby, Wakefield, York and North Yorkshire County Council working together toward a common prosperous and sustainable city region in areas such as transport, skills, housing, spatial planning and innovation.

2.19 The Leeds City Region Transport Strategy is geared towards improving transport across the city region over the next 20-25 years, prioritising the following key areas:

- Addressing existing demand for travel;
- Tackling current problems of congestion;
- Supporting future development and prosperity, and
- Progressing towards a lower carbon economy.

2.20 Work on the strategy has provided a key evidence base to inform the development of the LTPs across the City Region, as it sets out and priorities the goals and challenges in the Department for Transport's Delivering a Sustainable Transport Strategy (DaSTS).

Local Planning Policy

2.21 There are a number of Local Planning, Transport, Economic Development and Regeneration Policies in place which need to be taken into account when developing the LDF and more specifically, the Core Strategy proposals on the highway and public transport networks.

West Yorkshire Local Transport Plan 2006-2011

2.22 The WYLTP has been produced by Metro and the five West Yorkshire district councils in order to present a plan which supports the wider agendas of each party. The plan sets out a programme for a wide range of improvements to local transport over the period 2006-2011 with objectives to:

- Deliver accessibility;
- Tackle congestion;
- Improve safety;
- Improve air quality; and
- To manage assets effectively and improve the condition of the transport infrastructure.

2.23 These objectives are aimed to facilitate the implementation of the Regional Transport Strategies across West Yorkshire.

Calderdale Local Transport Strategy (emerging)

2.24 Calderdale are currently working on a new local transport strategy. Early discussions are drawing out a number of key themes for the future of transport in the area:

- Integrate and connect modes of transport;
- Invest in key strategic transport links;
- Improve the quality of public transport infrastructure;
- Encourage more walking and cycling;
- Reduce traffic congestion at hotspots;
- Educate and inform people; and
- Reduce the need to travel.

2.25 The overall theme of a more sustainable and equitable transport system throughout Calderdale will inform the strategy. However, the emphasis may change and detailed schemes and policies will be added as the transport strategy is developed and consulted upon.

Informing the Study Methodology

2.26 A hierarchy of national, regional and local policy and guidance forms the policy context to guide the LDF process. A key challenge is to make sure that that 'top-down' national policy meshes well with the more 'bottom-up' local policy to produce workable strategies for the area.

2.27 As indicated in the paragraphs above, there is a focus within the national and regional policy on the aspiration for sustainable development options; in local policy the reality is that planning for sustainable development has to be set in the context of the reality of local conditions and the needs of the local population.

2.28 The framework set out in the GTA is broadly consistent with the other national, regional and local transport planning policy, and in the absence of the awaited Guidance on the Transport Evidence Base document, will be used to form the guiding principles used in this study.

2.29 The five NATA objectives of Environment, Safety, Economy, Accessibility and Integration will form the appraisal framework against which each of the Core Strategy Options is tested.

2.30 By using the GTA and NATA principles, which are themselves consistent with the DaSTS national and emerging regional objectives, the elements of the transport evidence base for the Core Strategy will be themselves consistent with existing and emerging policy and objectives.

3 Overall Methodology

General

Background

3.1 The methodology for this study was developed in consultation with Calderdale MBC officers to provide an early indication of the transport implications of potential Core Strategy approaches to land-use in the borough.

3.2 A separate, parallel study is being undertaken by Mouchel to develop a SATURN traffic model of east Calderdale. Once that model is ready, it should be available for detailed testing of Core Strategy approaches, and refinement of traffic and transport interventions supporting a Core Strategy Preferred Option.

3.3 Our methodology has been developed so that our scenarios can be operationalised in the SATURN model for later detailed analysis.

3.4 This study aims to:

- Provide transport evidence for the Core Strategy, independent of testing options within the SATURN traffic model;
- Provide inputs to the SATURN traffic model when it becomes available;
- Complete and report sooner than the SATURN model study, to inform ongoing development of the Core Strategy and Preferred Option.

3.5 The methodology is effectively in three stages:

- Core Strategy scenario development;
- Assessing the transport and spatial impacts of each scenario; and
- Appraising each scenario against various wider impact indicators.

Core Strategy Scenario Development

3.6 Information describing the development land allocations in each potential Core Strategy approach is used to predict the number and pattern of trips to and from areas in Calderdale. A scenario is developed for each of the Core Strategy approaches.

Assessing the Transport and Spatial Impacts of each Scenario

3.7 Here we take the scenarios developed in the previous stage and predict how the trips will use the transport network in Calderdale. This allows forecasts of where increases in traffic or increases in demand for public transport may cause stress on the existing networks, and guides development of possible transport improvements and interventions.

Appraising each Scenario against Various Wider Impact Indicators

3.8 An appraisal framework informed by national guidance on transport and sustainability objectives is used to assess the wider impacts of each scenario.

4 Core Strategy Scenario Development

Introduction

4.1 This section describes the methodology adopted to evaluate the potential Core Strategy approaches being explored by Calderdale MBC, in terms of the number and pattern of trips to and from areas in Calderdale.

Methodology Overview

4.2 The following key assumption is made that is at the heart of the growth forecasts:

- The forecast growth in trips is constrained to the trips generated by the assumed net increase in the number of dwellings. It is further assumed that if the dwellings are built and occupied there will be employment to support the additional population.

4.3 In summary, the process for production of the Calderdale RSS growth forecast was:

- Receive current land allocations from Calderdale planners for:
  - Employment land; and
  - Housing land.
- Apply trip generation rates to the number of net new dwellings in each forecast year and produce "production" trip ends by journey purpose and time of day;
- Allocate the additional "production" and "attraction" trip ends to the appropriate geographical origins and destinations;
- Split the additional trip ends by the time of day model period;
- Apply mode split assumptions to the additional trip ends;
- Use the new trip ends to create forecast year trip matrices.

4.4 We then assign the new forecast year matrices to a custom built transport assignment model of Calderdale and assess the impacts.

Dwelling Allocations

4.5 The approach to growth forecasting aimed to use the best available land use allocations that could be provided by CMBC planners to produce forecasts that are consistent with the Regional Spatial Strategy (RSS).

4.6 The Yorkshire and Humber Regional Spatial Strategy (May 2008) specifies the construction of 750[1] new net dwellings per year from 2008 until 2026 that is the last year of the plan. This means 13,500 net new dwelling between 2008 and 2026.

[1] Table 12.3 Yorkshire and Humberside Published RSS

4.7 The existing allocations for housing and employment are identified in planning data supplied by Calderdale MBC and are presented in Table 4.2. This table represents net new dwellings from 1st April, 2009 to 2026[2] that partly explains the difference between the tabulated totals and those required by the RSS.

4.8 If we adjusted the RSS target to exclude the 15 months of build between January 2008 and 1st April 2009 then is would be 16.75 * 750 houses = 12,563 dwellings. This indicates that the existing land allocations fall short of providing for the number of dwellings required by the RSS by around 3,000 dwellings.

4.9 The dwellings for each of the three options were allocated to model zones in line the distribution shown in Table 4.1. However, these allocations we geographically fine-tuned to map them onto the search areas identified by the client. The priority search areas for housing and employment are illustrated in Figure 4.1.

TABLE 4.1 HOUSING ALLOCATION SEARCH

Option	Search Areas
1	H1, H2, H3, H4, H5, H6, E1, E2
2	H1, H3, H4, H6, H8, E1, E2, E3
3	H1, H3, H4, H6, H7, H8, E1, E2

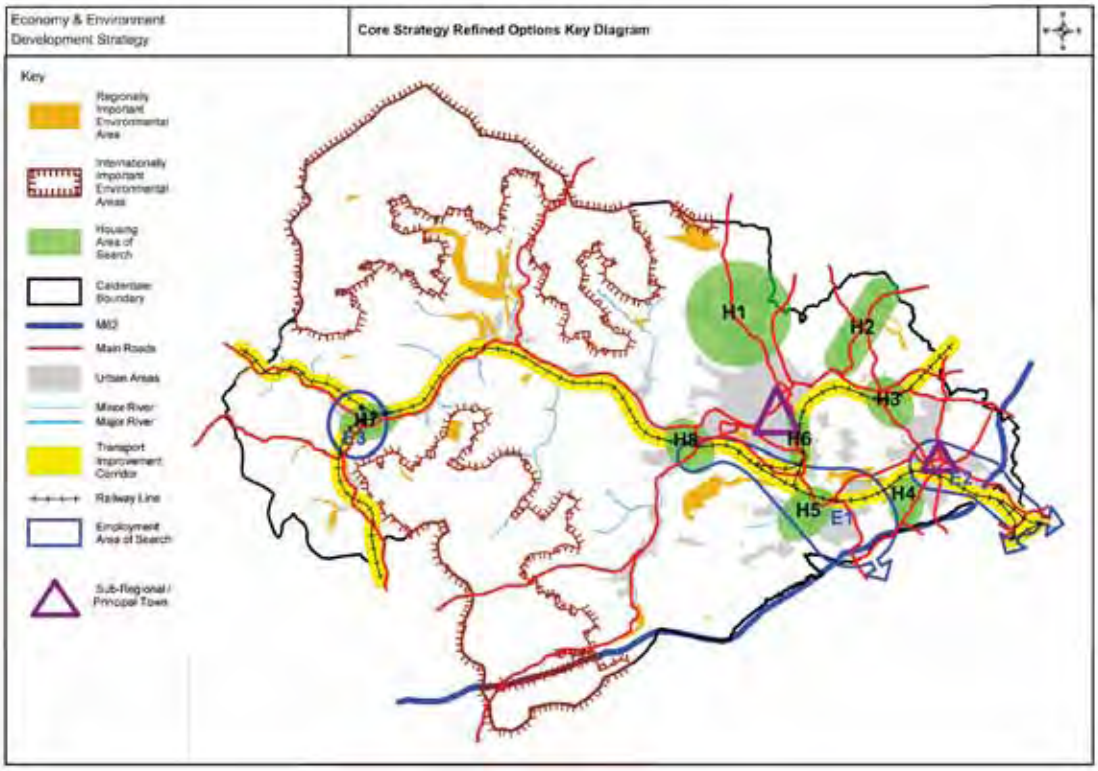
4.10 The location of the search areas are shown in Figure 4.1.

[2] Data supplied by Calderdale Development Strategy Team, 16th December, 2009

TABLE 4.2 CALDERDALE HOUSING OPTIONS

Current Settlement		Housing Growth		
Hierarchy Status	**Settlement Name**	**Option 1***	**Option 2***	**Option 3**
Sub Regional Town	Halifax (Incl. Illingworth, Mixenden, Ovenden,	5230	5230	4750
Principal Town	Brighouse (Incl. Rastrick, Hipperholme, Lightc	1900	1430	1900
	Todmorden (Incl. Walsden, Gauxholme etc.)	100	1430	670
Local Town	Sowerby Bridge (Incl. Sowerby)	N/A	N/A	670
	Elland (Incl. Greetland, West Vale etc.)	950	670	670
	Hebden Bridge	50	70	70
	Mytholmroyd	50	70	70
	Shelf	380	70	70
Local Centre	Luddenden & Luddendenfoot	50	70	70
	Ripponden & Rishworth	50	70	70
	Northowram	380	70	70
	Holywell Green	50	70	70
	Southowram	50	70	70
	Bank Top	10	10	10
	Bradshaw	10	10	10
	Ainley Top	10	10	10
	Wainstalls	10	10	10
	Norwood Green	10	10	10
	Elland Upper Edge	10	10	10
	Sowood Greem	10	10	10
	Elland Lower Edge	10	10	10
	Warley	10	10	10
	Jagger Green	10	10	10
	Mount Tabor	10	10	10
	Wainsgate	10	10	10
	Brearley Bridge	10	10	10
Neighbourhood/ Small Rural Centre	Outlane	10	10	10
	Portsmouth & Cornholme	10	10	10
	Barkisland	10	10	10
	Heptonstall	10	10	10
	Mill Bank	10	10	10
	Eastwood	10	10	10
	Old Town & Chiserley	10	10	10
	Charlestown	10	10	10
	Pecket Well	10	10	10
	Harvelin Park	10	10	10
	Triangle	10	10	10
	Callis Bridge	10	10	10
	Slack	10	10	10
	Soyland Town	10	10	10
	Blackshawhead	10	10	10
	Total	9520	9600	9500

FIGURE 4.1 HOUSING AND EMPLOYMENT SEARCH AREAS



4.11 The dwellings shown in Table 4.2 were initially allocated to the relevant model zone system adapted for the study and distributed by the existing housing allocations. This distribution was then further tweaked to ensure that the dwelling distributions favoured the search areas. The zone map is shown in Figure 4.2.

4.12 The distribution methodology is best illustrated by example.

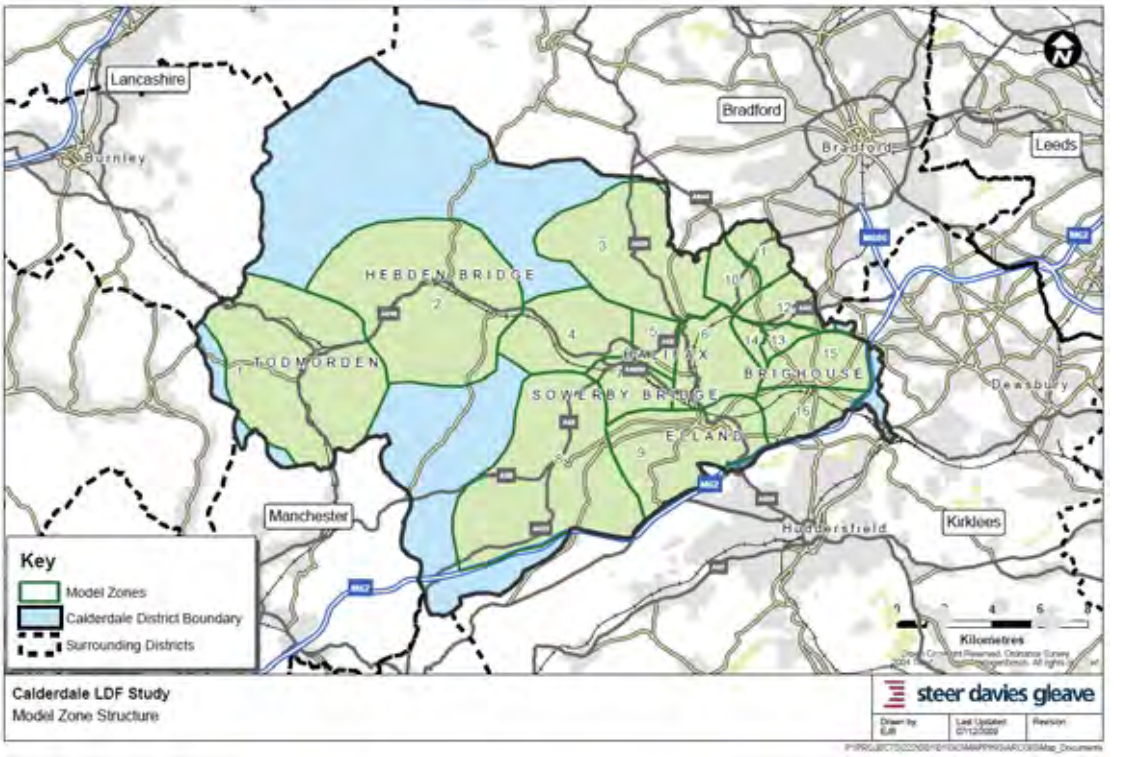
4.13 For Option 1 the allocation of dwellings to Halifax is 5,230 and Halifax is represented by zones 3, 4, 5, 6, 7 and 8. For Option 1 the search areas relevant to Halifax are H1 and H6 that correspond to zones 3 and 6 respectively (and this can be seen by comparing Figure 4.1 and Figure 4.2).

4.14 Table 4.3 shows how the existing distribution of dwellings was adjusted to favour the two search areas. The proportion for the zone in which H1 sits is lifted from 0.42 to 0.50 and the zone in which H6 sits is lifted from 0.06 to 0.15. These adjustments are based on judgment without a more detailed geographical specification of allocations than those provided in Table 4.2.

TABLE 4.3 HALIFAX OPTION 1 DISTRIBUTION

Zone	Search Area	Existing Distribution (Proportion)	Adjusted Distribution (Proportion)	Dwelling Allocation
3	H1	0.42	0.50	2615
4		0.10	0.07	347
5		0.03	0.02	100
6	H6	0.06	0.15	785
7		0.26	0.17	912
8		0.13	0.09	472
		1.00	**1.00**	5230

Figure 4.2 Study Zoning System



Employment Allocations

4.15 Calderdale provided employment land allocation data in the form of a GIS database. The employment land allocations are tabulated in Table 4.4. The trips generated by the housing were linked to the employment site distribution by the area of each site and this method is explained below.

TABLE 4.4 CALDERDALE EMPLOYMENT LAND ALLOCATIONS

Policy	Ref	Location	Area	Type
E 3	EM63	Foseco, Holmfield Industrial Estate, Holmefield, Halifax.	1.72	Industry and Warehouse
E 3	EM64	Hays Lane, Mixenden, Halifax.	0.56	Office
E 3	EM52	West of Holmfield Industrial Estate, Holmefield, Halifax.	6.09	Office
E 3	EM56	North of Holmfield Industrial Estate, Holmefield, Halifax.	6.8	Industry and Warehouse
E 3	EM53	South of Shroggs Road, Ovenden, Halifax.	6.62	Industry and Warehouse
E 3	EM17	Century Road, Elland.	1.67	Industry and Warehouse and Office
E 3	EM47	Adjacent Stainland Road (North of River), Elland.	2.51	Industry and Warehouse
E 3	EM57	Adjacent Halifax Building Society, Wakefield Road, Sowerby Bridge.	4.02	Office
E 3	EM65	Shay Lane, Illingworth, Halifax.	0.6	0
E 3	EM42	Wakefield road, Clifton, Brighouse.	25.48	Office
E 3	EM62	Armytage Road, Brighouse.	0.73	Industry and Warehouse
E 3	EM60	River Street, Brighouse.	1.7	Industry and Warehouse
E 3	EM44	Southedge Quarry , Hipperholme, Halifax.	13.05	Industry and Warehouse and Office
E 3	EM67	Lowfields, Elland.	5.07	Industry and Warehouse
E 3	EM36	Elland Power Station, Elland.	8.77	0
E 3	EM1	Brids Royd Lane, Brighouse.	1.28	Industry and Warehouse
E 3	EM68	East of Brighouse Road, Hipperholme, Halifax.	7.43	Industry and Warehouse
E 3	EM46	Adjacent Surfacem, Huddersfield Road, Elland.	3.72	Industry and Warehouse
E 3	EM16	Wistons Lane, Elland.	1.25	Industry and Warehouse and Office
E 3	EM11A	Atlas Works, Elland.	6.36	Industry and Warehouse
E 3	EM51	South of Burnley Road, Friendly, Sowerby Bridge.	2.26	Industry and Warehouse
E 3	EM50	East of Halifax Road, Ripponden, Sowerby Bridge.	1.84	Industry and Warehouse
E 3	EM31	Burnley Road, Mytholmroyd, Hebden Bridge.	0.72	Office
E 3	EM61	Mytholm Works, King Street, Hebden Bridge.	2.03	Office
E 3	EM59	Mons Mill, Burnley Road, Todmorden.	2.32	Residential
E 3	EM54	South of Bacup Road, Gauxholme, Todmorden.	0.6	0
E 4	MU5	Dewsbury Road, Elland.	4.71	Retail
E 4	MU4	Sugdens Mill, Mill Royd Street, Brighouse.	3.28	Retail
E 4	MU8	Drakes Industrial Estate, Shay Lane, Halifax (formerly EM28)	3.65	0
E 4	MU10	Furness Avenue, Illingworth, Halifax	3.47	0
E 4	MU1	West of Boothtown Road, Boothtown, Halifax.	15.34	Mixed B
E 4	MU9	Parade of Shops, Mixenden Road, Mixenden	0.41	0
E 4	MU2	Former Transco Site, Mulcture Hall Road, Halifax.	3.76	Mixed B

Trip Generation

4.16 The growth model methodology applied did not require the application of trip generation forecasts to the employment allocations and this will become evident. It was necessary to apply robust trip generation rates to the dwellings and the trip generation rate per dwelling adopted was 3.59 one way trips. This trip generation rate was generated from the TRICS database and is an average of daily person trips for different housing types and this is shown in Table 4.5.

TABLE 4.5 DWELLING TRIP GENERATION RATE

Dwelling Type	Departures	Arrivals
03A Houses Privately Owned	4.43	4.69
03C Flats Privately Owned	2.23	2.61
03K Mixed Private Housing	3.08	3.28
03L Mixed Non-Private Housing	4.16	4.24
Average	**3.59**	

4.17 A crucial step in the development of the growth forecast is to determine the overall number of jobs forecast in Calderdale and determine how many of those can be supported by the workforce growth generated by the housing.

4.18 It was agreed at a workshop with CMBC officers that we would adopt an employment forecast of jobs for Calderdale that took 33% of the difference between the Employment Land Review Base and the Employment Land Review Plus. This is illustrated in Table 4.6

TABLE 4.6 ADOPTED EMPLOYMENT FORECAST (2008-2026)

Forecast	Jobs
Employment Land Review Base	9,779
Employment Land Review Plus	15,529
Adopted Employment forecast	11,677

4.19 The net new workforce generated by the new dwellings is based on a jobs per dwelling rate of 0.91. If this is applied to 9,520 dwellings for option 1 this generates a net new workforce available of 8,663 by 2026. When this value is compared with 11,677 from Table 4.6 it is evident that 3,013 of the required workforce to meet the employment forecast in Calderdale will have to originate from outside Calderdale.

Trips Forecasts

4.20 Having determined the overall volume of dwellings and employment the next task is to generate the trip volumes by journey purpose that is done through example for Option 1.

4.21 The 9,520 dwellings when multiplied through by the one-way trip generation rate of 3.59 trips per dwelling gives us 34,177 household based one way trips.

4.22 These trips will exclude the non-home based (NHB) trips and these are estimated by using journey purpose splits that are imported from the 2008 Merseyside Household Information Survey. This data provides more detailed journey purpose splits than can be provided by the National Travel Survey (NTS). The data has been validated at an aggregate level against NTS data for West Yorkshire that is illustrated below.

4.23 The Merseyside HIS journey purpose split data was validated to demonstrate its suitability for use in Calderdale by inferring infer which journey purposes in the NTS data for West Yorkshire are home based and non-home based though this would not be a perfect comparison. The validation results are presented in Table 4.7 and demonstrate that the use of the Merseyside data is reasonable.

TABLE 4.7 JOURNEY PURPOSE SPLIT VALIDATION

	Merseyside HIS	West Yorkshire NTS
Home based commute	23.7%	22.9%
Employer's business	5.4%	3.9%
Other	70.9%	73.3%

4.24 Table 4.8 shows how the net additional dwellings for each option are converted into trip end attractions. The 34,177 trip ends generated by the 9,520 dwellings becomes 38,175 trip ends once the 10% additional non home-based trips are factored in.

TABLE 4.8 OPTIONS 1 TRIP GENERATION BY JOURNEY PURPOSE

Journey Purpose	Journey Purpose Split	Trips
Home based commute	24%	9,042
Home based education	16%	6,225
Home based shopping	19%	7,254
Home based other	29%	10,907
Home based employee's business	2%	749
Non home based employees business	3%	1,308
Non home based other	7%	2,691
Total all trips	100%	38,175

Source: Merseyside Household Information Survey (2008)

Production and Attraction Balancing

4.25 Having identified the target trip end totals these were then allocated to the appropriate geography, that is household sites, employment sites or, for those journey purposes for which we have no specific data such as non home-based, then the existing trip distribution that is estimated from census journey to work data is adopted. These allocations are illustrated in Table 4.9 below.

4.26 Having forecast the all day productions and attractions by journey purpose and origin it was then possible to make sure the production-attraction linkage is plausible and so the appropriate geographical records are expanded to the appropriate trip ends. For example, for a commuting trip to work the housing production trip end is allocated to housing sites data and the employment attraction trip end is allocated to employment sites.

4.27 The values illustrated so far are all-day one way trips and the reverse leg is applied during the processing that follows. In this example at this stage we have forecast 38,175 x 2 = 76,350 trips.

TABLE 4.9 2026 ALLOCATIONS OF TRIPS TO GEOGRAPHY BY JOURNEY PURPOSE (OPTION 1)

	Production				Attraction			
Purpose	Housing	Employment	Existing	Total	Housing	Employment	Existing	Total
HB Commute	9,042			9,042		9,042		9,042
HB Education	6,225			6,225			6,225	6,225
HB Shopping	7,254			7,254			7,254	7,254
HB Other	10,907			10,907			10,907	10,907
HB EB	749			749		749		749
NHB EB		1,308		1,308		654	654	1,308
NHB Other		1,345	1,345	2,691		1,345	1,345	2,691
Sub Total	34,177	2,653	1,345	38,175	0	11,790	26,386	38,175

Time of Day Split

4.28 Having identified the all day trip end totals and to which geographical records they should be applied the journey purpose splits tabulated below have been applied. The time of day splits have also been imported from the Merseyside Household Information surveys (2008).

TABLE 4.11 TIME OF DAY SPLITS

Purpose	Morning Peak Hour	Average Inter Peak Hour	Afternoon Peak Hour	Rest of Day
	0800-0900	1000-1600	1700-1800	
HB Commute	17.7%	2.5%	15.5%	64.3%
HB Education	40.8%	6.3%	3.2%	49.7%
HB Shopping	1.6%	11.7%	5.6%	81.2%
HB Other	3.3%	5.8%	9.4%	81.4%
HB EB	12.3%	5.8%	15.7%	66.2%
NHB EB	14.5%	8.0%	9.5%	68.0%
NHB Other	5.6%	11.0%	4.0%	79.3%

Source: Merseyside Household Information Survey (2008)

4.29 Note the large proportions of all day trips that exist in the rest of the day column. This reflects the hourly nature of the three time period models that are morning peak hour, average inter-peak hour and pm-peak hour. This explains why the large trip-end numbers in previous tables are significantly reduced in the actual matrix tables presented later.

Directionality

4.30 Directionality factors have also been supplied to the productions and attractions to ensure that the relevant tidality is respected. The assumed tidality factors by time of day and journey purpose are presented in Table 4.12. If one takes the example of HB commuting trips it can be seen that in the morning peak hour 90% of the trips are from home to work with 10% (shift workers) in the reverse direction. The PM peak assumption is the reverse of this and in the average inter-peak hour it is assumed the balance of trips between home and work are even.

TABLE4.12 DIRECTIONAL FACTORS BY TIME OF DAY AND JOURNEY PURPOSE

	Production	Attraction	AM	IP	PM
HB Commute	Housing	Employment	0.9	0.5	0.1
	Employment	Housing	0.1	0.5	0.9
HB Education	Housing	Ex Distribution IN	1	0	0
	Ex Distribution IN	Housing	0	1	1
HB Shopping	Housing	Ex Distribution IN	0.9	0.5	0.2
	Ex Distribution IN	Housing	0.1	0.5	0.8
HB Other	Housing	Ex Distribution IN	0.8	0.5	0.3
	Ex Distribution IN	Housing	0.2	0.5	0.7
HB EB	Housing	Employment	0.9	0.5	0.2
	Employment	Housing	0.1	0.5	0.8
NHB EB	Employment	Employment	0.5	0.5	0.5
	Employment	Ex Distribution IN	0.25	0.25	0.25
	Ex Distribution IN	Employment	0.25	0.25	0.25
NHB Other	Employment	Employment	0.25	0.25	0.25
	Ex Distribution IN	Ex Distribution IN	0.25	0.25	0.25
	Employment	Ex Distribution IN	0.25	0.25	0.25
	Ex Distribution IN	Employment	0.25	0.25	0.25

Cross Calderdale Boundary Commuting Trips

4.31 The values presented in the worked examples above represent those commute trips representing new Calderdale based employees who find employment in Calderdale. We have, in these examples, excluded the employees who will have to originate from outside Calderdale (see paragraph 4.19).

4.32 3,013 of the employees needed in Calderdale are assumed to originate from outside Calderdale and generate additional home-based commute trips. These home-based commuting trips from outside Calderdale are also assumed to have the same directionality assumptions applied.

Cross Calderdale Boundary Other Journey Purpose Trips

4.33 We have not made the simple assumption that all other journey purposes have an origin and a destination within Calderdale. We have applied the following assumptions that are tabulated in Table 4.13.

TABLE 4.13 CROSS CALDERDALE BOUNDARY TRIP ASSUMPTIONS

	Within Calderdale	Outside Calderdale
HB Education	90%	10%
HB Shopping	100%	0%
HB Other	90%	10%
HB EB	80%	20%
NHB EB	90%	10%
NHB Other	90%	10%

Mode Split

4.34 The final step in the process prior to generating the future year matrices is to split the trips by mode. We have adopted TEMPRO v5.4 car vs public transport mode splits.

Furnessing

4.35 Once the final, fully disaggregated trip ends are produced they are then 'furnessed' using as a base the journey-to-work distributions for Calderdale.

4.36 The furnessing process pairs up origin and destination trip ends based on the existing distribution of trips in the journey-to-work matrices. In the absence of better data the implicit assumption is that the journey-to-work matrices are a reasonable proxy for overall activity.

5 Assessing Future Transport Demand in Calderdale

Introduction

5.1 This section describes the methodology by which the scenarios developed in the previous stage are used to predict how the trips will use the transport network in Calderdale. This allows forecasts of where increases in traffic or increases in demand for public transport may cause stress on the existing networks, and guides development of possible transport improvements and interventions.

Methodology Overview

5.2 In summary, the methodology for predicting the trip assignment in Calderdale is:

- Start with the development trip matrices produced from the growth model;
- Set up a link-based spreadsheet model (the Network Conditions Model; NCM) covering the major routes within Calderdale;
- Assess the base year traffic flows on the major routes within Calderdale;
- Assess the likely routes between origins and destinations in Calderdale and to/from the surrounding districts;
- Assign the development trip matrices to the major routes within Calderdale;
- Add the development flows to the base year flows to produce scenario flows for each Core Strategy approach.

Network Conditions Model

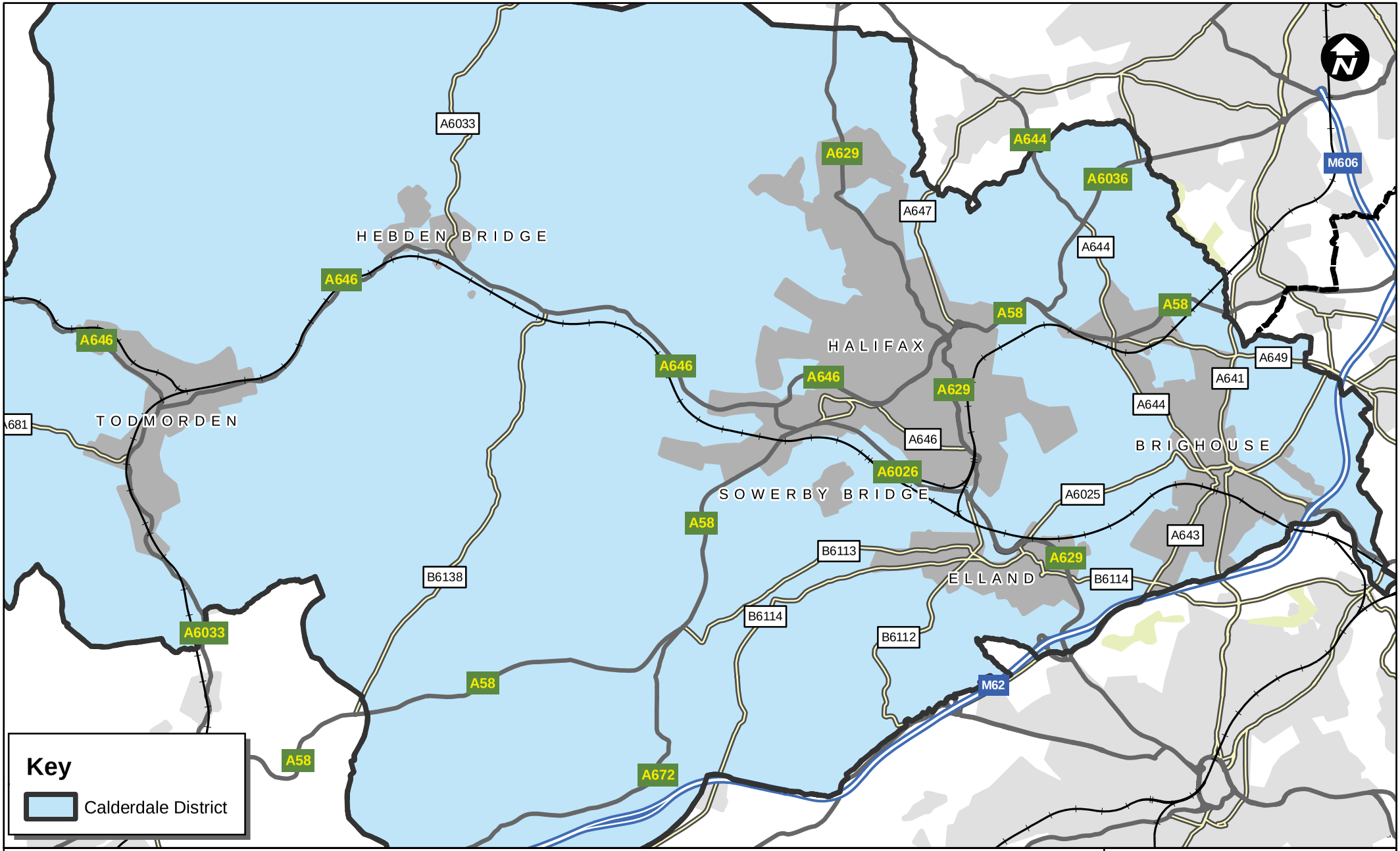
5.3 Major routes within Calderdale were identified and a link-based representation of those links was set up within a spreadsheet model, to allow simple link-based calculations to be performed. The spreadsheet model was linked to a GIS to enable mapping of the output data. Figure 5.1 shows the links included in the NCM and considered to be the major routes throughout Calderdale.

Base Year Traffic Flows

5.4 CMBC provided us with 2009 morning and evening peak traffic data for all the major sections of road within the district. Figures 5.2 and 5.3 show respectively a representation of the morning and evening peak base hour traffic flows on the links in the NCM.

5.5 Currently, the highest traffic flows are on the A58 from Halifax through to Hipperholme, the A629 Ovenden Road in north Halifax, and the A629 between Halifax and Elland in both peak hours.

5.6 Figures 5.4 and 5.5 show respectively the base volume/capacity on the links in the NCM. Capacity refers to link capacity only and was assumed at 1800 per lane. Number of lanes was assessed as the number over the majority of the link, not including junctions. In both peaks, link capacity is most stressed on the section of the A58 between Halifax and Stump Cross.



Calderdale LDF Study

Figure 5.1 Base Road Network

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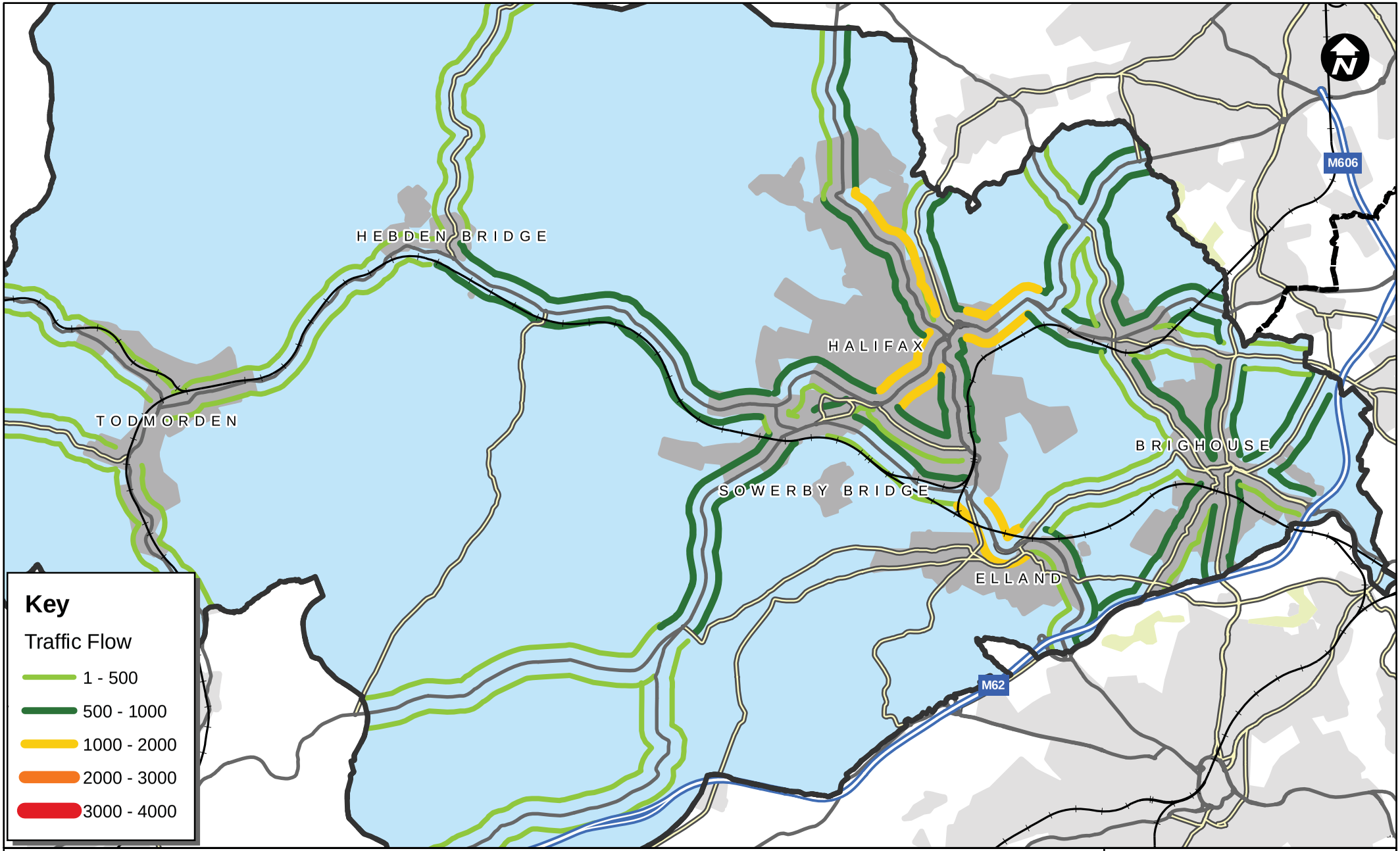

Calderdale LDF Study

Figure 5.2 Base traffic flow - AM

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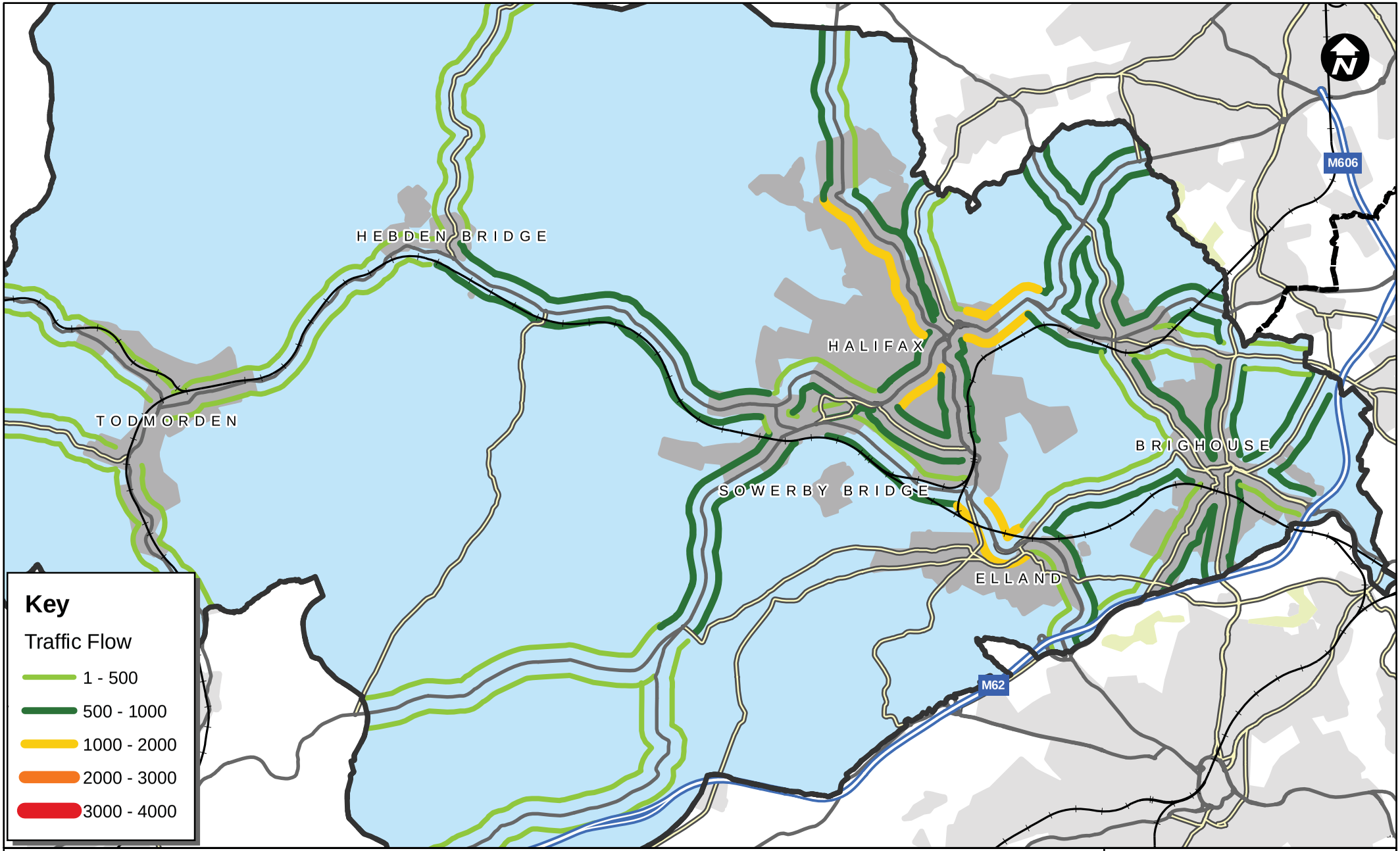

Calderdale LDF Study

Figure 5.3 Base traffic flow - PM

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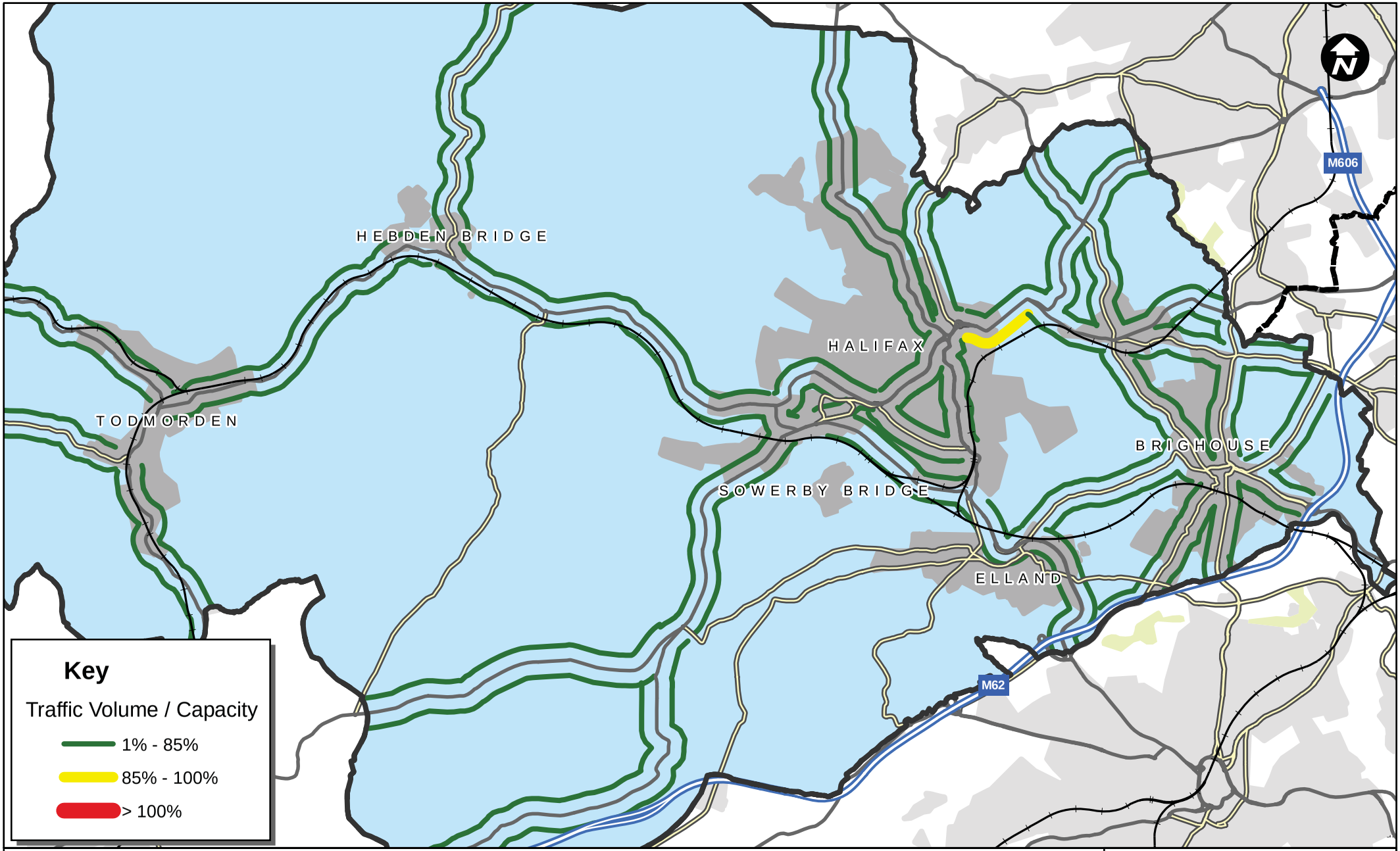

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Figure 5.4 Network Conditions: Traffic Volume / Capacity - Base AM

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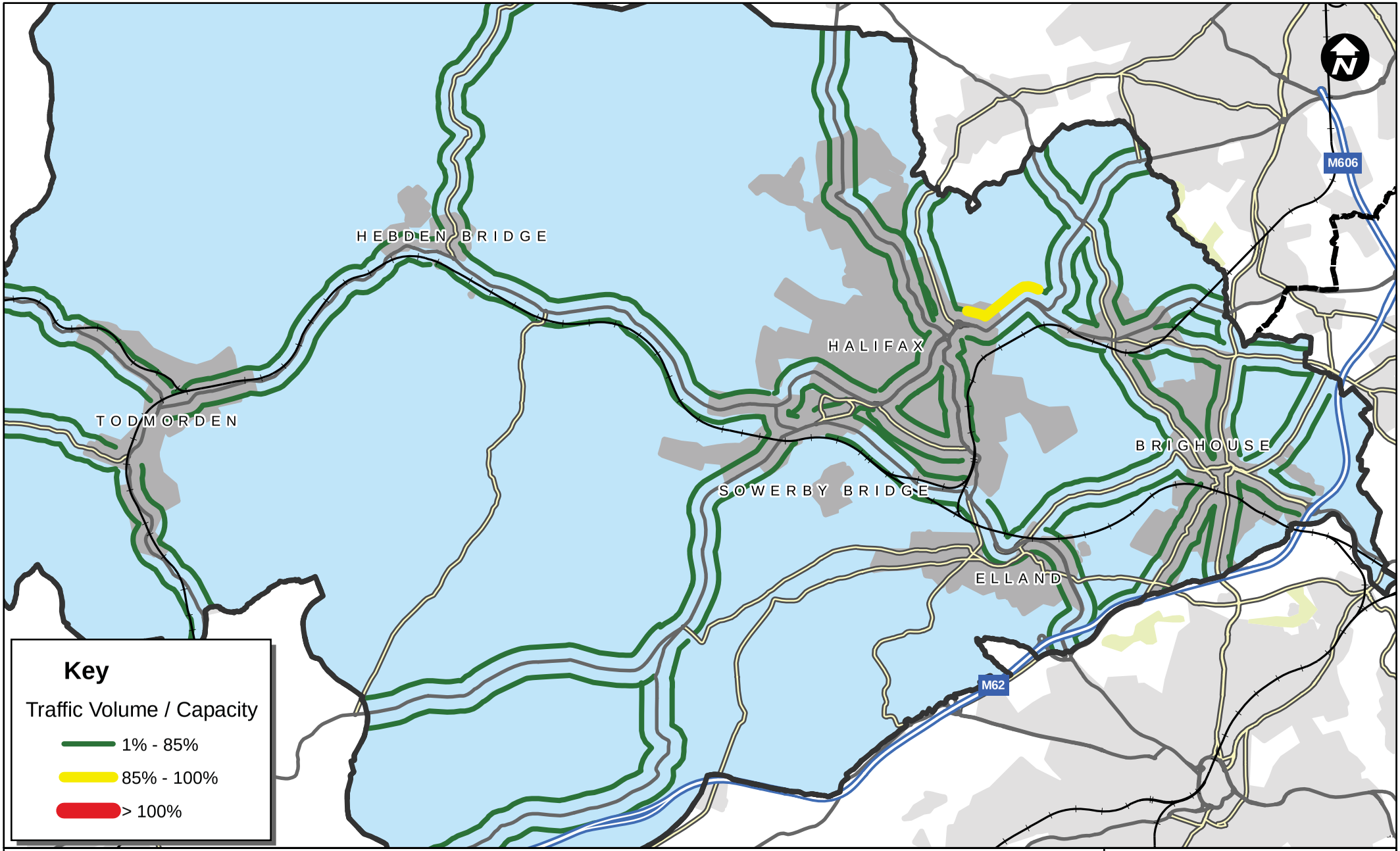

Calderdale LDF Study

Figure 5.5 Network Conditions: Traffic Volume / Capacity - Base PM

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Routeing

5.7 In consultation with CMDC we analysed which links in the NCM would be used by any trip between origin and destination within the district, or paired with an external trip end in one of the surrounding districts.

5.8 The major road network in Calderdale provides relatively little route choice, and generally there is only one likely principal route between origins and destinations. Trips between internal zones and external trip-ends, were generally assumed to take the shortest route to the district boundary and then either directly enter/exit the external zone, or to use the motorway.

5.9 All routeing assumptions are approximate and generally reflect the principal or most important routes between origins and destinations in Calderdale. More detailed analysis of how Core Strategy approach trips use the network will be possible when the SATURN model of the district becomes available.

Core Strategy Approaches: Development Traffic

5.10 New traffic demand, associated with development in each of the Core Strategy approaches was assigned to the NCM. Figures 5.6 – 5.11 show how the new traffic assigns to the network in each approach in the morning and evening peak hours.

5.11 Figures 5.12 – 5.18 then show the addition of the base traffic and the new development traffic in each approach in the morning and evening peak hours. This represents our forecasts of future year traffic flows on the network if all LDF development occurs.

5.12 Figures 5.19 – 5.23 show the volume/capacity for each future year traffic scenario. Similarly to the volume/capacity assessment in the base year, this refers to link capacity only, and does not reflect junction capacity.

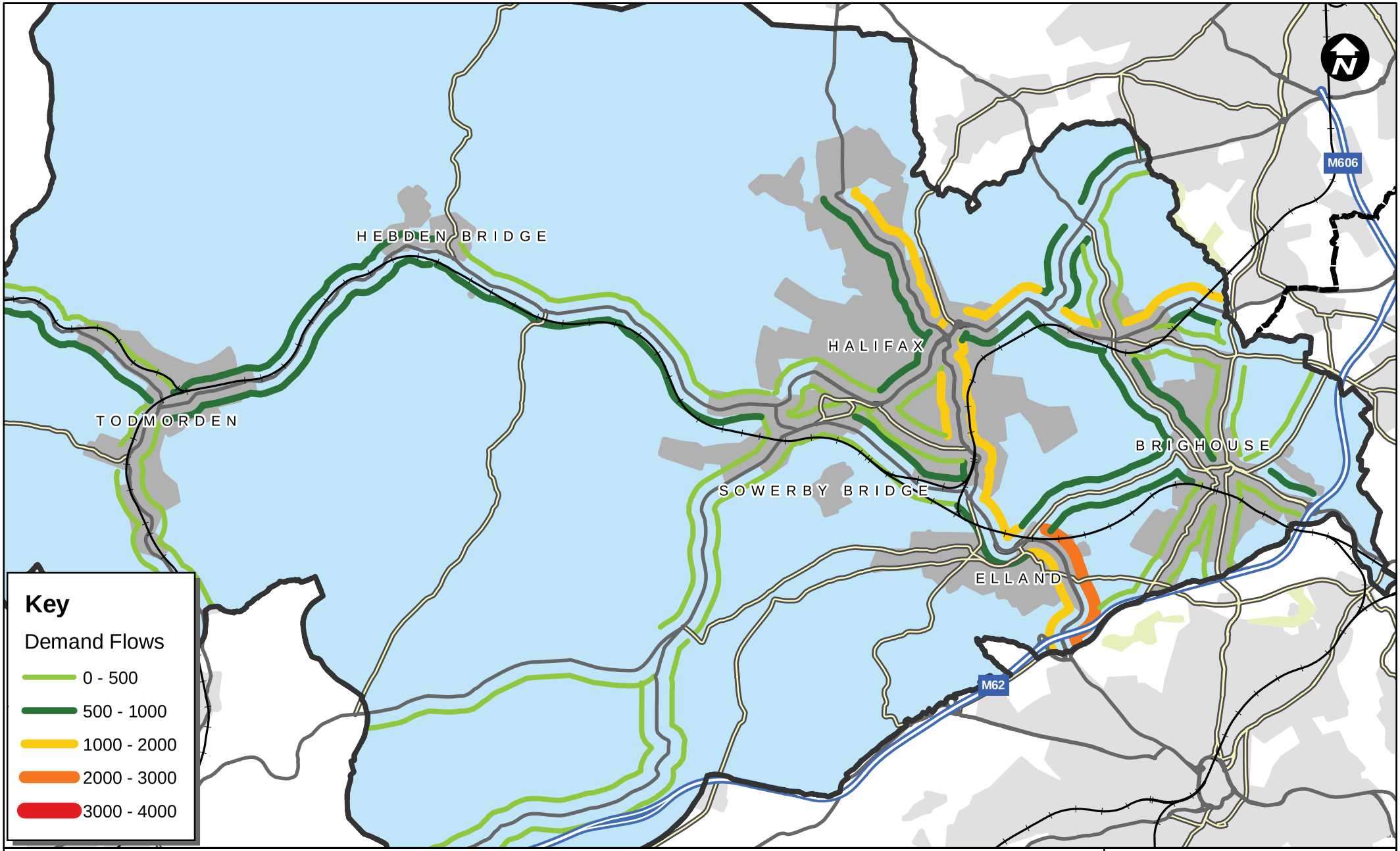

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Figure 5.6 LDF Traffic Demand - Approach 1 AM

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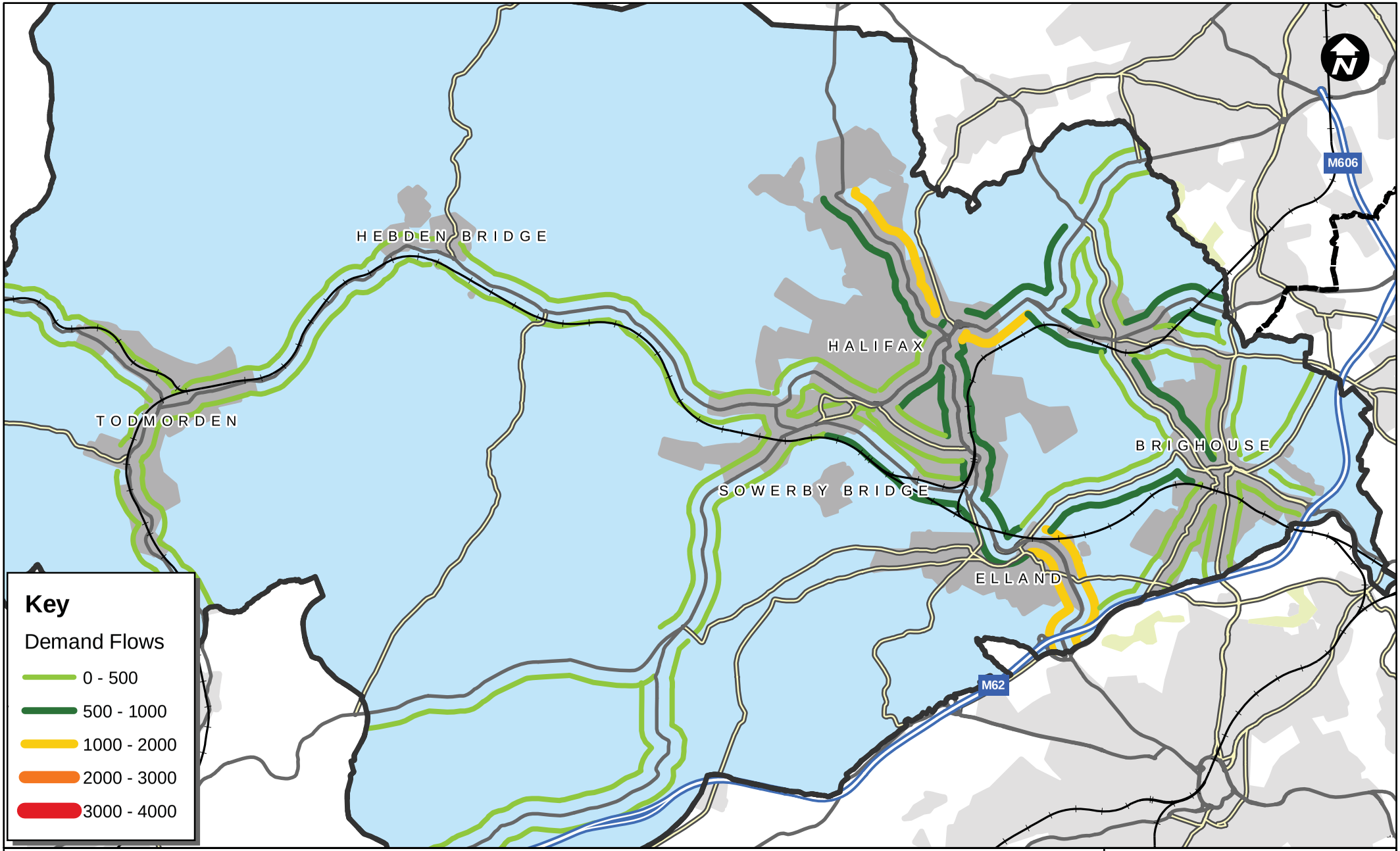

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Figure 5.7 LDF Traffic Demand - Approach 1 PM

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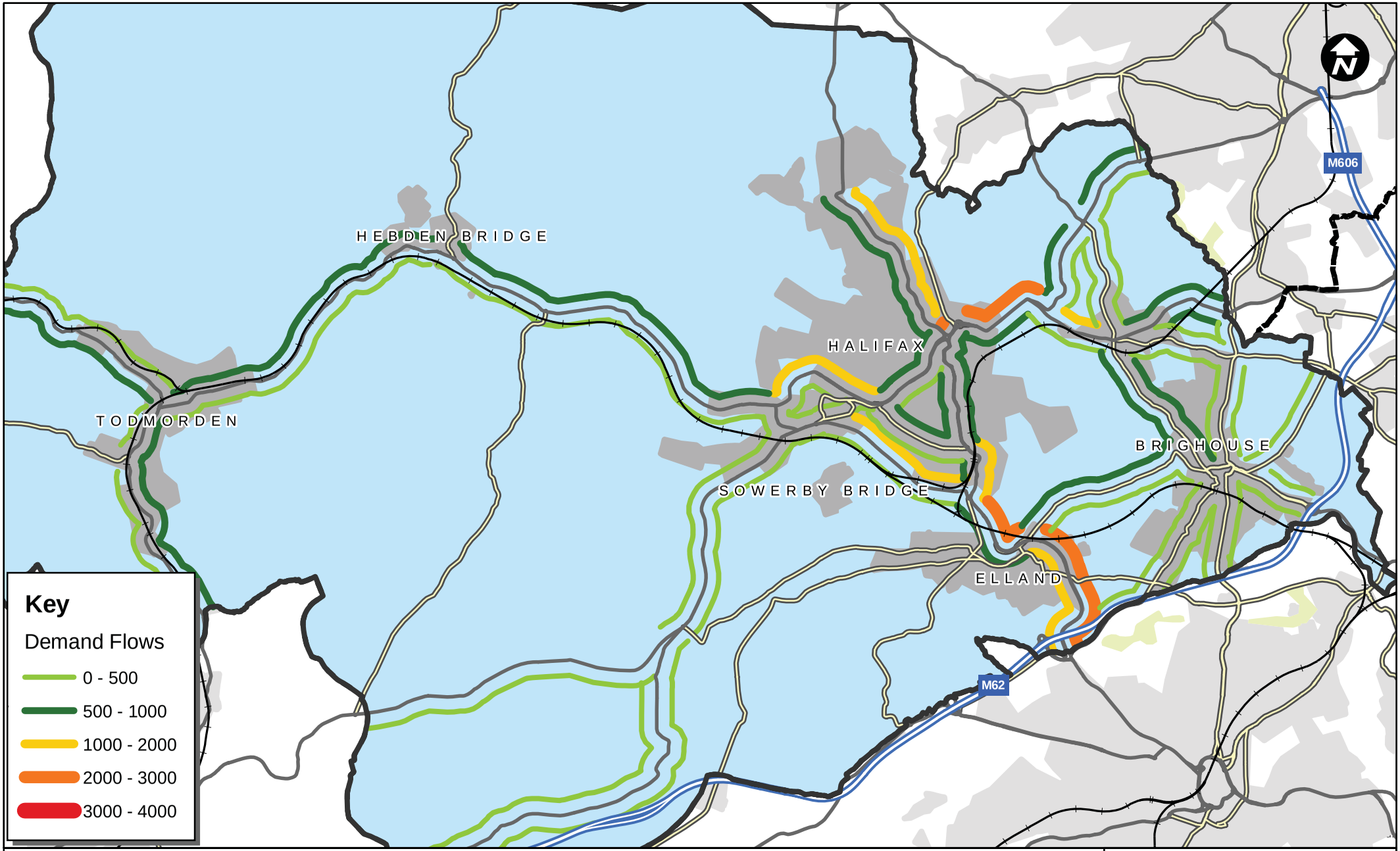

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Figure 5.8 LDF Traffic Demand - Approach 2 AM

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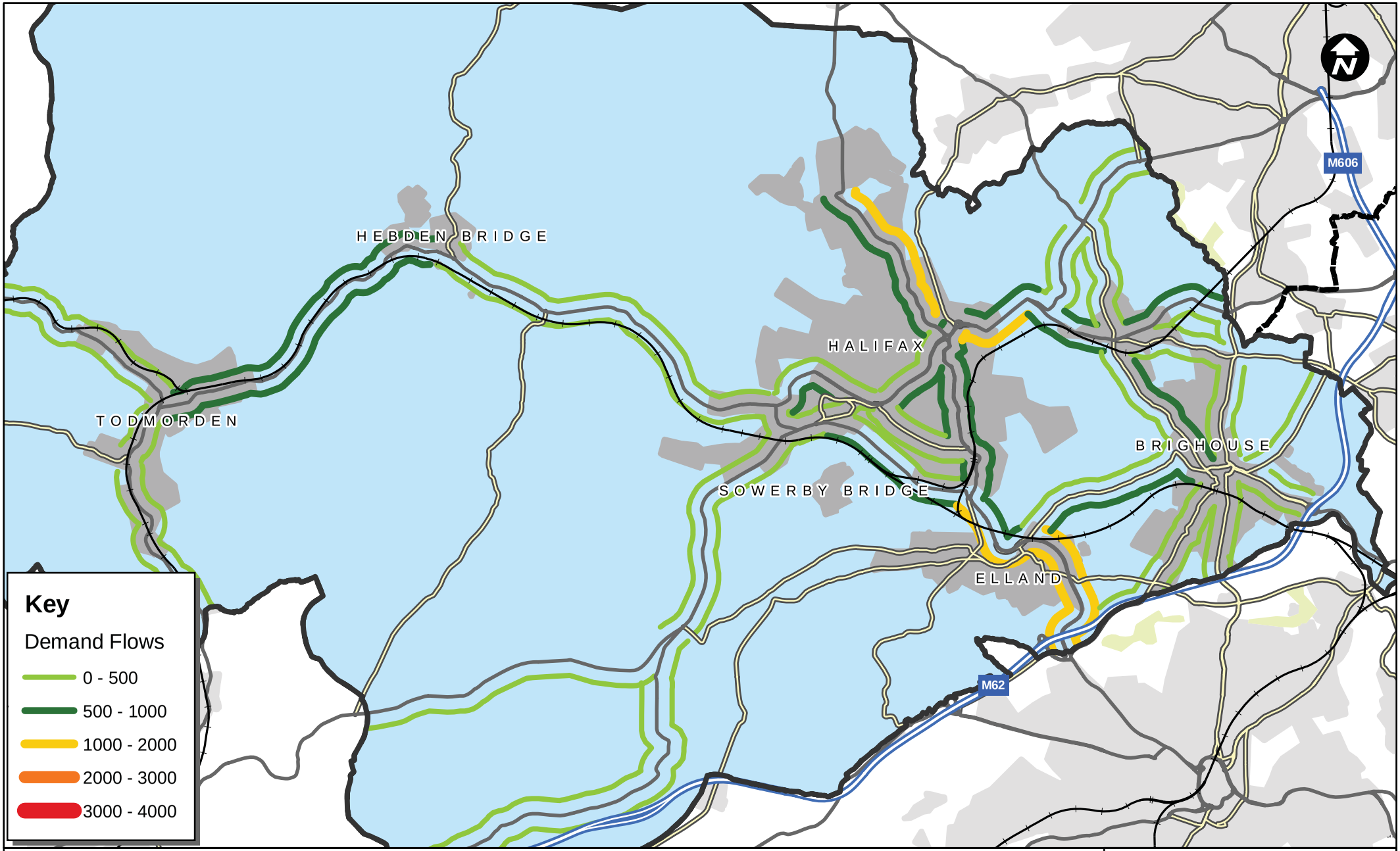

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Figure 5.9 LDF Traffic Demand - Approach 2 PM

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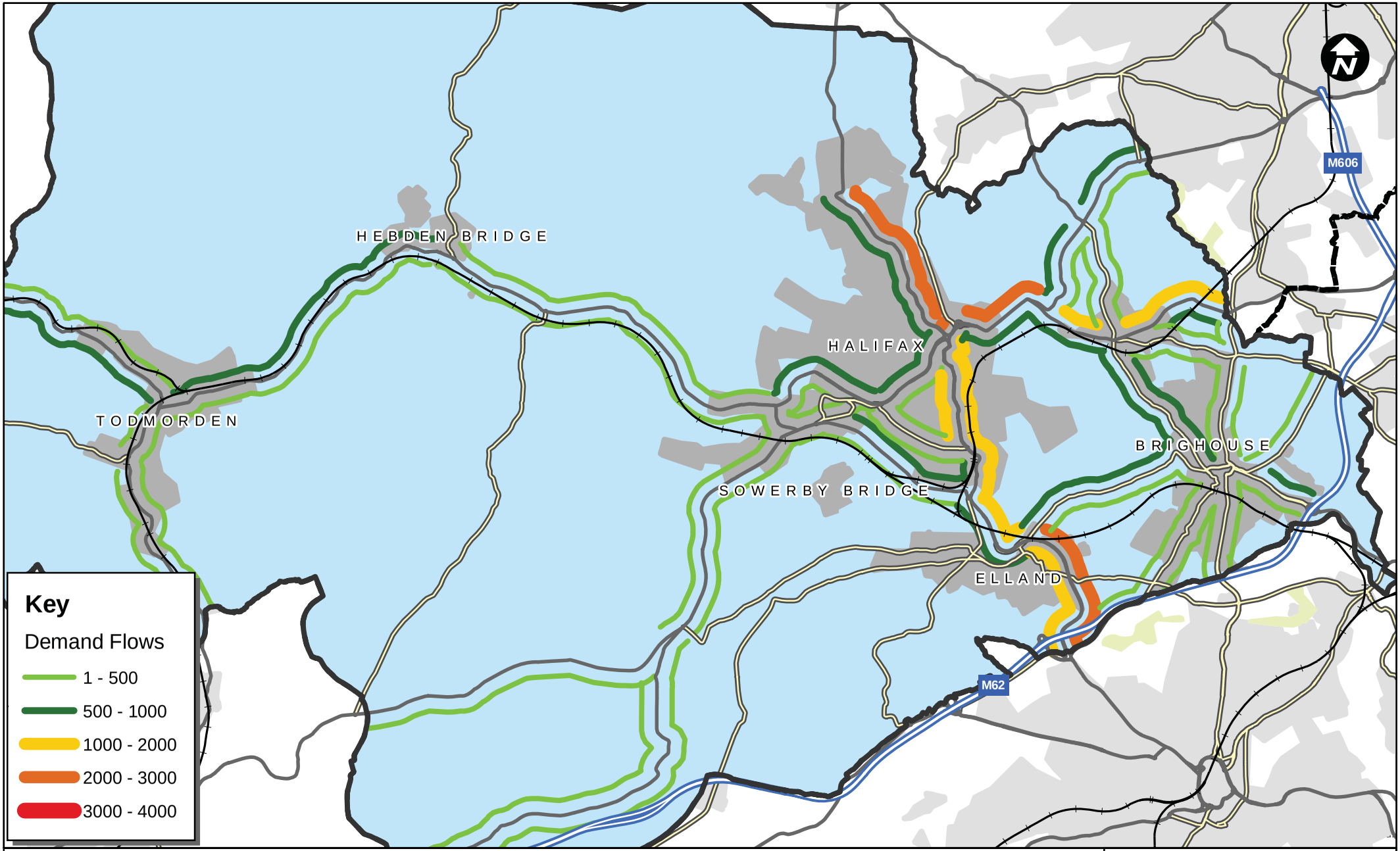

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Figure 5.10 LDF Traffic Demand - Approach 3 AM

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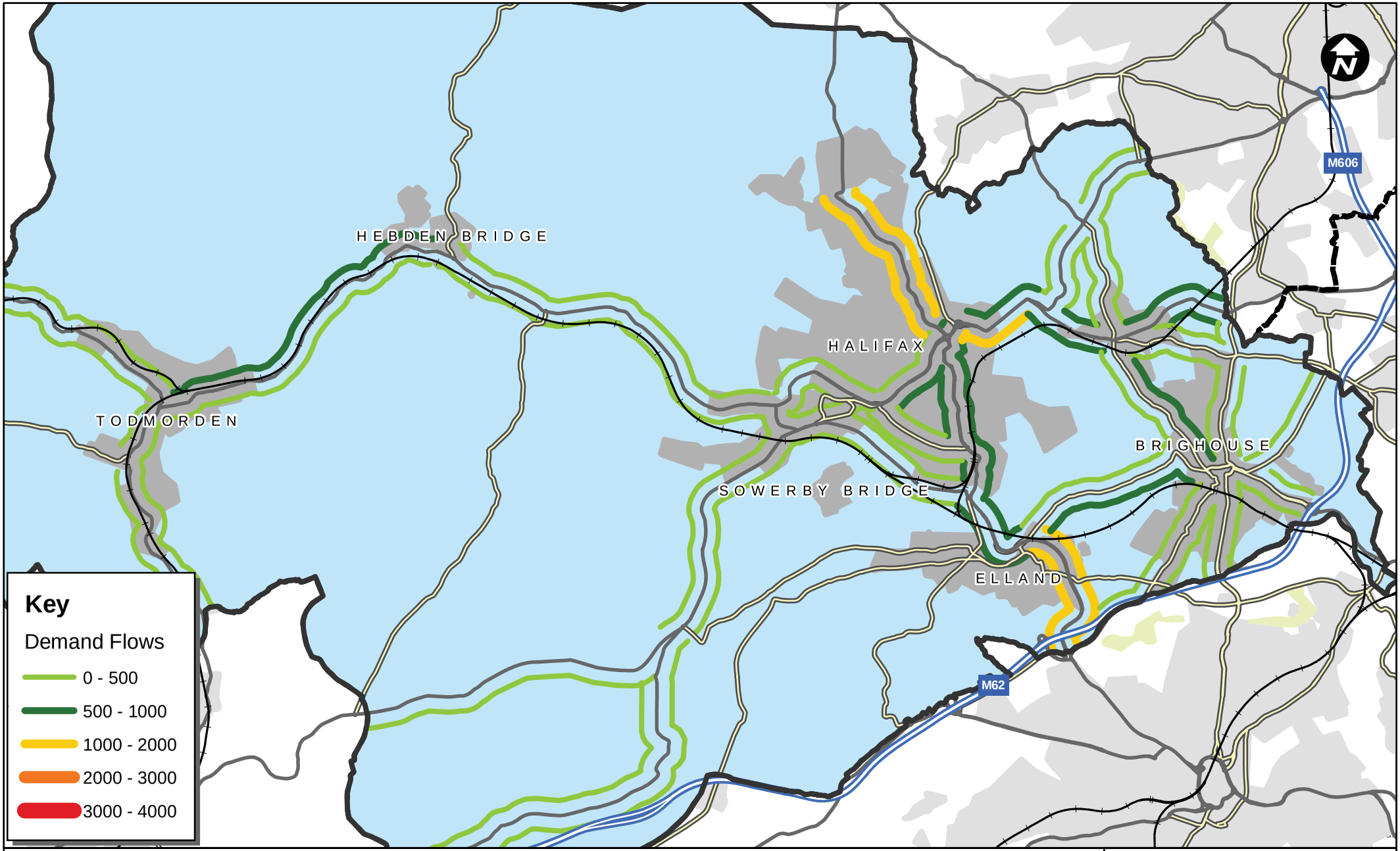

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Figure 5.11 LDF Traffic Demand - Approach 3 PM

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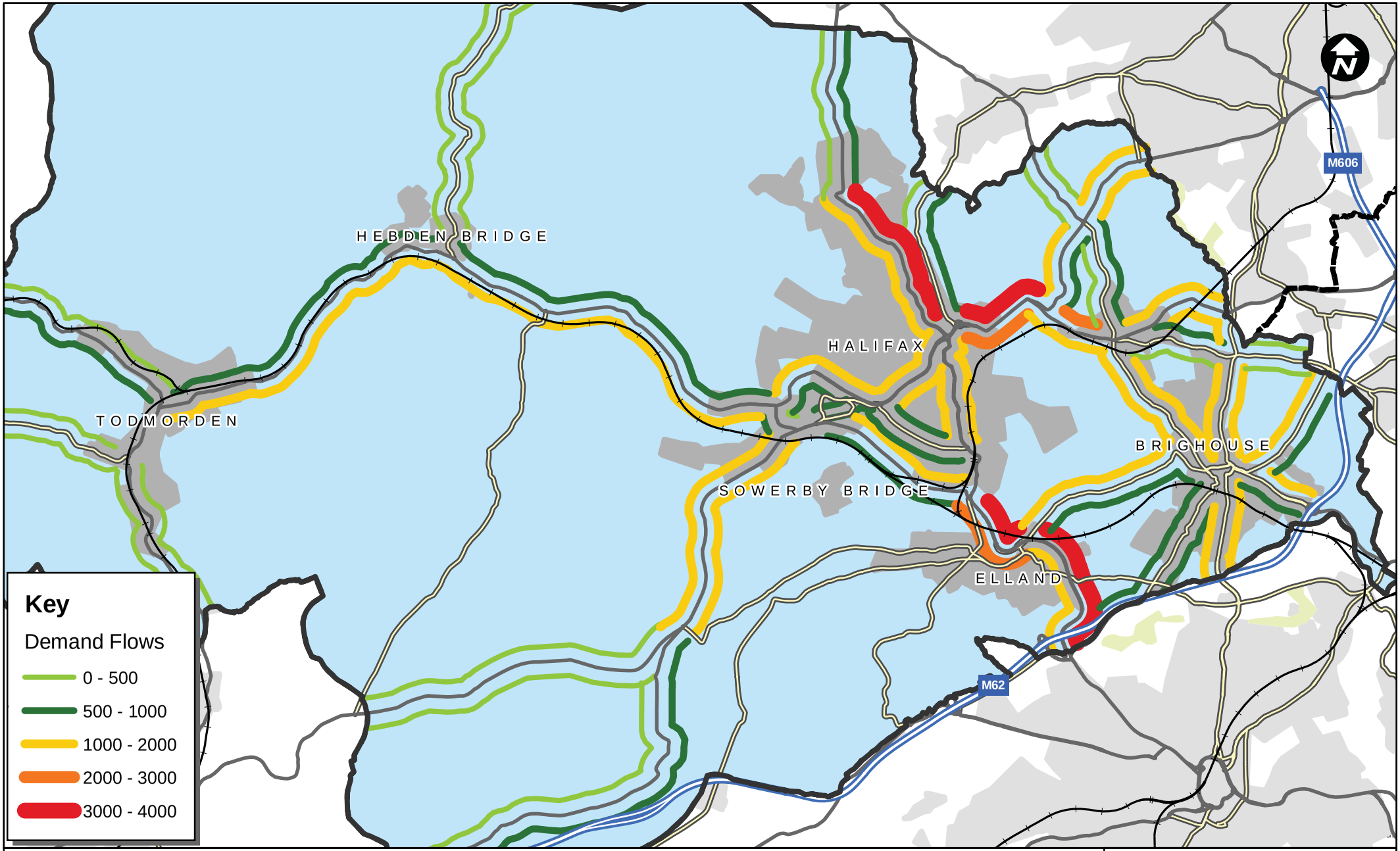

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Figure 5.12 Base + Additional LDF Traffic Demand - Approach 1 AM

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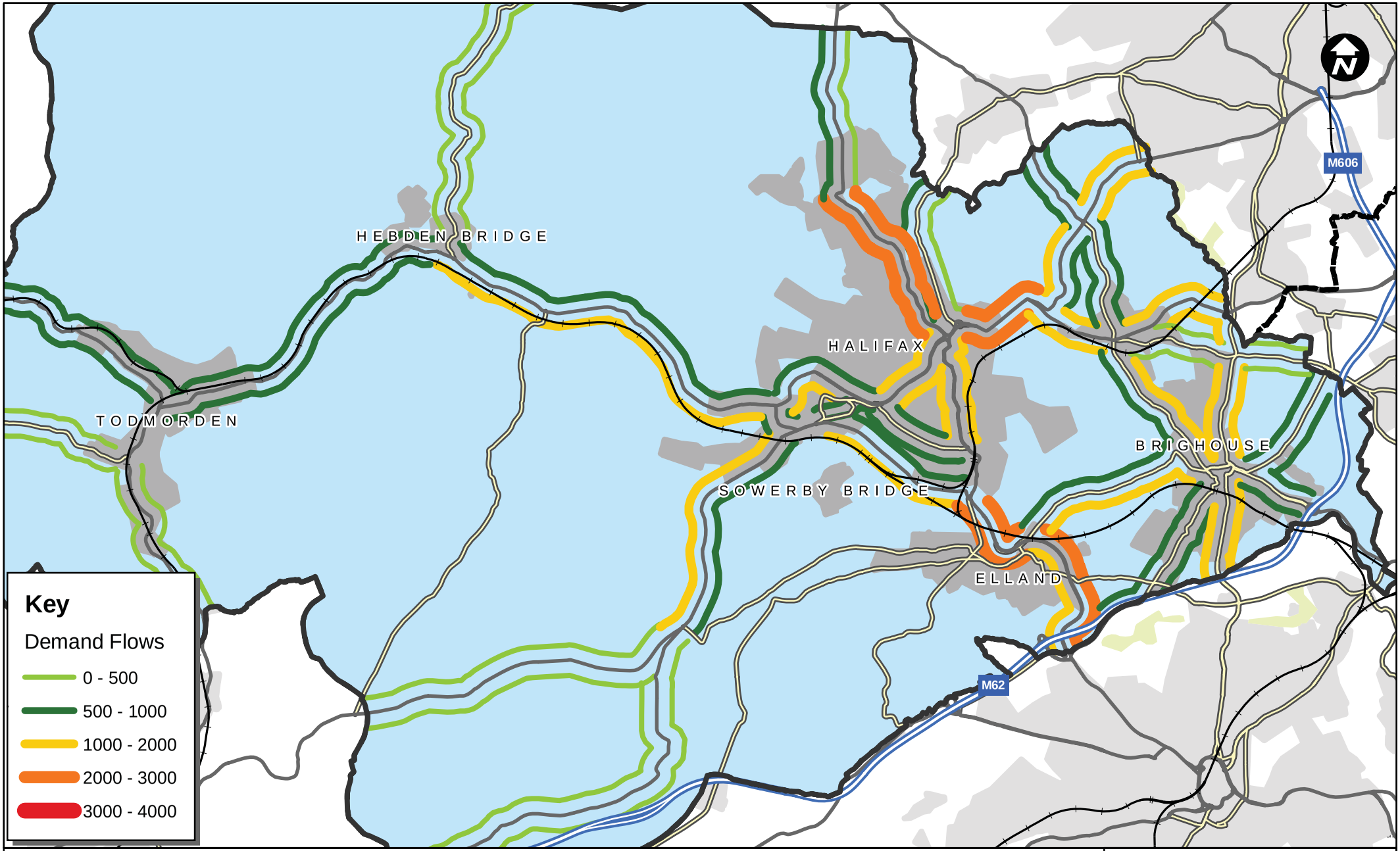

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Figure 5.13 Base + Additional LDF Traffic Demand - Approach 1 PM

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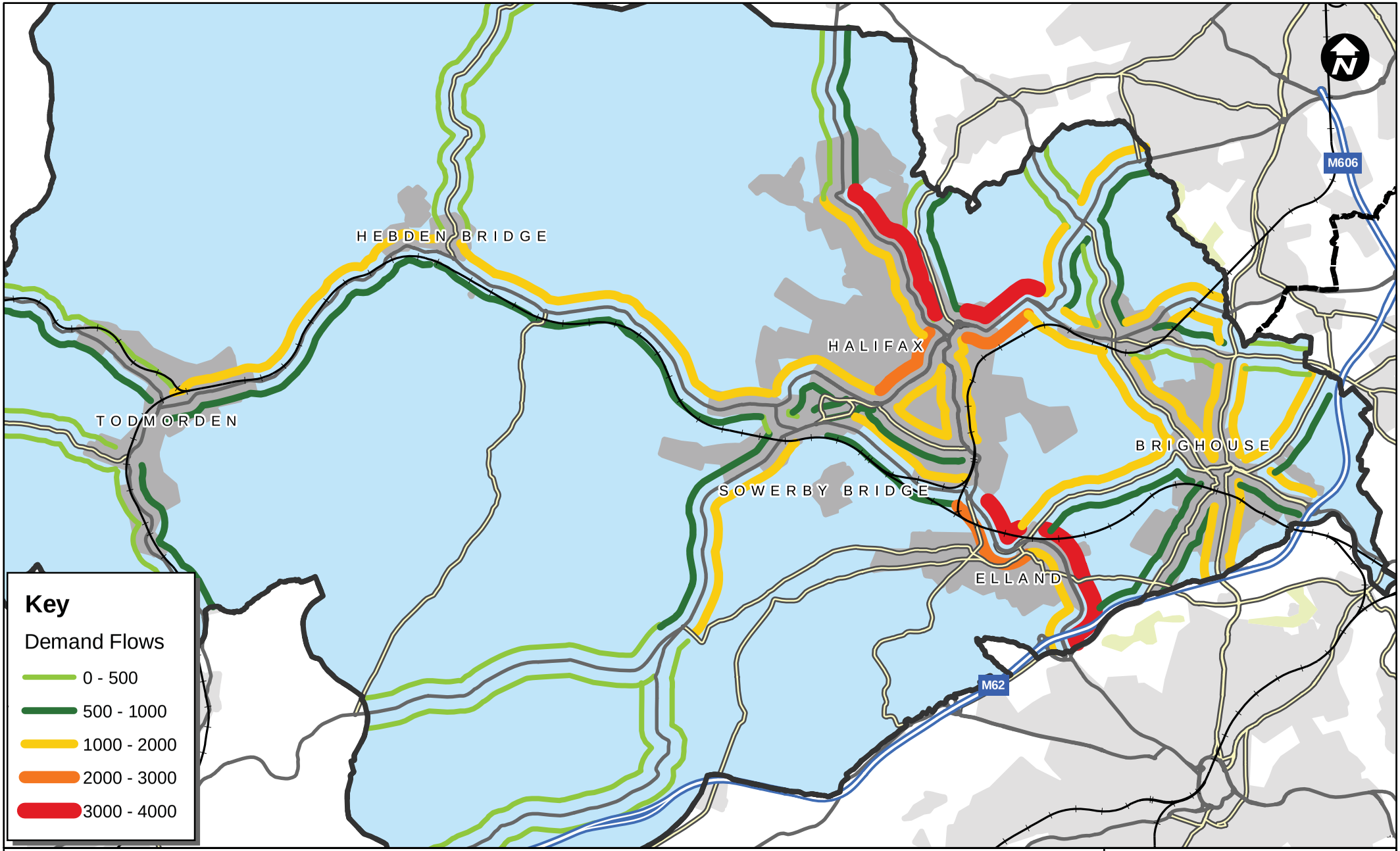

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Figure 5.14 Base + Additional LDF Traffic Demand - Approach 2 AM

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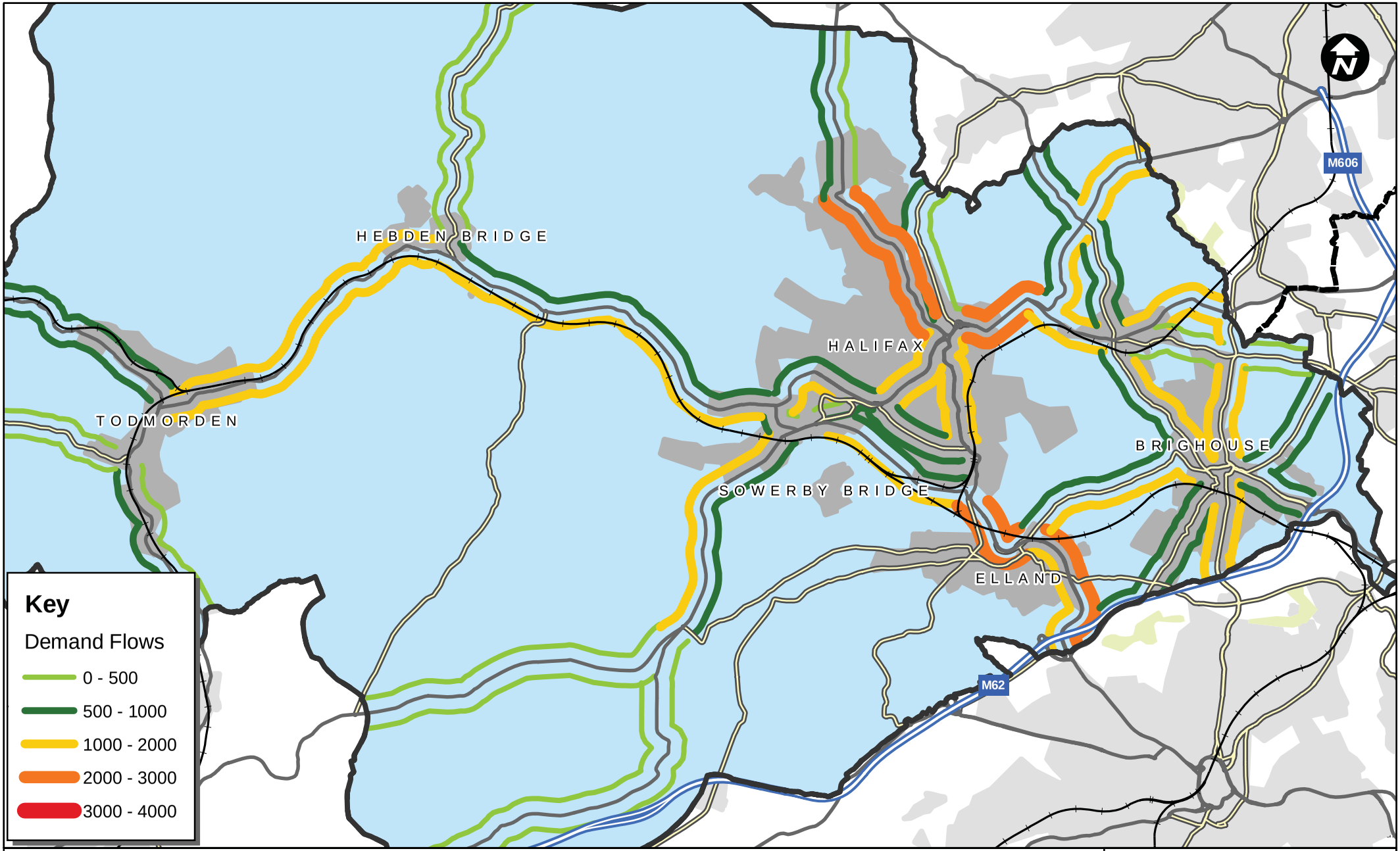

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Figure 5.15 Base + Additional LDF Traffic Demand - Approach 2 PM

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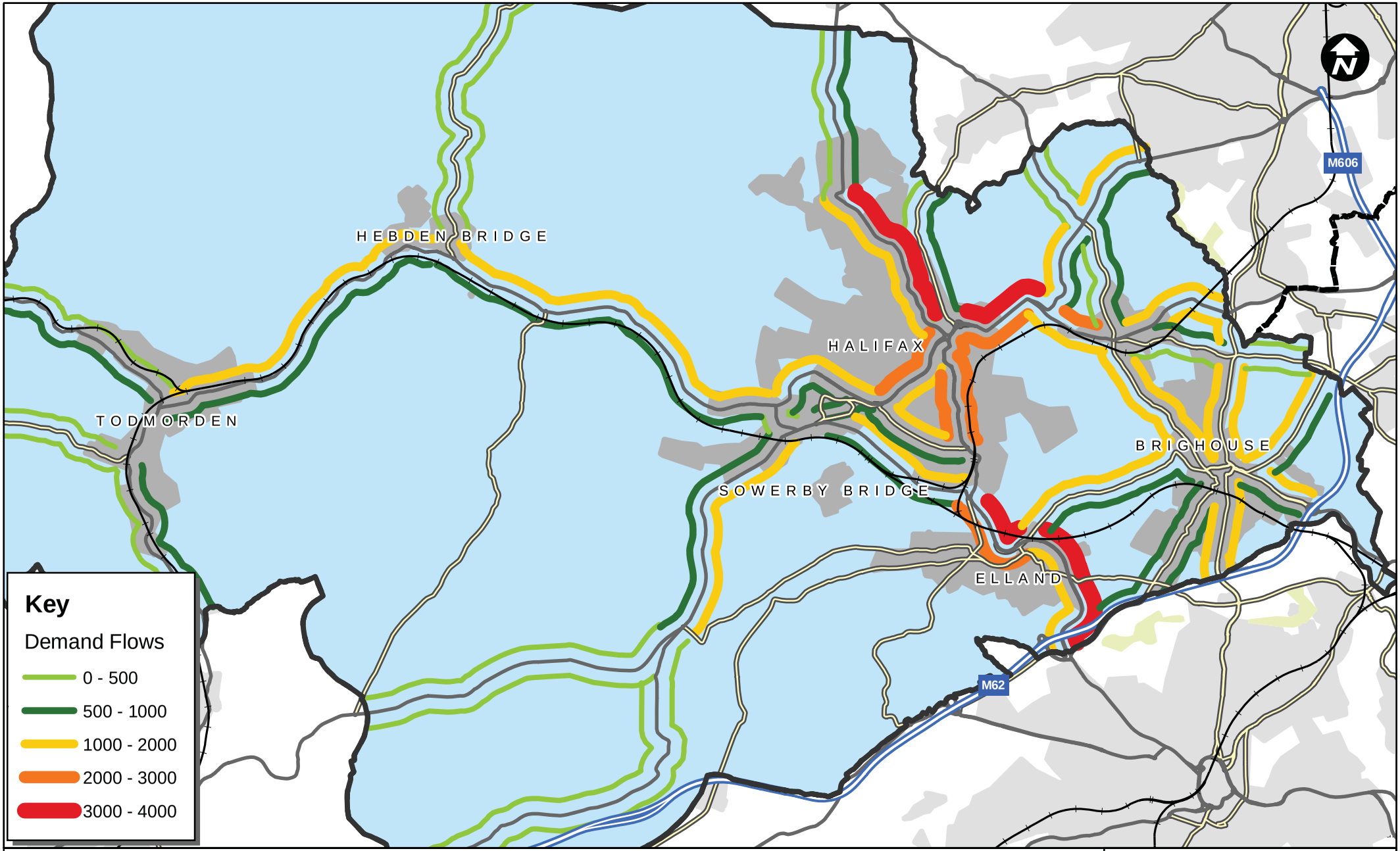

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Figure 5.16 Base + Additional LDF Traffic Demand - Approach 3 AM

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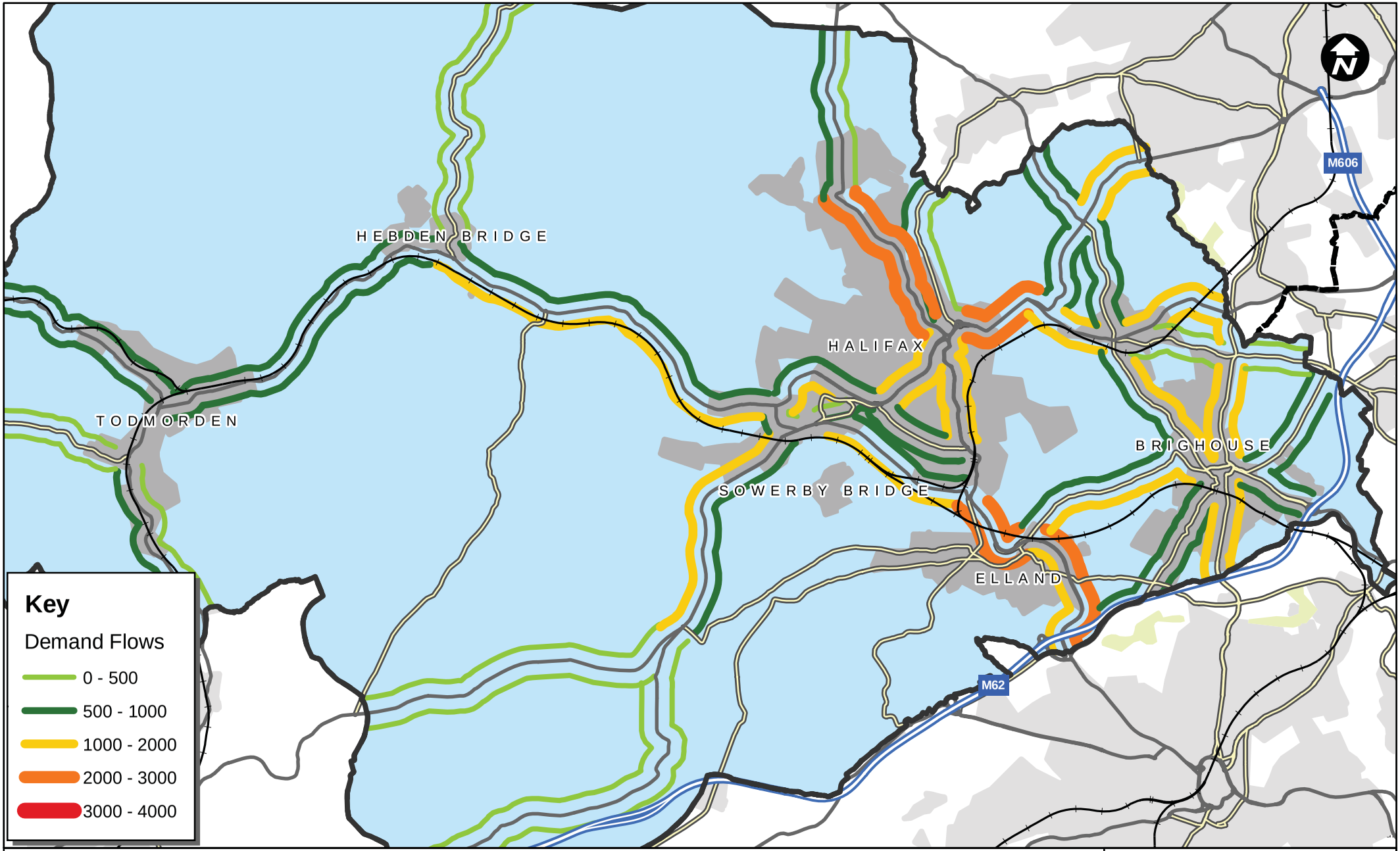

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Figure 5.17 Base + Additional LDF Traffic Demand - Approach 3 PM

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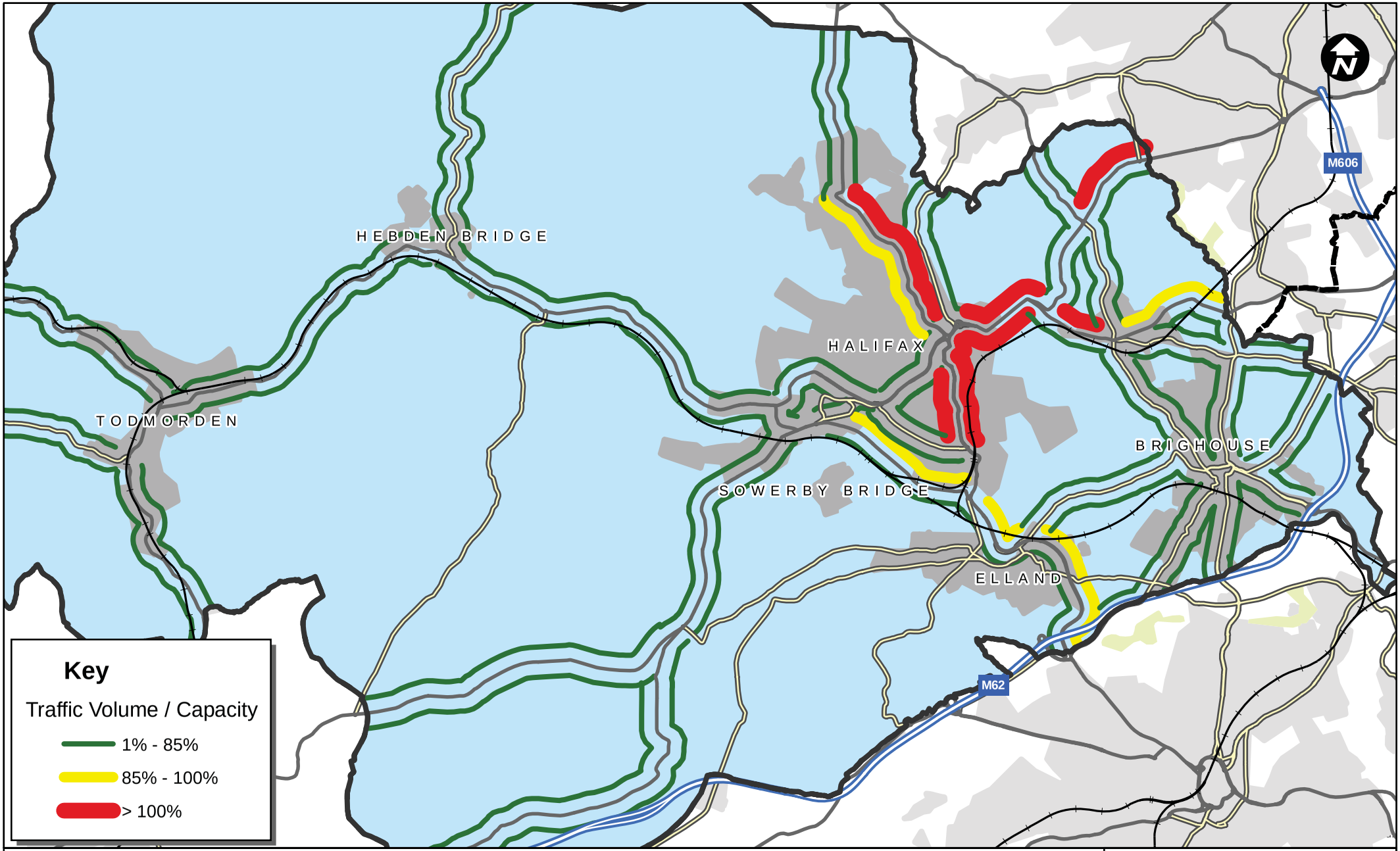

Calderdale LDF Study

Figure 5.18 Network Conditions: Traffic Volume / Capacity - Approach 1 AM

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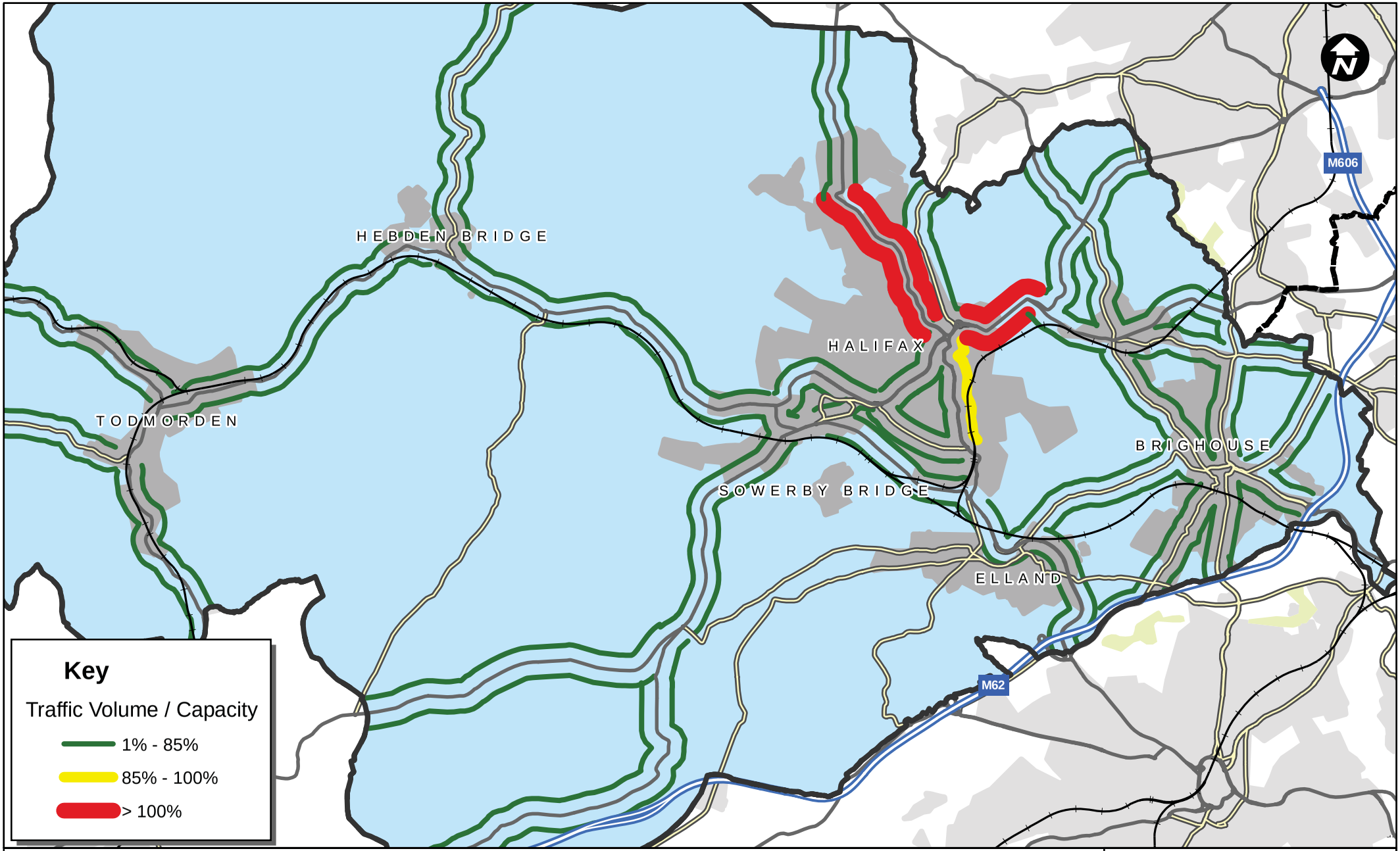

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Figure 5.19 Network Conditions: Traffic Volume / Capacity - Approach 1 PM

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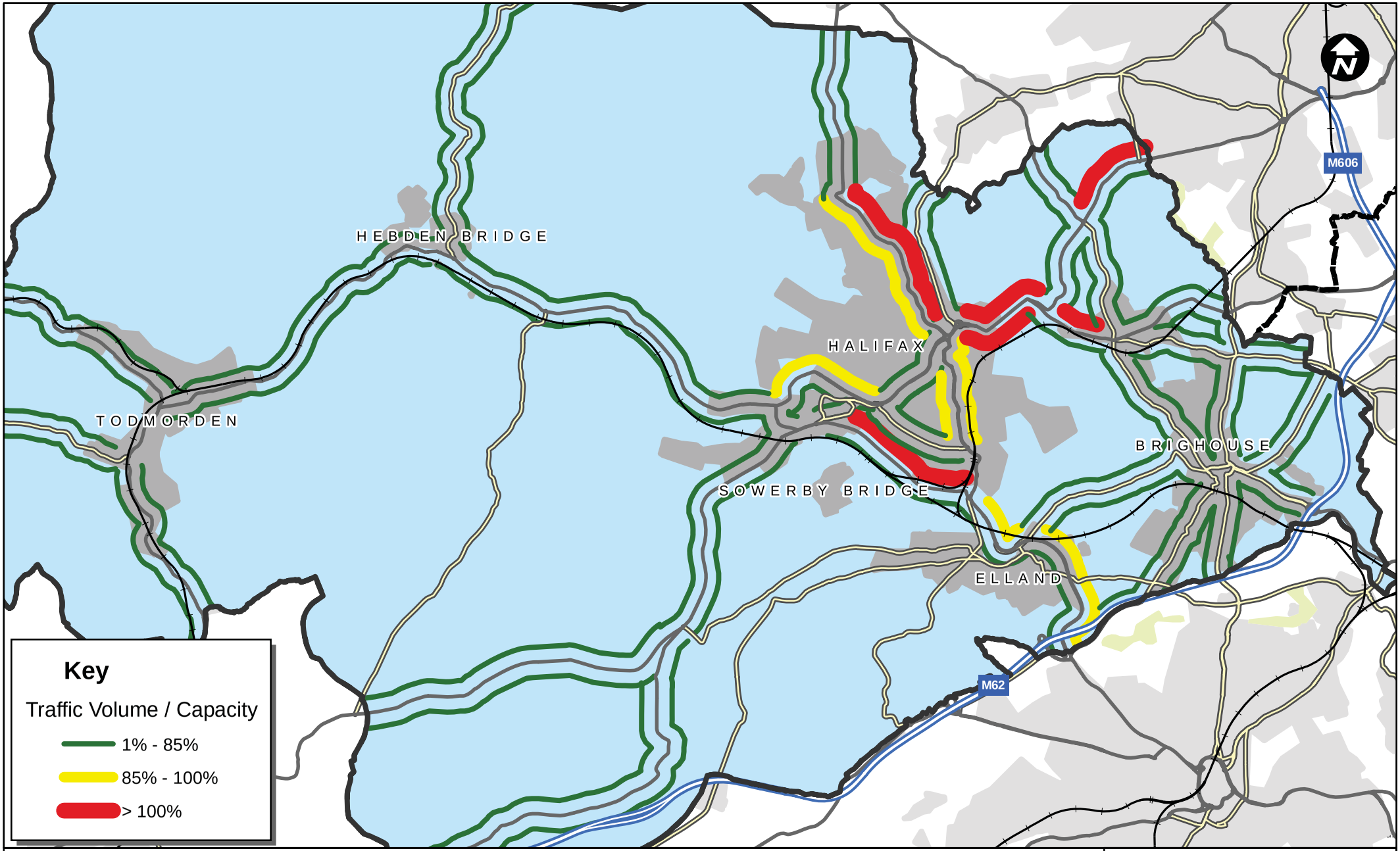

Calderdale LDF Study

Figure 5.20 Network Conditions: Traffic Volume / Capacity - Approach 2 AM

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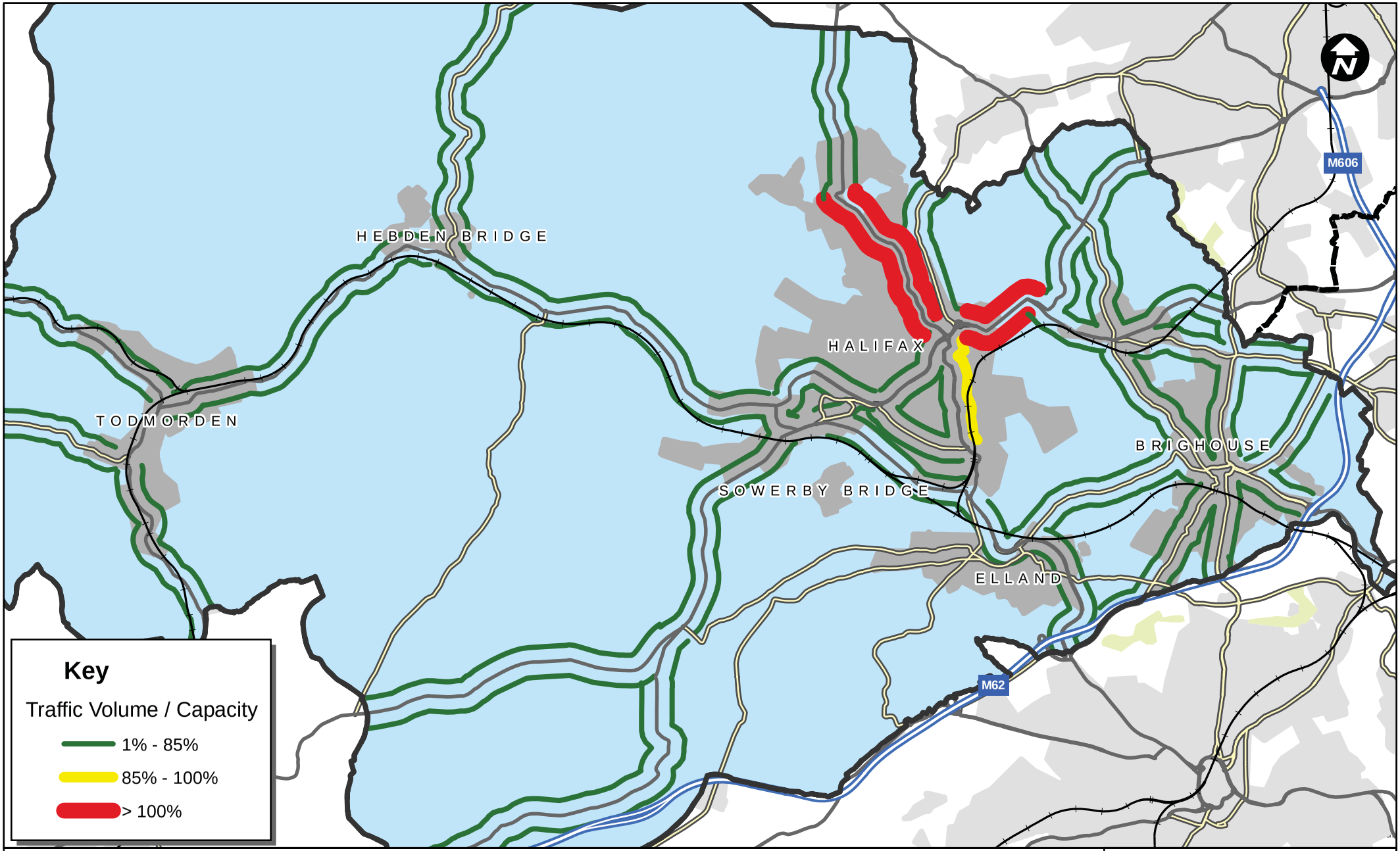

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Figure 5.21 Network Conditions: Traffic Volume / Capacity - Approach 2 PM

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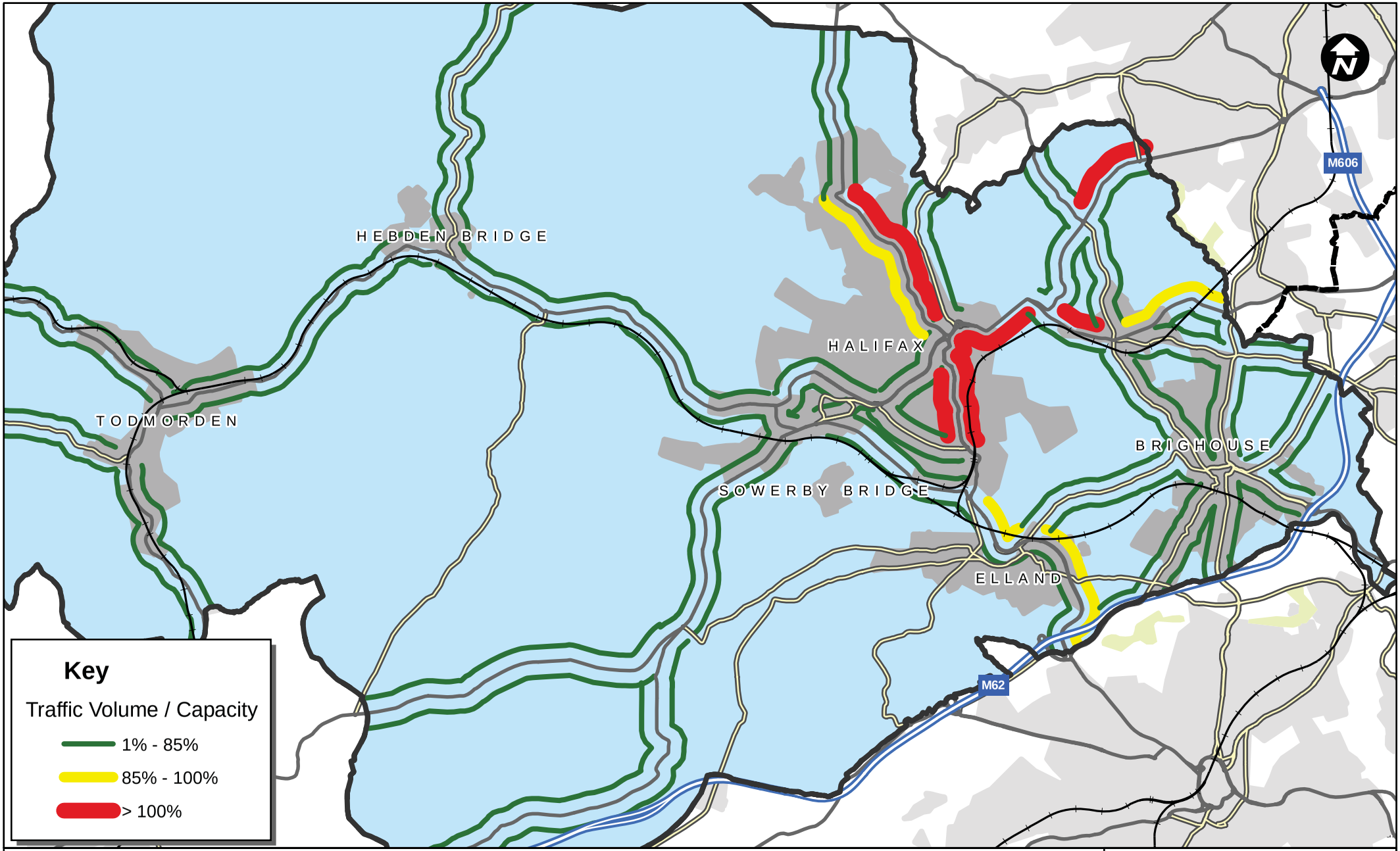

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Figure 5.22 Network Conditions: Traffic Volume / Capacity - Approach 3 AM

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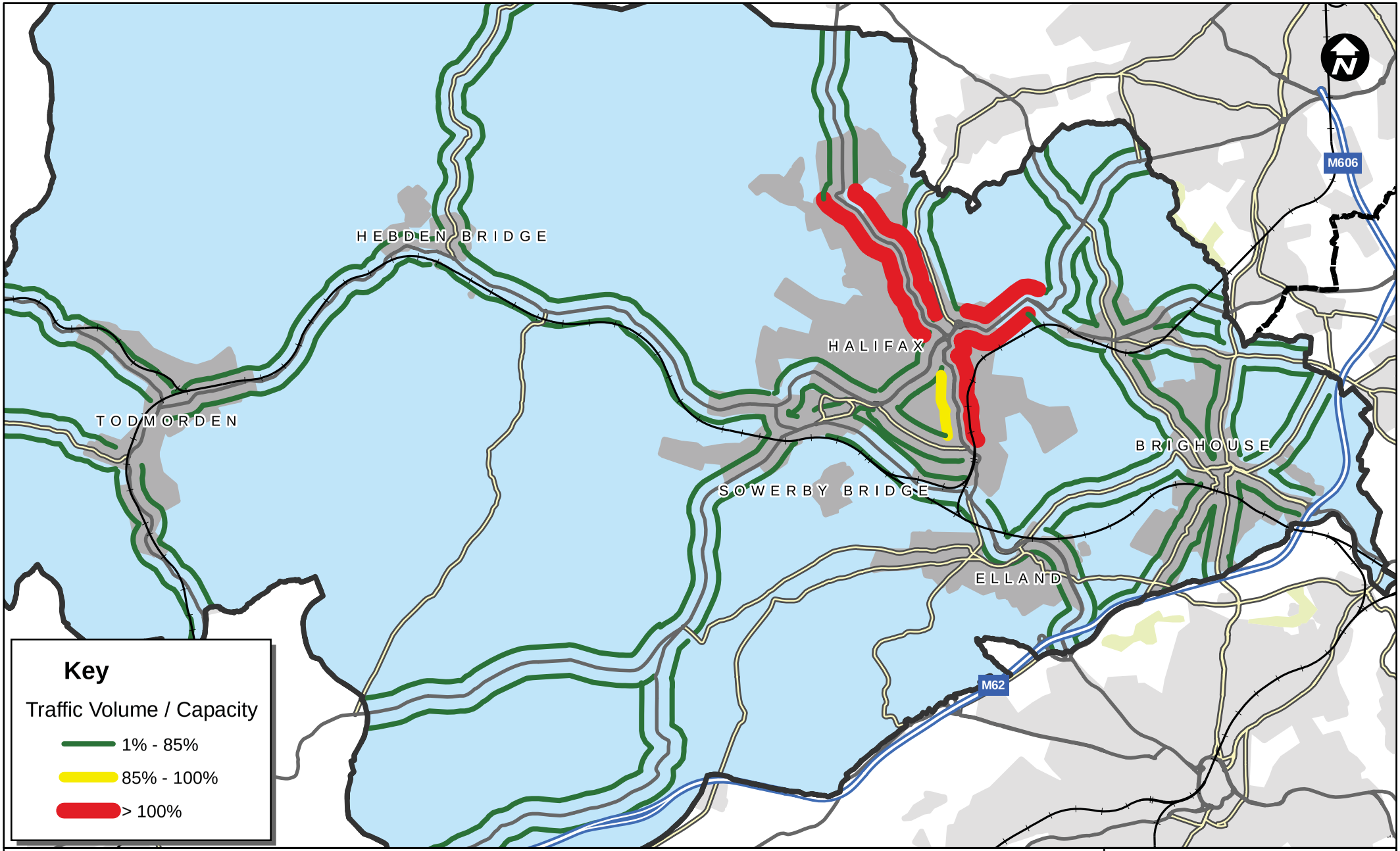

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Figure 5.23 Network Conditions: Traffic Volume / Capacity - Approach 3 PM

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Summary of Network Conditions

5.13 In this section we have summarised the main points regarding our forecasts of the effects of each Core Strategy approach on Calderdale's road network (as shown visually in the figures above).

Approach 1 Network Conditions

5.14 In Core Strategy Approach 1 development is focused in the eastern parts of Calderdale, particularly in Halifax, Sowerby Bridge, Brighouse, Elland, Shelf and Northowram. The NCM shows:

- Demand above link capacity on the A629 into northern Halifax (AM and PM);
- Demand above link capacity on the A629 between Halifax and Elland (AM only), close to capacity (PM);
- Demand close to link capacity on the A629 from Elland to the M62 (AM);
- Demand above link capacity on the A58 between Halifax, Stump Cross and Hipperholme (AM and PM);
- Demand above link capacity on the A6036 from Shelf to Bradford (AM only);
- Demand close to link capacity on the A6026 between Sowerby Bridge and Elland (AM only).

Approach 2 Network Conditions

5.15 In Core Strategy Approach 2 there is an enhanced role for development in Todmorden, however, there is still a significant focus on eastern parts of Calderdale, particularly in Halifax, Sowerby Bridge, Brighouse and Elland. The NCM shows:

- Demand above link capacity on the A629 into northern Halifax (AM and PM);
- Demand close to link capacity on the A629 between Halifax and Elland (AM and PM);
- Demand close to link capacity on the A629 from Elland to the M62 (AM);
- Demand above link capacity on the A58 between Halifax, Stump Cross and Hipperholme (AM and PM);
- Demand above link capacity on the A6036 from Shelf to Bradford (AM only).
- Demand above link capacity on the A6026 between Sowerby Bridge and Elland (AM only).
- Demand close to link capacity on the A646 between Luddendenfoot and Halifax (AM only).

Approach 3 Network Conditions

5.16 In Core Strategy Approach 3 development is apportioned between settlements much in line with their current size. As in all three approaches, there is a

significant focus on eastern parts of Calderdale, particularly in Halifax, Sowerby Bridge, Brighouse and Elland, but also a significant development in Todmorden. The NCM shows:

- Demand above link capacity on the A629 into northern Halifax (AM and PM);
- Demand above link capacity on the A629 between Halifax and Elland (AM and PM);
- Demand close to link capacity on the A629 from Elland to the M62 (AM only);
- Demand above link capacity on the A58 between Halifax, Stump Cross and Hipperholme (AM and PM);
- Demand above link capacity on the A6036 from Shelf to Bradford (AM only);
- Demand above link capacity on the A6026 between Sowerby Bridge and Elland (AM only).

Differences between the Core Strategy Approaches

5.17 The different approaches to locating Core Strategy development are very similar, driven by issues such as land availability and realistic chances of being taken forward. As such, the impacts on the road network can be expected to be broadly similar – and indeed that is what the network conditions model shows.

5.18 A number of impacts are common to all three Core Strategy approaches.

5.19 High demands and possible problems with link capacity are found in all three approaches on:

- the A58 between Halifax and Hipperholme;
- the A629 between Ovenden and north Halifax;
- the A629 between Halifax and Elland;
- the A629 outbound between Elland and the M62.

5.20 Additionally, there are some problems identified in only one or two of the approaches:

- Option 1: close to capacity on the A58 east of Hipperholme and towards the M62/M606 junction, and on the A6026 between Sowerby Bridge and Elland;
- Option 2: above capacity on the A6026 between Sowerby Bridge and Elland, and close to capacity on the A646 between Luddendenfoot and Halifax;
- Option 3: close to capacity on the A58 east of Hipperholme and towards the M62/M606 junction.

6 Appraising the Core Strategy Approaches

Introduction

6.1 An appraisal framework has been adapted from the one we used to appraise Core Strategy options in Bradford. This framework is informed by the New Approach to Appraisal and has indicators for wider benefits including Environment, Safety, Economy, Integration and Accessibility.

6.2 Our methodology for conducting the appraisal has necessarily been altered from that used in Bradford because there is no multi-modal transport model available for Calderdale.

Appraisal Framework Results

6.3 Where we have quantitative results, generally, we present them as % differences from the average of all three options. This is because our methodology has been developed to provide a comparison between Core Strategy approaches, not a robust assessment of, for example, future year link flows in Calderdale.

6.4 Negative % differences mean the approach performs better than the average of all three approaches, and *vice versa*. Small differences between approaches (up to +/- 10%) are probably not significant, given the nature of this modelling exercise.

Environment

6.5 To assess impact on the environment we have used a mixture of global and local indicators.

6.6 Globally, we assess the total number of additional vehicle kilometres travelled over the whole district due to new LDF traffic. This number is calculated in the NCM from link flow multiplied by link distance. Distance travelled is a relatively crude, but useful, proxy for overall environmental performance (the more distance travelled, the more fuel is used, and the more air pollutant emissions are released).

6.7 We also assess the total additional demand falling within the six Air Quality Management Areas in Calderdale.

6.8 Tables 6.1 and 6.2 show the environmental appraisal results for the morning and evening peaks respectively.

TABLE 6.1 CORE STRATEGY APPROACH APPRAISAL: ENVIRONMENT AM

Environment	Approach 1	Approach 2	Approach 3
Total Vehicle-KM	1%	1%	-2%
AQMA: Salterhebble	-3%	-2%	5%
AQMA: Sowerby Bridge	26%	-9%	-18%
AQMA: Hebden Bridge	2%	4%	-6%
AQMA: Luddendenfoot	0%	11%	-11%
AQMA: Stump Cross	-4%	-2%	6%
AQMA: Brighouse	4%	-8%	4%

TABLE 6.2 CORE STRATEGY APPROACH APPRAISAL: ENVIRONMENT PM

Environment	Approach 1	Approach 2	Approach 3
Total Vehicle-KM	-1%	3%	-2%
AQMA: Salterhebble	-1%	-5%	6%
AQMA: Sowerby Bridge	17%	-2%	-16%
AQMA: Hebden Bridge	-22%	25%	-3%
AQMA: Luddendenfoot	-4%	12%	-8%
AQMA: Stump Cross	-1%	-3%	4%
AQMA: Brighouse	3%	-6%	3%

6.9 In both the morning and evening peak there is no significant difference in environmental performance globally across the district between the three Core Strategy approaches. The results suggest slightly more vehicle km in approach 2 – related to the extra distance travelled by traffic to and from Todmorden.

6.10 There are differences evident in the impact on individual air quality management areas. For instance, Core Strategy approach 2 performs the worst in Luddendenfoot and Hebden Bridge – because of the additional traffic to and from Todmorden. However, the other approaches perform worst in other areas – again because of the relative location of LDF development in each approach.

Safety

6.11 Globally, we assess the total number of additional vehicle kilometres travelled over the whole district due to new LDF traffic. This number is calculated in the NCM from link flow multiplied by link distance.

6.12 This is the same measure as used for overall environmental performance, and again, is a crude but useful proxy for overall safety performance (the more distance is travelled in the district, then the higher the number of accidents there is likely to be).

6.13 Tables 6.3 and 6.4 show the safety appraisal results for the morning and evening peaks respectively.

TABLE 6.3 CORE STRATEGY APPROACH APPRAISAL: SAFETY AM

Safety	Approach 1	Approach 2	Approach 3
Total Vehicle-KM	1%	1%	-2%

TABLE 6.4 CORE STRATEGY APPROACH APPRAISAL: SAFETY PM

Safety	Approach 1	Approach 2	Approach 3
Total Vehicle-KM	-1%	3%	-2%

6.14 In both the morning and evening peak there is no significant difference in safety performance globally across the district between the three Core Strategy approaches. The results suggest slightly more vehicle km in approach 2 – related to the extra distance travelled by traffic to and from Todmorden.

Economy

6.15 To assess impact on the economy we have used a mixture of global and local indicators.

6.16 Globally, we assess the total number of links that are within capacity, close to capacity and over-capacity over the whole district due to new LDF traffic. This is a proxy measure of congestion and delay.

6.17 We also assess the total additional demand falling within the three corridors particularly important to the economic functioning of Calderdale.

6.18 Tables 6.5 and 6.6 show the economic appraisal results for the morning and evening peaks respectively.

TABLE 6.5 CORE STRATEGY APPROACH APPRAISAL: ECONOMY AM

Economy	Approach 1	Approach 2	Approach 3
CC: Huddersfield Road (A629)	1%	-2%	1%
CC: Burnley Road (A646)	-9%	13%	-4%
CC: A58 corridor	-4%	-2%	6%
No. Links <85% V/C	64	64	64
No. Links 85%<100% V/C	5	5	5
No. Links >100% V/C	7	7	7

TABLE 6.6 CORE STRATEGY APPROACH APPRAISAL: ECONOMY PM

Economy	Approach 1	Approach 2	Approach 3
CC: Huddersfield Road (A629)	2%	-2%	1%
CC: Burnley Road (A646)	-8%	11%	-2%
CC: A58 corridor	-1%	-3%	4%
No. Links <85% V/C	70	71	70
No. Links 85%<100% V/C	1	1	1
No. Links >100% V/C	5	4	5

6.19 In both the morning and evening peak there is no significant difference in economic performance globally across the district between the three Core Strategy approaches. The number of links under, close to and above capacity is effectively the same in all three approaches.

6.20 Each of the local economic corridors is worst impacted in a different one of the three Core Strategy approaches, related to the relative location of development in each approach.

Integration and Accessibility: Bus

6.21 We do not have quantitative results from the NCM to assess integration or accessibility numerically. Instead we have conducted a scoping assessment of the availability of public transport in the district, the potential for improvements, and the overall pattern of development in the three Core Strategy approaches.

6.22 Figure 6.1 shows the number of peak hour buses on the major links in Calderdale plotted in the NCM.

6.23 As can be seen, the western settlements in Calderdale are relatively poorly served in terms of numbers of bus services. However, services in the eastern parts of Calderdale are considerably better, and routes which may be characterised as well served are:

- A629 corridor from Ovenden into northern Halifax;
- A629 corridor from northern Halifax through Elland to Kirklees;
- A58 corridor from Sowerby Bridge through Halifax to Hipperholme;
- A647 corridor from Halifax to Queensbury;
- A6036 from Shelf to Bradford;
- A641 from Bradford through Brighouse to Kirklees.

6.24 The existing bus services operate in the corridors in eastern Calderdale that the NCM shows heavy future year demand on the road network, and we may expect operators to increase service frequencies to benefit from the increased demand in the urbanised areas.

6.25 There may be scope for lessening the impact on the road network in the eastern part of Calderdale by further improvements to the bus offer on the A629, A58 and A6036 corridors. We recommend cross-boundary working with Bradford and Kirklees to further improve the bus connectivity between the districts in these regions.

6.26 In particular, our recent work in Bradford has identified the A6036 corridor as being key to both Bradford and Calderdale's LDF aspirations, because both districts have development in the surrounding area. Our recommendations to Bradford included extra service provision on routes serving the Keighley-Haworth-Queensbury-Calderdale, and also on direct connections between central Bradford and Calderdale via the A6036.

6.27 Similarly, the A629 and A641 corridors between Calderdale and Kirklees will be key in providing connectivity between LDF development on both sides of the border. We do not currently know exactly where development in Kirklees will be, but it is likely that significant amounts will be in Huddersfield. Equally, there is significant development intended in Calderdale in Halifax, Brighouse, and in approaches 1 and 3 in Elland. Adequate and increased bus provision on the A629 and A641 will enable strengthening of the links between the two districts in terms of commuting and other economic activities.

6.28 Generally, there is a very good match between the possible development locations in the Core Strategy approaches, and the existing areas of good bus service provision in Calderdale.

6.29 However, this is not true in the western settlements. In Approach 2 significant development is intended for Todmorden, which is not currently well served by bus. If Approach 2 were to go forward, then we would recommend a more detailed examination of the A646 corridor linking Todmorden with Hebden Bridge and Halifax, and also the A6033 corridor linking Todmorden with Manchester. It may be possible to mitigate some of the impact of development on the road network by increased bus service provision on these routes.

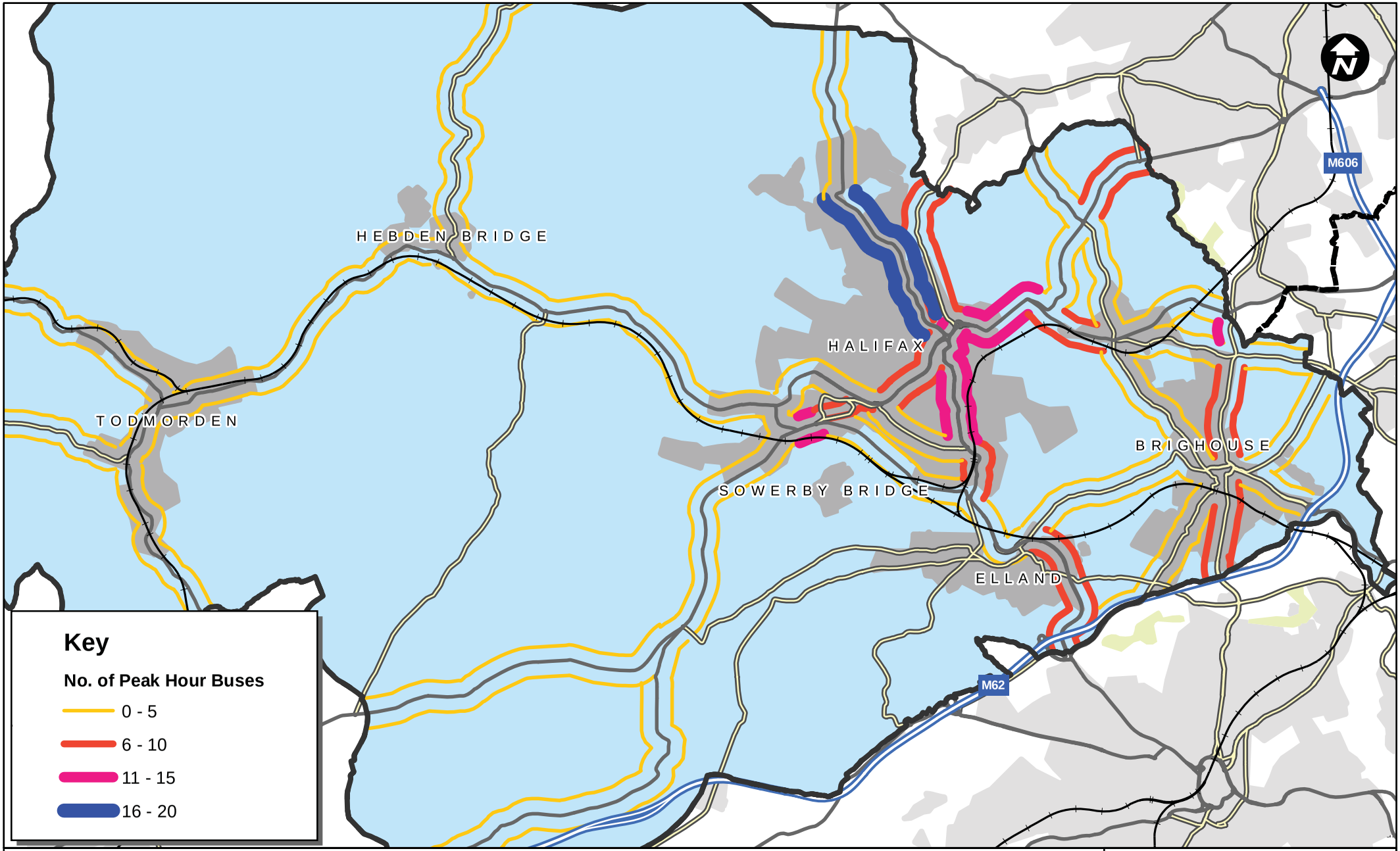
Integration and Accessibility: Rail

6.30 Most existing rail services in Calderdale are at capacity at peak times. Services to Manchester and to Leeds/Bradford are particularly stressed.

6.31 Generally, the potential development areas in the three approaches are sited well with regards to existing rail stations in the district. Assuming that capacity increases on the rail lines in the future are taken forward, then connectivity between the new development areas and Leeds, Bradford and Manchester will be good and will support commuting and other economic activity between the districts.

6.32 We have identified three rail issues for further consideration given the intended patterns of development in the Core Strategy approaches:

- Significant development in Elland would both support, and be supported by, the ongoing proposals for a new rail station and park-and-ride in that area. The projected highway capacity issues on the A629 could be mitigated to an extent by increased rail provision in the corridor;
- Northern parts of Halifax, the Shelf/Northowram corridor, and the Hipperholme area are not currently well served by rail. There is an opportunity to combine increased development in the area with bringing forward the plans for a new rail station at Hipperholme. Similarly to the A629 corridor, increased rail provision would mitigate capacity problems on the A58 corridor;
- The Halifax to Huddersfield rail service is slow and takes a circuitous route. Even so, future LDF development in both Kirklees and Calderdale may necessitate capacity increases on this line to service additional travel demand between the districts. The economic interdependence of the two districts is likely to increase significantly in the future with the intended LDF developments. Providing additional north-south rail connectivity and possibly examining whether a more direct line routing can be made will become increasingly attractive as the highway links become saturated.



Calderdale LDF Study

Figure 6.1 Network Conditions: Number of peak hour buses

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EJB	02/02/2010	

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7 Conclusions

Comparison of the Three Core Strategy Spatial Approaches

7.1 None of the three spatial approaches tested is significantly better or worse in comparison to the other approaches;

7.2 Localised impacts (such as increased potential emissions in Air Quality Management Areas), which depend on exact locations of development, do vary significantly between approaches. If particular localised issues are deemed important, then it may be necessary to consider spatial approaches which avoid worsening impacts in those areas;

7.3 Whichever approach, or whichever parts of the different approaches are combined, are taken forward into the Preferred Option will cause significant local impacts on the transport network which will require mitigation in terms of improved public transport provision and in some cases improvements to the highways network;

7.4 High demands and possible problems with link capacity are found in all three approaches on:

- the A58 between Halifax and Hipperholme;
- the A629 between Ovenden and north Halifax;
- the A629 between Halifax and Elland;
- the A629 outbound between Elland and the M62.

7.5 Additionally, there are some problems identified in only one or two of the approaches:

- Approach 1: close to capacity on the A58 between Hipperholme and the M62/M606 junction, and on the A6026 between Sowerby Bridge and Elland;
- Approach 2: above capacity on the A6026 between Sowerby Bridge and Elland, and close to capacity on the A646 between Luddendenfoot and Halifax;
- Approach 3: close to capacity on the A58 between Hipperholme and the M62/M606 junction.

7.6 Generally, there is a very good match between the possible development locations in the Core Strategy approaches, and the existing areas of good bus service provision in Calderdale.

7.7 There are opportunities for cross-boundary bus solutions with Bradford and Kirklees to service future development on the A6036, A629 and A641 corridors between the districts.

7.8 Generally, the potential development areas in the three approaches are sited well with regards to existing rail stations in the district. Opportunities exist to combine increased development in the Elland and Hipperholme areas with new rail stations at those locations.

Recommendations for the Preferred Option and Beyond

7.9 Transport is only one consideration for the development of a Preferred Option for spatial development in Calderdale. All three potential approaches tested in this study have strengths and weaknesses in terms of transport, but we did not find any issues that make any option significantly better or worse than the others. We can therefore conclude that transport will not be the defining factor in developing the Preferred Option.

7.10 However, that is not to say transport will not be important to the Preferred Option; a sustainable and integrated transport strategy, infrastructure delivery plan, and long term vision for transport in Calderdale will be vital to ensuring that the future aspirations of the district are reached.

7.11 The existing highways in Calderdale are currently congested at peak times. On some routes, particularly the A58 through Stump Cross and Hipperholme, there is congestion and significant delay even in some off-peak hours.

7.12 The topography and constraints on available land in Calderdale make it unlikely that significant provision of additional highway infrastructure would be possible, even if desirable in the future.

7.13 Our view is that the increased demand for transport resulting from LDF development will result in two possible scenarios:

- Business-as-usual transport provision: the highway network will become increasingly congested, and connectivity across Calderdale, and between Calderdale and the surrounding districts will be reduced, with significant delays hindering economic and other activity. Environmental and safety impacts will be severe;
- Sustainable transport provision: the highways network will become increasingly congested, but in an environment whereby non-car mode accessibility has been aggressively enhanced, even at the expense of existing road capacity for private vehicles. The resultant increased demand for public transport will in turn make enhanced services and infrastructure economically viable.

7.14 To achieve the second of these scenarios a shift in thinking will be required in the district; both in the council and in the populace. Even without the recent economic crisis, it was very unlikely that significant funding would have been made available from central or regional government for new transport infrastructure.

7.15 The emphasis has very much shifted towards local solutions, developer led funding, and demand management for a more sustainable future. Necessity (through a squeeze in government spending) will eventually dictate that all local authorities adopt such an approach. We suggest that there is an opportunity, and a need, to put Calderdale at the forefront of sustainable thinking to solve the transport problems that will be created by future development targets.

7.16 We have a number of general recommendations as to how this may be achieved:

- Bus priority measures: bus journey times across Calderdale and to/from other districts currently suffer because of delays and congestion on the highways.

Without addressing this issue, even in a future of severe highway congestion, people will continue to prefer to sit through the delays in their cars than sit on buses. Bus journey times must be improved relative to cars by prioritising roadspace for bus use;

- In parallel with general bus priority measures, it may be possible, in association with METRO, to implement Quality Bus Contracts on particular routes, in order to rationalise service provision and control pricing on strategically important corridors (such as those to/from Bradford and Kirklees), and to increase service provision on less profitable corridors (such as to/from western Calderdale);
- For some journeys within Calderdale, but particularly to increase connectivity with other districts, improvements to rail service provision will be vital. Both capacity increases and the new stations at Elland and Hipperholme will be necessary in the medium-to-long term to satisfy the demand for longer distance trips;
- Currently it is cheaper to use a car than public transport for many journeys in Calderdale. Cheap and freely available parking, combined with high bus fares, sends out the perverse signal that car is a better option than public transport. It will be vital to implement demand management measures such as punitive parking charges and limited availability of parking spaces to reduce car use. Parking strategies can be targeted at reducing car mode share for specific journey types, such as commuting, which require long-stay parking, whilst not penalising retail activity by improving availability and pricing of short-stay spaces. Parking is an emotive issue however, and politically, it can be difficult to implement radical changes in policy;
- A stronger emphasis on sustainable communities will be necessary as part of the planning and development control process in Calderdale. Measures to reduce travel demand, by appropriate siting of housing, employment and service development, will play a role in ensuring future sustainability. Smarter Choices, such as personalised travel planning, can further reduce travel demand and increase modal shift to sustainable modes.

7.17 We have a number of specific recommendations for consideration as the Preferred Option is developed:

- Development in western Calderdale will need to be well-supported by increased public transport provision. Significant development in this area will cause impacts on the A646 which are difficult to mitigate by providing additional highway capacity because of the topography and character of the area.
- As the Preferred Options of both Calderdale and Kirklees emerge, there will undoubtedly be a need for a detailed investigation into how to satisfy future year demand increases on the A629 corridor linking northern Halifax, Elland and Kirklees. Although currently well served by bus and road, rail provision is relatively poor.
- Equally, as the Preferred Options of both Calderdale and Bradford emerge, detailed investigations into the A6036 corridor linking Halifax, Shelf/Northowram, Queensbury and Bradford will be needed. We recommend

that bus solutions are sought for this corridor and for the other corridors linking the two districts.

- If significant development in northern Halifax along the A629 corridor goes ahead, then in addition to public transport improvements, it may be necessary to consider providing linkage between the A629 and the A647, to service increased transport demand between northern Halifax and new employment development in Bradford. Currently, cars and buses to/and from Bradford have to either take a circuitous route via the A629 and then the Thornton Road, or travel into the congested junctions in central Halifax to access the A647 or A58 routes to Bradford.
- The A58 between Halifax and Hipperholme, linking the district with the motorway network, will be increasingly stressed, whatever the spatial arrangement of future development. Highways improvements on this corridor are difficult – again because of the topography and character of the area, so increased public transport provision will be key to ensuring future travel demands can be serviced.

7.18 This study has used a relatively 'coarse' methodology to provide early indications of the transport issues surrounding Core Strategy development in Calderdale in the future.

7.19 Once the SATURN model of the district becomes available, it will be possible to test the emerging Preferred Option in much more detail, and to appraise the Preferred Options performance more thoroughly and provide quantitative information on environmental, safety and economic impacts. Additionally, the new model will also be useful to investigate issues such as junction capacity on the road network, and feed into the infrastructure delivery plan. Outputs from this study, such as the future year demand scenarios, can be relatively easily adapted for input into the SATURN model.

7.20 However, as indicated, there would also be benefits in more detailed studies in specific corridors such as the A629, A58 and A6036 – maybe using a micro-simulation approach – into providing, for instance, improved highway capacity and improved priority for bus services.

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