



# > Waltham Forest Strategic Infrastructure Plan Transport Infrastructure Needs Assessment

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## GLOSSARY

Acronym/Abbreviation	Definition
AAP	Area Action Plan
AWT	Average Waiting Time
CP4	Control Period 4
EDF	Equivalent Doorstep Frequency
GLA	Greater London Area
GLA	Greater London Authority
HLOS	High Level Output Statement
LB	London Borough
LCN+	London Cycle Network
LDF	Local Development Framework
LIP	Local Implementation Plan
LU	London Underground
MTS	Mayor's Transport Strategy
NR	National Rail
NRWP	Non-resident Workforce Population
O-D	Origin-Destination
PIXC	Passenger in Excess of Capacity
POI	Point of Interest
PPP	Private Public Partnership
PTAL	Public Transport Accessibility Level
RUS	Route Utilisation Strategies
SVD	Selective Vehicle Detection
SWT	Scheduled Waiting Time
TBC	To be confirmed
TfL	Transport for London
UDP	Unitary Development Plan

## **1. INTRODUCTION**

### **1.1 Purpose and Scope**

Waltham Forest is a densely populated London borough covering an area of 38km<sup>2</sup> with a population of over 226,000. It is a dynamic and ethnically diverse borough in the North East of London. The area is at the confluence of a number of social, economic and environmental opportunities, being part of the Lea Valley, the London-Stansted-Cambridge corridor and in strategic proximity to the Olympic Development Opportunity Area.

The Sustainable Community Strategy sets out that the key to a successful future for the borough is increasing the prosperity of all its residents. Jobs, the relevant skills and good access to them, are the priority. Our Place in London sets out what the Council needs to do and how increasing prosperity will change life in the borough for the better. In summary, the Council's ambition for the future is that:

1. The borough is vital to London's success, particularly relating to the legacy of the Olympics and Stratford City
2. People aspire to live here
3. All its children are happy, resilient and successful
4. None of its residents live in poverty
5. Vulnerable people get the support they need
6. It is the greenest borough in London

The predicted increase in London Borough of Waltham Forest's (hereafter referred to as 'LB Waltham Forest') population and housing provisions over the next 20 years, as determined by the Greater London Authority, will create increased pressure on the existing infrastructure within the borough and will in turn generate a need for the provision of further green, physical and social infrastructure.

In order to be genuinely sustainable, the anticipated housing and employment growth will need to be supported by the timely delivery of the necessary infrastructure. Strategic infrastructure, including transport and utilities will be needed, as well as more localised social infrastructure, such as schools, healthcare services and community facilities including police and emergency services.

As such, this Strategic Infrastructure Plan assesses these needs and has been developed through a process of collaboration with the Council and the Local Strategic Partners. This study sets out the infrastructure capacity and future needs for the borough. The plan will be utilised to inform land use and growth allocations in the Local Development Framework (LDF).

This technical report is part of the Waltham Forest Strategic Infrastructure Plan. The purpose of this report is to identify the transport infrastructure needs of the London Borough of Waltham Forest over the period 2009 to 2026.

The report supports the principals and priorities in the *Core Strategy: Issues and Options* Development Plan Document, which outline the challenges and requirements in which Waltham Forest Council will work to ensure the provision of facilities and services for the community. Social infrastructure is an important element to address when assessing the increase in population up to 2026.

For the purposes of this report, transport infrastructure includes:

- Overground rail lines, stations and capacity
- London Underground (LU) rail lines, stations and capacity
- Highways
- Bus services, routes and physical infrastructure
- Public realm in, around and connecting transport interchanges
- Cycle ways

## 1.2 Research Methods

This report has been prepared as a technical study and is a desktop review of published sources of information, information provided by phone interviews and meetings with service and infrastructure providers and agencies, and additional written information provided by those agencies.

### **Growth Scenarios**

The LDF process sets out how new development will be planned for and managed over the next 15 years. However, for consistency with the London Plan, LB Waltham Forest will plan forwards to 2026. To ensure that the assessment of infrastructure requirements is as robust as possible, forecasts for development have been divided into two five-year development periods to 2019 and one seven year development period extending to the planning horizon of 2026. As there is a greater level of uncertainty of the precise nature of development post 2019 it is not as important to apply the five-yearly phasing framework from this point on.

This study uses two growth scenarios:

- The lower growth scenario is based on the 2008 London Plan's housing target for Waltham Forest of 665 new homes per annum
- The higher growth scenario tests the impacts of a greater level of growth in Waltham Forest to understand the impact on associated infrastructure requirements. In consultation with the Council this has been set at 1,251 new homes per annum.

The lower growth scenario will inform the next stage of the LDF process, whereas the higher growth is a test of the upper parameters of possible housing development. **Table 2-3** presents the two housing development scenarios.

**Table 1-1: New Housing Projections by Sub-area, 2009-2026**

Sub-area	2009-2014		2014-2019		2019-2026		2009-2026	
	L	H	L	H	L	H	L	H
Northern WF	224	224	245	745	656	656	1,125	1,625
Central WF	1,916	1,916	2,196	2,446	2,982	3,132	7,094	7,494
Blackhorse Lane	384	1,763	377	1,460	140	140	902	3,364
Southern WF	921	1,311	627	2,699	742	4,768	2,290	8,778
<b>Total</b>	<b>3,445</b>	<b>5,214</b>	<b>3,445</b>	<b>7,350</b>	<b>4,520</b>	<b>8,696</b>	<b>11,410</b>	<b>21,260</b>

Source: 2008 Round Demographic Projections, 2009 (GLA DMAG) background tables<sup>1</sup>, Waltham Forest Council

**Sub Areas**

In planning infrastructure for growth, PPS12 confirms that it is often relevant to consider the location of growth and relative issues of growth in different locations. Accordingly, this report examines demand for facilities for facilities principally at a sub-area level to ascertain where, and what types of infrastructure, will be required in the context of Waltham Forest’s pattern of growth and the phased development trajectory.

We have divided the borough up into four sub-areas, determined largely by urban character and locations for major new housing development. The sub-areas loosely follow ward boundaries. There are three main character areas in Chingford to the north (Northern Waltham Forest), Walthamstow centre (Central Waltham Forest) and Leyton to the south-east (Southern Waltham Forest). Blackhorse Lane to the west of Walthamstow town centre is a focus for significant regeneration<sup>2</sup>.

It should be noted that while demand can be tracked to certain sub-areas, because of economies of scale in making provision for transport infrastructure and also because certain types of infrastructure have naturally-occurring extensive catchment areas, provision can be best made at sub-area, borough-wide or even supra-borough (i.e. sub-regional or metropolitan) levels. Where appropriate, the recommendations made in this report reflect this.

**Figures 1-1** and **1-2** show the development trajectories for the borough. They also includes changes projected in the supply of commercial office, industrial space (from the *Waltham Forest Employment Land Review 2009*, URS), retail space (*Waltham Forest*

<sup>1</sup> The housing trajectory for Waltham Forest is estimated by sub-area by applying the Council’s expected locations and quantum of growth to the figures.

<sup>2</sup> Further detail of how the growth areas and sub-areas have been defined is provided in the *Waltham Forest Infrastructure Study: Executive Summary and Strategic Infrastructure Plan*

*Retail and Leisure Study 2009*, Nathan Litchfield and Partners) and the likely employment resulting from these changes.

Figure 1-1: Waltham Forest's Development Trajectory, 2009 to 2026, Lower Growth Scenario

Waltham Forest 2009 - 2026 Lower Growth Trajectory

NORTHERN WALTHAM FOREST				
	2009 - 2014	2014 - 2019	2019 - 2026	Total (2009-2026)
	224	245	656	1,125
	280	338	1,318	1,936
	0	0	0	0
	-5,647	5,647	-7,906	-19,200
	4,790	7,260	9,984	22,034
	-47	36	87	76

TOTAL BOROUGH				
	2009 - 2014	2014 - 2019	2019 - 2026	Total (2009-2026)
	3,445	3,945	4,520	11,910
	5,787	7,140	7,282	20,209
	+15,243	+15,243	+15,243	+21,340
	-23,177	-23,177	-23,177	-32,447
	16,413	23,768	34,030	74,212
	926	1,228	1,750	3,904

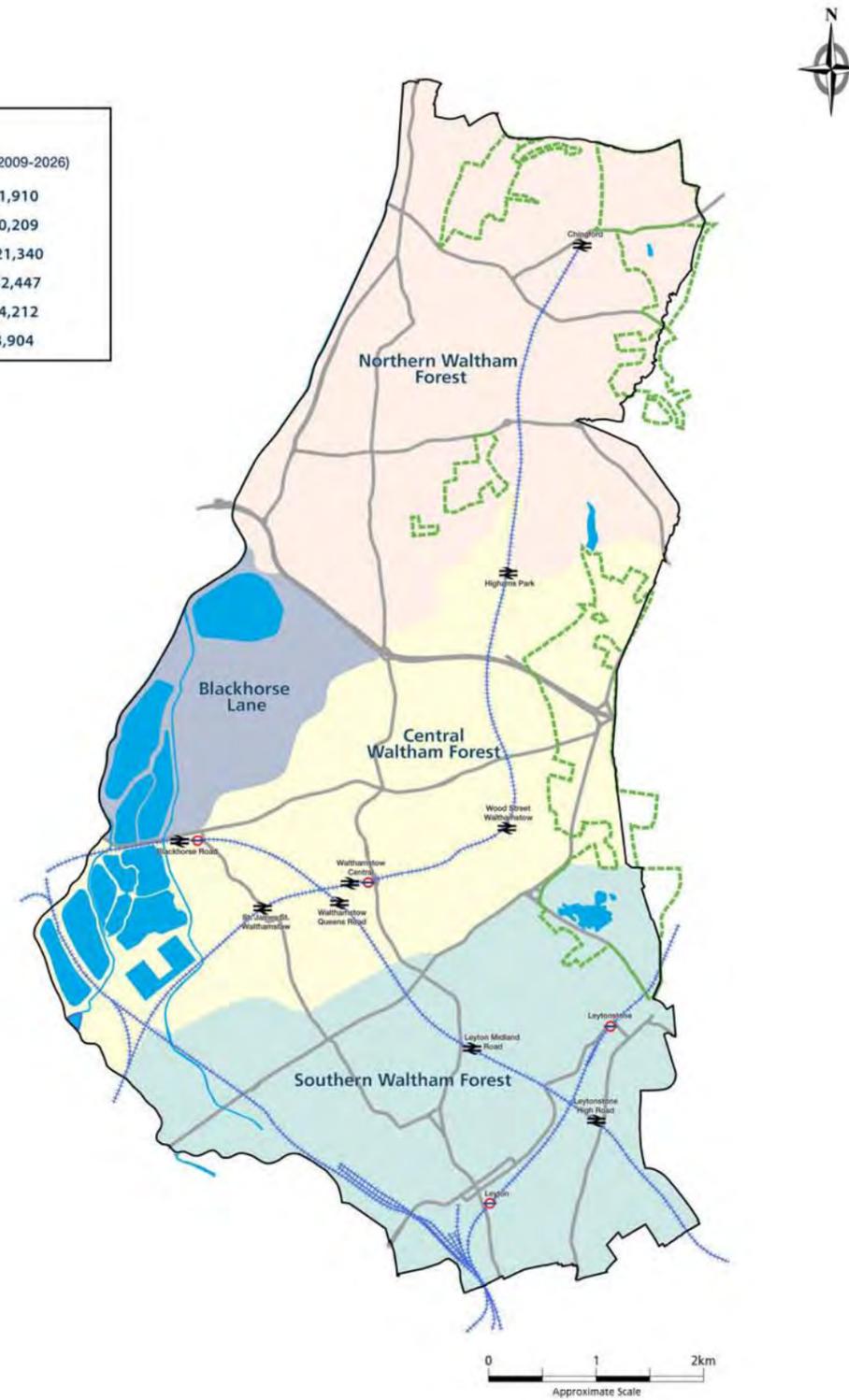
BLACKHORSE LANE				
	2009 - 2014	2014 - 2019	2019 - 2026	Total (2009-2026)
	384	377	140	902
	738	719	-43	1,413
	+2,338	+2,338	+3,274	7,950
	-9,647	-9,647	-13,506	32,800
	0	0	0	0
	-98	-98	-138	-334

CENTRAL WALTHAM FOREST				
	2009 - 2014	2014 - 2019	2019 - 2026	Total (2009-2026)
	1,916	2,196	2,982	7,094
	2,994	3,752	5,005	11,751
	+2,868	+2,868	+4,015	9,751
	-2,824	-2,824	-3,953	3,953
	9,157	12,026	16,882	38,064
	458	576	808	1,843

SOUTHERN WALTHAM FOREST				
	2009 - 2014	2014 - 2019	2019 - 2026	Total (2009-2026)
	921	627	742	2,290
	1,775	979	1,002	3,756
	+10,037	+10,037	+14,051	34,125
	-5,059	-5,059	-7,082	-7,082
	2,467	4,483	7,164	14,114
	613	714	992	2,318

**LEGEND**

	London Underground Stations		Dwellings (units)
	Railway Stations		Population
	Railway		Commercial Office (gross m <sup>2</sup> )
	A-roads		Industrial (gross m <sup>2</sup> )
	Green Spaces		Retail (gross m <sup>2</sup> )
	Lakes / Ponds / Reservoirs		Jobs (number)



Source Based on Joint analysis by London Borough of Waltham Forest and URS Corporation

Figure 1-2: Waltham Forest's Development Trajectory, 2009 to 2026, Higher Growth Scenario

Waltham Forest 2009 - 2026 Higher Growth Trajectory

NORTHERN WALTHAM FOREST				
	2009 - 2014	2014 - 2019	2019 - 2026	Total (2009-2026)
	224	745	656	1,625
	280	1,691	1,318	3,290
	0	0	0	0
	-5,647	-5,647	-7,906	-19,200
	4,790	7,260	9,984	22,034
	-47	36	87	76

TOTAL BOROUGH				
	2009 - 2014	2014 - 2019	2019 - 2026	Total (2009-2026)
	5,214	7,350	8,696	21,260
	10,575	16,356	18,584	45,515
	+15,243	+15,243	+15,243	+21,340
	-23,177	-23,177	-23,177	-32,447
	16,413	23,768	34,030	74,212
	926	1,228	1,750	3,904

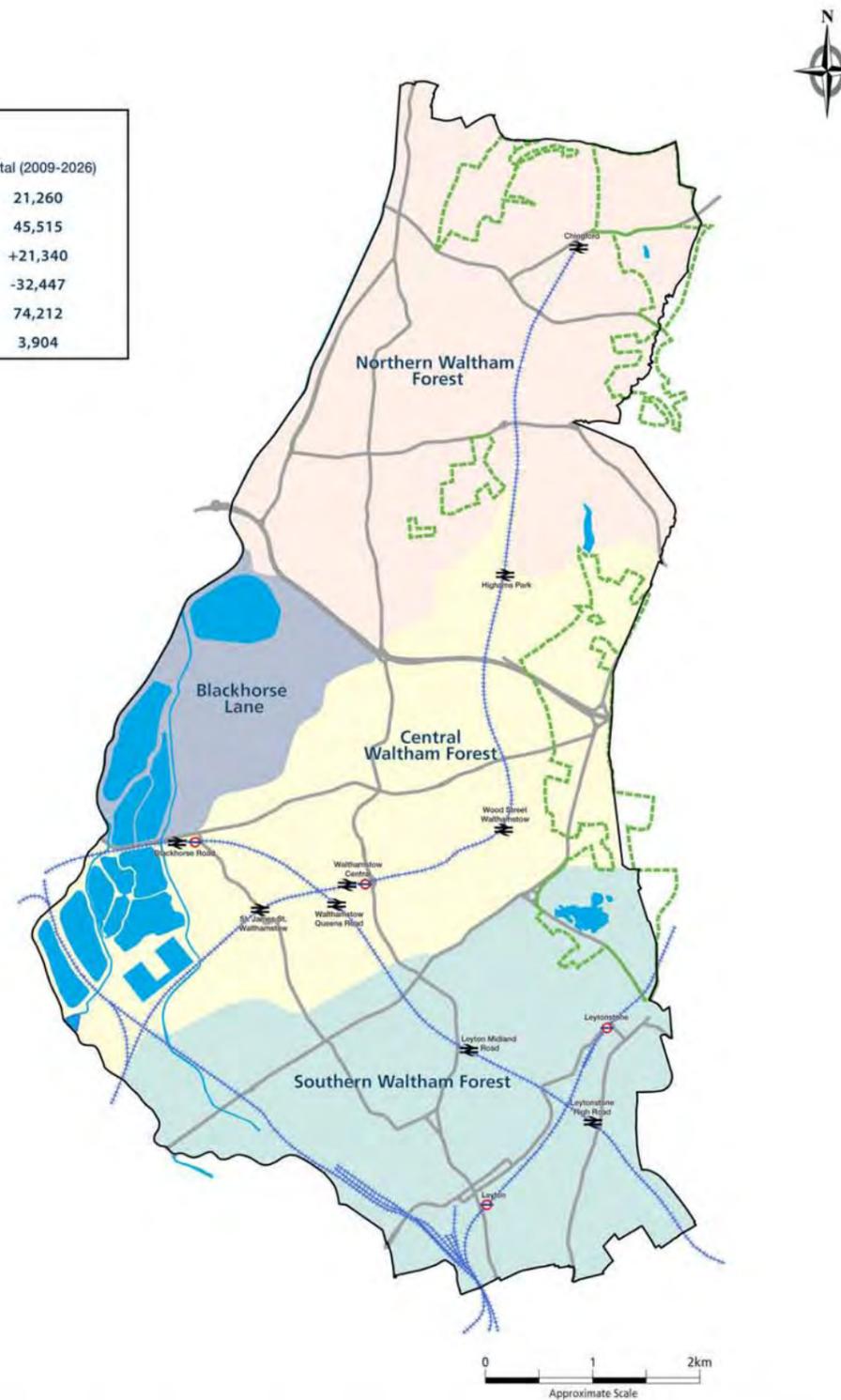
BLACKHORSE LANE				
	2009 - 2014	2014 - 2019	2019 - 2026	Total (2009-2026)
	1,763	1,460	140	3,364
	4,470	3,650	-43	8,076
	+2,338	+2,338	+3,274	7,950
	-9,647	-9,647	-13,506	32,800
	0	0	0	0
	-98	-98	-138	-334

CENTRAL WALTHAM FOREST				
	2009 - 2014	2014 - 2019	2019 - 2026	Total (2009-2026)
	1,916	2,196	3,132	7,494
	2,994	3,752	5,411	12,834
	+2,868	+2,868	+4,015	9,751
	-2,824	-2,824	-3,953	3,953
	9,157	12,026	16,882	38,064
	458	576	808	1,843

SOUTHERN WALTHAM FOREST				
	2009 - 2014	2014 - 2019	2019 - 2026	Total (2009-2026)
	1,311	2,699	4,768	8,778
	2,831	6,586	11,898	21,315
	+10,037	+10,037	+14,051	34,125
	-5,059	-5,059	-7,082	-7,082
	2,467	4,483	7,164	14,114
	613	714	992	2,318

**LEGEND**

London Underground Stations	Dwellings (units)
Railway Stations	Population
Railway	Commercial Office (gross m <sup>2</sup> )
A-roads	Industrial (gross m <sup>2</sup> )
Green Spaces	Retail (gross m <sup>2</sup> )
Lakes / Ponds / Reservoirs	Jobs (number)

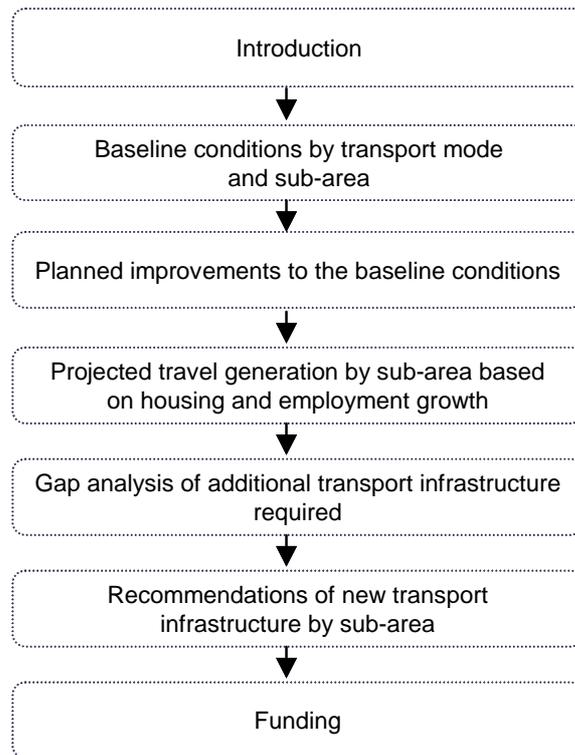


Source Based on Joint analysis by London borough of Waltham Forest and URS Corporation

### 1.3 Report Structure and Approach

The report follows a sequential approach to establishing the evidence base for the recommendations, as shown in **Figure 1-2**:

**Figure 1-2 Report Structure Illustrating the Approach**



- **Section 2** examines the baseline conditions of the current transport infrastructure in the borough. This analysis is summarised by sub-area.
- **Section 3** identifies the investment and improvements to the current transport infrastructure in the pipeline and examines the effect this will have on improving the future capacity of the system.
- **Section 4** models the additional traffic that is likely to be generated under both the lower and higher housing development scenarios. The numbers also incorporate changes to the employment structure projected in the borough.
- **Section 5** proposes transport infrastructure solutions to identified deficiencies in the system given the current baseline and projected increase in patronage.
- **Section 6** examines the range of funding sources available to the Council to pay for the proposed infrastructure.

## 2 TRANSPORT INFRASTRUCTURE ASSESSMENT

### 2.1 Introduction

Waltham Forest faces several challenges as it seeks to provide high quality transport services for its residents, workers and the many who pass through the borough. Much of this travel and associated infrastructure are outside the direct control of the authority. However, Waltham Forest is still charged with the responsibility for ensuring that all transport services are adequate and sufficient to support new developments, especially in designated growth areas.

The following assessment follows an approach that is based on:

- Identifying existing travel patterns of the workforce population of the borough
- The location of future growth areas within the borough and areas of employment opportunities available to the workforce population of the borough
- Understanding the existing transport infrastructure assets
- Identifying the planned infrastructure provisions together with the current and planned future capacity of that infrastructure
- Identifying the predicted gaps in future infrastructure provision given assumed levels of growth and funding plans.

**Section 2.2** examines the existing travel patterns and baseline conditions in the borough by mode, this forming the basis for future assessments and transport infrastructure gap analysis. This is followed by a review of growth assumptions, focusing especially on the designated growth areas identified within the Waltham Forest Core Strategy and Growth Area Programme of Development, and the areas of opportunity identified within the current and emerging policies of the London Plan.

**Sections 3, 4 and 5** consider the planned transport investment programmes and assess how these meet assumed growth in travel, both generally within the borough and specifically by area or corridor. Finally, gaps in the supply of transport infrastructure where planned provision fails to provide for future needs are identified and future funding priorities recommended addressing the gaps so determined for the growth projections.

### 2.2 Baseline Conditions

Baseline travel conditions within Waltham Forest have been assessed for each mode of travel for the four sub-areas identified namely Northern WF, Central WF, Blackhorse Lane and Southern WF. This forms the basis for an assessment of future needs and areas where there may be gaps in infrastructure provision.

A fundamental informant for the baseline, and future needs assessment, is an understanding of the existing travel demand and the travel patterns by mode, origin and

destinations undertaken by the population of Waltham Forest. The 2001 Census data being used to facilitate such understanding and to assess the travel demands by mode likely to be generated from the growth projections

### 2.2.1 Existing Travel Patterns

In 2007 there were approximately 146,500 working age residents in Waltham Forest, which accounts for 65.9% of the population. Of working age residents 111,500 (73.5%) were economically active with 101,400 people in employment and 9,400 people unemployed. This is slightly below the economic activity rate for London (75.7%). There are relatively low proportions of people working from home in Waltham Forest. According to Census 2001 6.9% of those people in employment worked mainly from home, which is below the rate for London of 8.3%.

The 2001 Census data includes details of journeys to work by mode of travel and data has been extracted for travel to jobs located in Waltham Forest (inbound) and travel to jobs by Waltham Forest residents (outbound). Data obtained from the 2001 journey to work Census identified a total resident workforce population within Waltham Forest of 97,680 people economically active, and a total non-resident workforce population within Waltham Forest of 25,970 people economically active. The 2001 population of 97,680 economically active people resident within Waltham Forest undertaking work related trips, with 6.9% economically active people resident within Waltham Forest not making work related trips, is comparable with the 111,500 economically active resident population quoted in 2007.

**Table 2-1** shows the modal characteristics of inbound and outbound journeys to work as determined from the 2001 Census. As can be seen from **Table 2-1**, the greater proportion of journeys to work associated with Waltham Forest were undertaken by car either as a driver or passenger, 51.3% of total trips inbound and 32.8% of total trips outbound, as compared with total public transport trips, 22.1% of total trips inbound and 46.4% of total trips outbound. However, it is pertinent to note that there are a greater proportion of outbound trips by public transport modes by the resident workforce population of Waltham Forest, 46.4%, as compared to outbound trips by car, 32.8%, conversely, there are a greater proportion of inbound trips by car mode by the non-resident workforce population of Waltham Forest, 51.3%, as compared with 32.8% inbound trips by public transport modes. Due to the relatively high level of car usage for work related trips by both the resident and non-resident working population of Waltham Forest, further analysis of the 2001 Census data was undertaken to determine likely reasons for the proportion of work related trips by car.

It should be noted that car-borne journeys into London as derived from the 2001 Census data, may be subject to subsequent external influence by the introduction of the central and western extension congestion charge zones. However, it is considered that the central zone boundary is sufficiently removed from Waltham Forest and the destinations within the congestion charge zones historically highly accessible by public transport modes from Waltham Forest that the results derived from the assessment of the 2001 Census data would still be considered to represent the travel patterns for Waltham Forest.

**Table 2-1: Journey to Work Modal Share for Waltham Forest (2001)**

Mode	Trips to Jobs in	
	Waltham Forest by Non-Residents	Trips to Jobs by Waltham Forest Residents
Workforce Population	25,970	97,680
London Underground	6.7%	27.6%
National Rail	4.2%	9.3%
Bus	11.2%	9.5%
Car (driver and passenger)	51.3%	32.8%
Taxi	1.1%	1.12%
Motorcycle	1.0%	1.2%
Bicycle	1.8%	1.8%
Walk	11.2%	7.1%
Other	0.4%	0.3%

*Source: Office for National Statistics 2001*

**Table 2-2** presents the journey to work mode share by geographical distribution between outbound trips originating from Waltham Forest with destinations within the Greater London area (GLA), excluding Waltham Forest, and destinations to the rest of the UK. Similarly for inbound trips with their destination in Waltham Forest but with their origin within the GLA excluding Waltham Forest, and origins within the rest of the UK.

It is clear from **Table 2-2** that the greater proportion of work related trips to Waltham Forest by non-residents and work related trips outside of Waltham Forest by residents of Waltham Forest, have origins and destinations within the Greater London Area. The proportions being 70% and 92% for inbound and outbound trips respectively.

It has also been determined from the Census data, that of the work related trips to the rest of the UK:

- 62.6%, (4893), 14.1%, (1,098), and 3.3%, (265), inbound trips originated from Essex, Hertfordshire and Kent respectively, with the proportion of those trips made by car being; 90.6%, 88.8% and 81.5% respectively
- 49.1%, (2,375), 19.7%, (953), and 3.4%, (165), of the outbound trips from Waltham Forest had destinations in Essex, Hertfordshire and Kent respectively, with the proportion of those trips made by car being; 75.2%, 73.1% and 67.3% respectively
- Inbound public transport trips by London Underground (LU) were 2.1%, 1.1% and 0.0% for Essex, Hertfordshire and Kent, with outbound proportions 6.1%, 5.8% and 12.7%

- Inbound public transport trips by train were 3.7%, 7.9% and 10.2% for Essex, Hertfordshire and Kent, with outbound proportions 4.3%, 9.44% and 9.1%
- Inbound Public transport trips by bus were 1.9%, 1.0% and 2.6% for Essex, Hertfordshire and Kent, with outbound proportions 6.2%, 3.5% and 3.6%.

It is considered that the tendency for the high proportions of car based trips from Essex, Hertfordshire and Kent, is a function of the journey distance and the availability of the strategic highway network comprising the M25, M11, A406, A10, A12 and A13.

**Table 2-2: Journey to Work Modal Share by Geographical Distribution (2001)**

Mode	Trips to Jobs in		Trips to Jobs by Waltham Forest Residents to	
	Waltham Forest From			
	GLA	Rest of UK	GLA	Rest of UK
Workforce Population	18,151	7,819	58,006	4,837
London Underground	10.95%	1.8%	42.3%	9.8%
National Rail	6.4%	6.8%	13.6%	8.0%
Bus	13.3%	1.9%	8.2%	5.3%
Car (driver and passenger)	62.7%	85.9%	29.2%	68.7%
Taxi	0.2%	0.1%	0.2%	0.3%
Motorcycle	1.2%	1.6%	1.6%	0.9%
Bicycle	2.0%	0.2%	1.8%	0.2%
Walk	2.8%	1.2%	1.0%	1.6%
Other	0.3%	0.1%	0.2%	0.3%

Source: Office for National Statistics 2001

**Figure 2-1 and 2-2** presents in graphical format the modal share by London Borough of the work related trips with origins and destinations within the Greater London Area. **Figure 2-3** indicates the proximity of the London Boroughs in relation to Waltham Forest. It can be seen from an examination of **Figure 2-1** that for inbound work related trips to Waltham Forest,

- Seven London Boroughs generate 76.95% (13,967) of the total work related inbound trips (18,151), these being; Barking and Dagenham (5.9%), Enfield (9.7%), Hackney (6.7%), Haringey (5.6%), Havering (6.7%), Newham (11.9%) and Redbridge (30.6%). It is pertinent to note that the principal inbound mode of transport from these seven London Boroughs is the car mode, generating 68.05%, 37.5%, 77.2%, 51.3%, 52.3%, 79.4%, 50.6% and 73.2% of all trips from each of the boroughs respectively
- The principal public transport mode used for inbound trips from the seven London Boroughs is the bus with 11.7% of trips from Enfield, 23.3% from Hackney, 20.8%

from Haringey, 28.2% from Newham, 9.8% from Redbridge, and the train with 11.3% of trips from Barking and Dagenham and 9.0% of trips from Havering.

For the outbound work related trips from Waltham Forest, 13 London Boroughs form the destination for 89% (51,683) of all work related outbound trips (58,006), these being;

- Camden (9.5%), City of London (10.87%), Enfield (4.5%), Hackney (6.7%), Haringey (4.2%), Islington (7.5%), Kensington and Chelsea (2.7%), Lambeth (1.9%), Newham (5.7%), Redbridge (6.5%), Southwark (2.9%), Tower Hamlets (8.3%) and Westminster (17.8%).

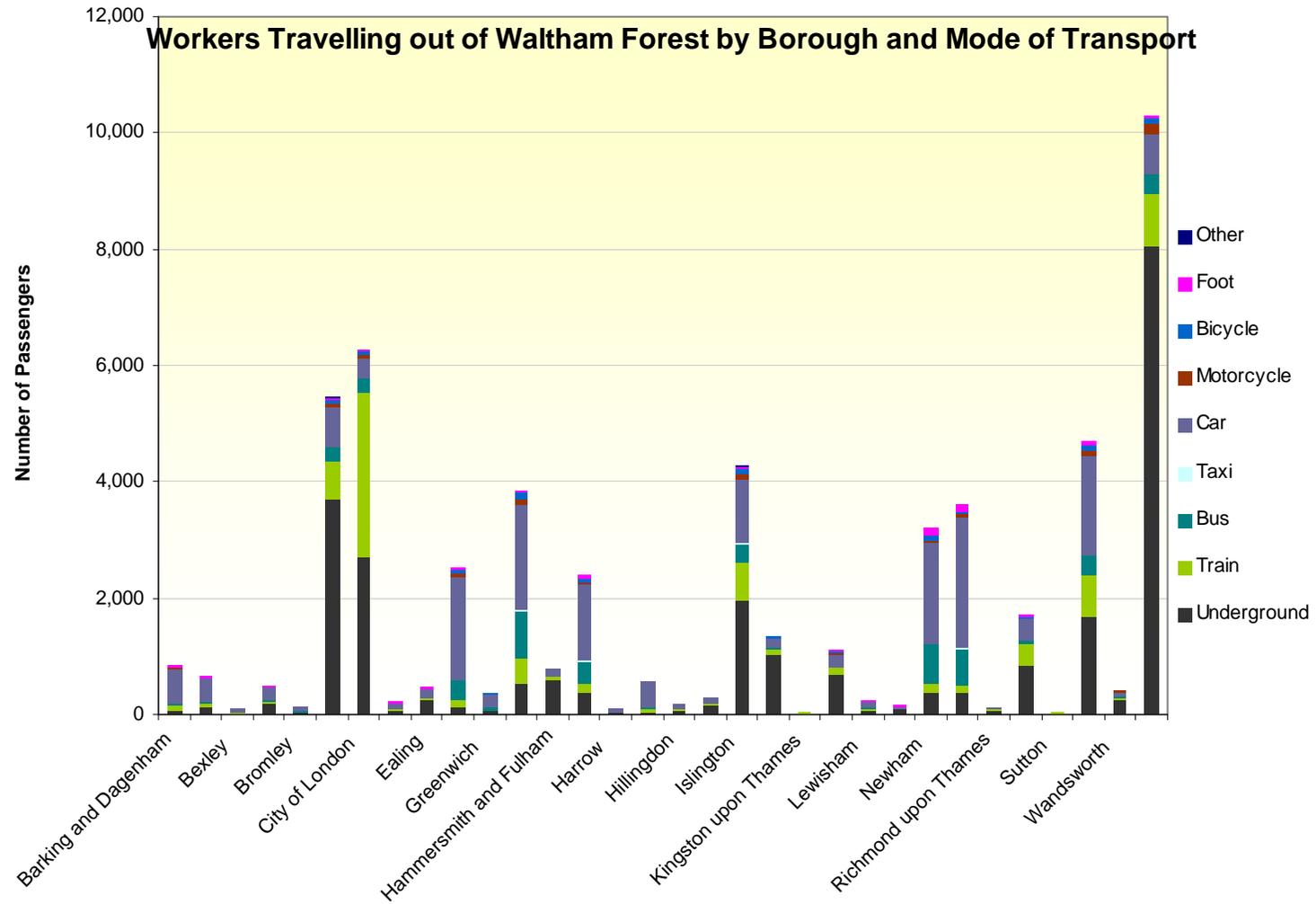
The principal outbound mode of transport from Waltham Forest to these London Boroughs is 'split' on a geographical basis, with the principal mode to those boroughs in close proximity to Waltham Forest being:

- The car, generating 67.8% of all trips to Enfield, 45.3% to Hackney, 53.1% to Haringey, 52.4% to Newham, 59.4% to Redbridge and 35.4% to Tower Hamlets;
- The second most used form of outbound transport to these London Boroughs from Waltham Forest is the bus, with 12.6% of trips to Enfield, 20.8% to Hackney, 16.3% to Haringey, 20.8% to Newham and 16.3% to Redbridge;
- The second most used form of transport to Tower Hamlets is the LU with 34.66% of all outbound trips.

For those boroughs with a longer outbound journey from Waltham Forest, the principal mode of travel is:

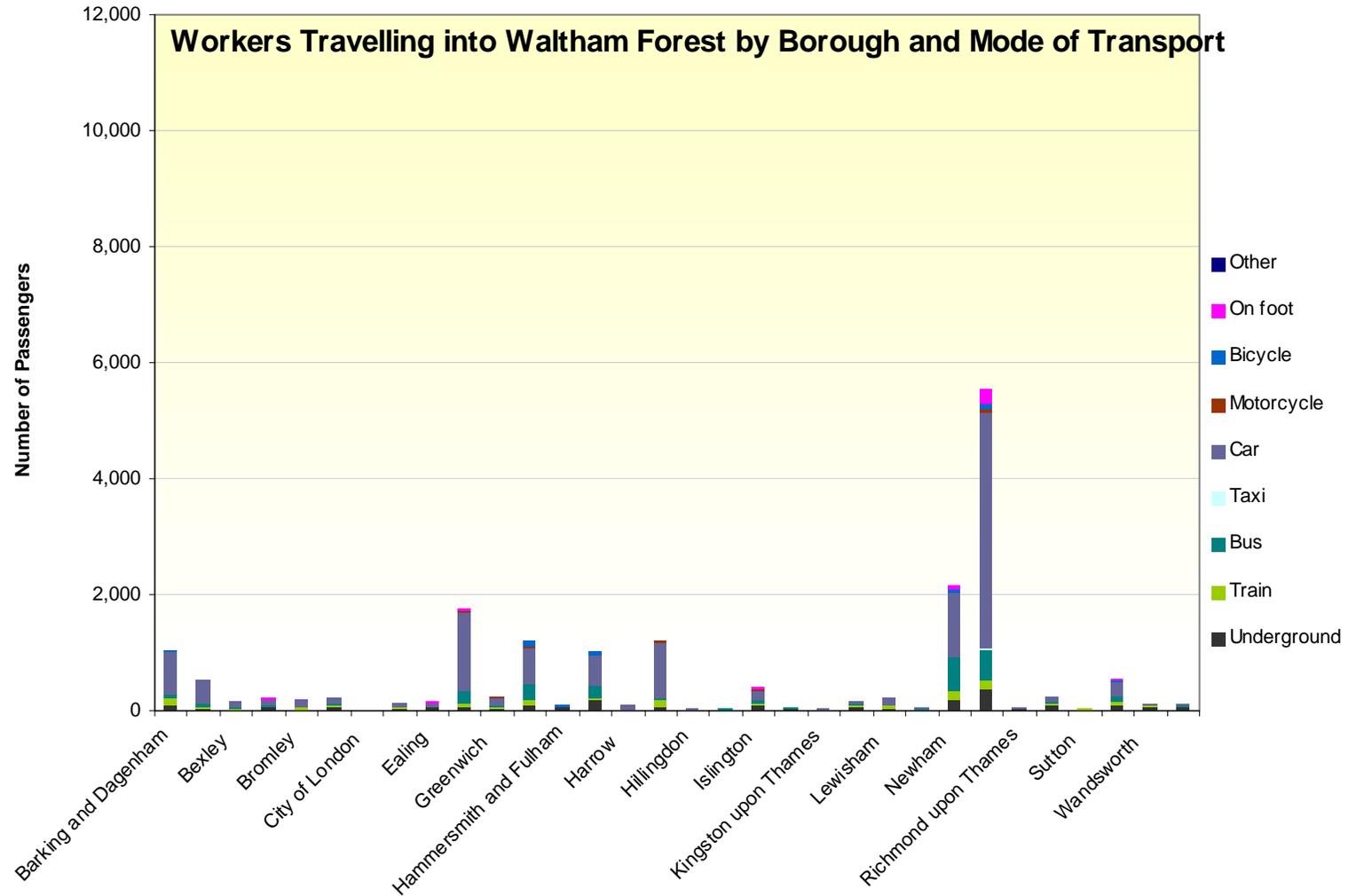
- The LU, generating 67.1% of trips to Camden, 45.0% to Islington, 76.5% to Kensington and Chelsea, 60.4% to Lambeth, 48.3% to Southwark and 78.0% to Westminster. The City of London is served equally by LU and train trips, with 43.1% and 43.1% of the total trips respectively;
- The second most used form of transport for outbound trips is the car with 12.2% of trips to Camden, 25.4% to Islington, 10.7% to Kensington and Chelsea and 18.8% to Lambeth;
- The train carries 22.5% of outbound trips to Southwark and 8.6% to Westminster.

Figure 2-1: Outbound Trips to London Boroughs by Mode



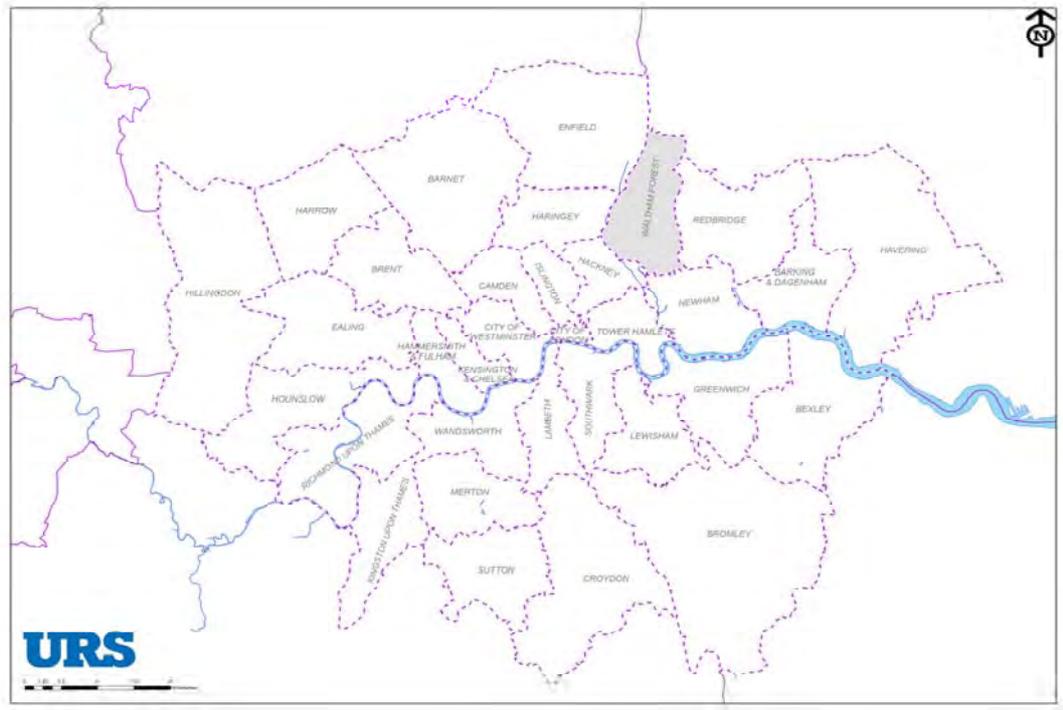
Source: Office for National Statistics 2001

Figure 2-2: Inbound Trips from London Boroughs by Mode



Source: Office for National Statistics 2001

Figure 2-3: Location of London Boroughs in Relation to Waltham Forest



Source: London Borough of Waltham Forest 2009

The results so derived from the analysis of work related trips from the 2001 Census data, identify a ‘trend’ in the mode of transport used for both inbound and outbound trips, in that the spatial proximity of the London Boroughs in relation to Waltham Forest reflects the proportion of car-borne and public transport trips undertaken by both the resident and non-resident workforce population of Waltham Forest. Correlation between the spatial proximity of the London Boroughs and the transport infrastructure provisions and public transport networks available for travel between Waltham Forest and the London Boroughs tends to reinforce the likely propensity for car-borne travel to and from the adjacent boroughs.

Finally, **Table 2-3** and **Figure 2-2** presents the journey to work modal share by sub-area of work related trips with origins and destinations within Waltham Forest. From an examination of **Table 2-3** and **Figure 2-2**, it can be seen that the greatest proportion of the workforce population within each sub-area, undertake work-related trips within that sub-area. The proportion of the sub-area workforce population working within each sub-area being:

- 44.3% (813) in the Blackhorse Lane sub-area;
- 66.1% (6506) in the Northern WF sub-area;
- 74.6% (8049) in the Southern WF sub-area; and

- 71.4% (8830) in the Central WF sub-area.

It can also be seen the largest trip attractor for cross-boundary work related trips within Waltham Forest is to the Central WF sub-area, attracting:

- 30.2% (554) of trips from Blackhorse Lane sub-area;
- 21.5% (2120) of trips from the Northern WF sub-area; and
- 19.6% (2111) of trips from the Southern WF sub-area.

It is evident from **Table 2-3** that the principal mode of cross-boundary transport between sub-areas is the car, with the greatest proportion of work related car-borne trips generated from the Northern WF sub-area with 69% (2,294) of the total sub-area workforce population using this mode. It is also evident from **Table 2-3** that the bus mode of transport is particularly important in cross-boundary travel between the sub-areas for work related trips, with up to 41% (447) of the Southern WF sub-area using the bus for work related trips to the Northern WF sub-area.

Walking is also an important mode of travel within and between the sub-areas, with up to 23% (2,033) of the workforce population walking to work in the Central WF sub-area and up to 20% (111) of the workforce population of the Blackhorse Lane sub-area walking to work within the Central WF sub-area.

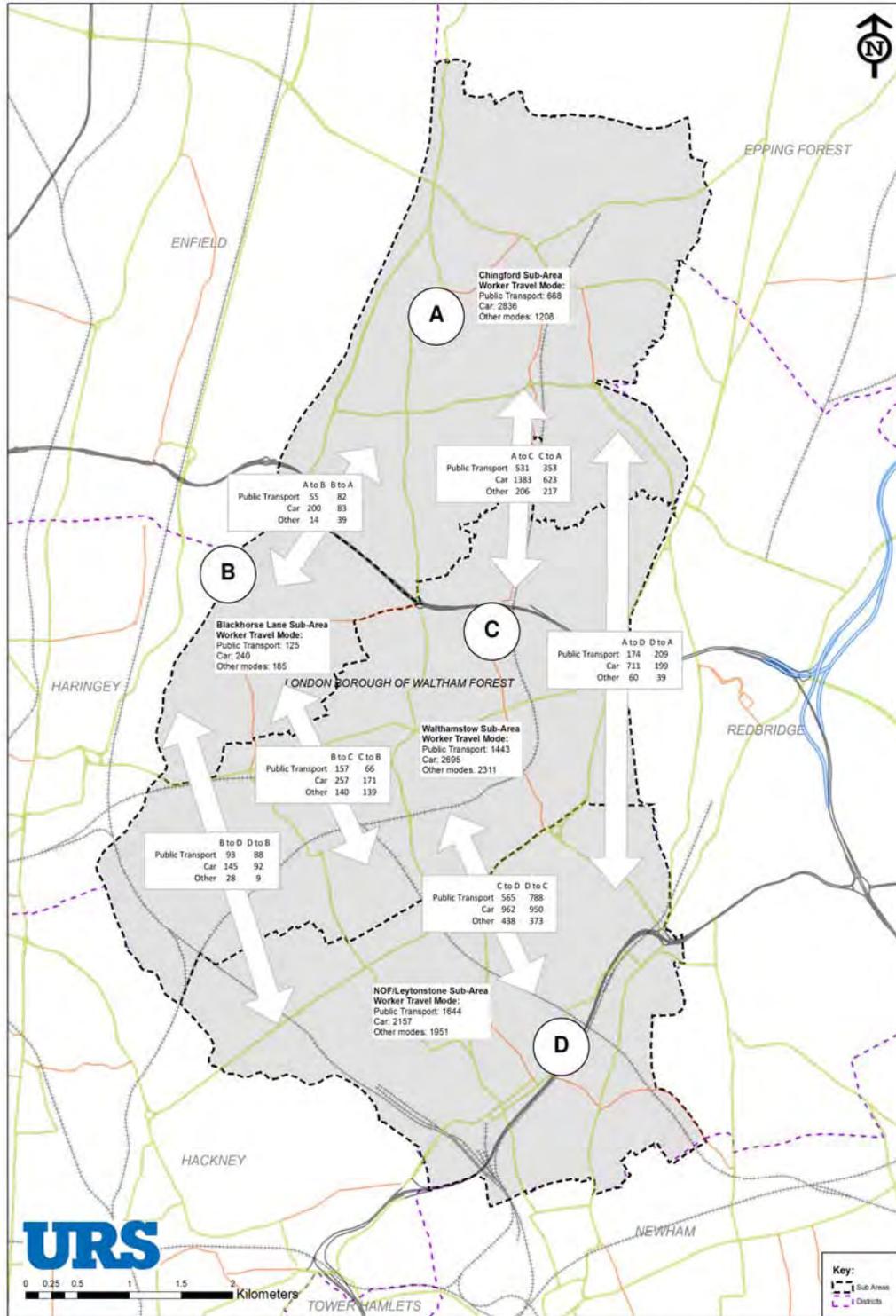
It is evident from the analysis of the 2001 Census Origin-Destination (O-D) data, that travel to and from Waltham Forest for work related trips by the economically active population, has a significant level of dependency upon car-borne travel. This is particularly evident for work related trips to and from Waltham Forest from boroughs in close proximity and those trips to and from the counties of Essex, Hertfordshire and Kent. Work related trips within the GLA with an origin or destination at a reasonable distance and with a degree of difficulty, (relating to the road network through London), from Waltham Forest, represent a far higher dependency upon public transport modes of travel, particularly the LU and train.

**Table 2-3: Journey to Work Modal Share by Sub Area for Trips with Both Origin and Destination Within Waltham Forest**

Origin sub area	Destination sub area	Total	Works from Home		Underground		Train		Bus		Taxi		Car - Drivers		Car - Passengers		Motorcycle		Bicycle		Foot		Other	
		Number	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
		34,837	6,735	19.3%	1,959	5.6%	832	2.4%	4,250	12.2%	635	1.8%	11,828	34.0%	1,241	3.6%	235	0.7%	704	2.0%	6,228	17.9%	190	0.6%
Blackhorse Lane	Blackhorse Lane	813	263	32.4%	75	9.2%	23	2.8%	27	3.3%	17	2.1%	202	24.9%	21	2.6%	3	0.4%	9	1.1%	165	20.3%	8	1.1%
Blackhorse Lane	Northern WF	204	-	0.0%	9	4.4%	6	2.9%	67	32.8%	3	1.5%	74	36.3%	6	2.9%	3	1.5%	9	4.4%	27	13.2%	-	0.0%
Blackhorse Lane	Southern WF	266	-	0.0%	6	2.3%	3	1.1%	84	31.6%	3	1.1%	136	51.1%	6	2.3%	6	2.3%	10	3.8%	9	3.4%	3	1.1%
Blackhorse Lane	Central WF	554	-	0.0%	18	3.3%	6	1.1%	133	24.0%	-	0.0%	214	38.6%	43	7.8%	3	0.6%	23	4.2%	111	20.0%	3	0.5%
Northern WF	Blackhorse Lane	269	-	0.0%	-	0.00%	3	1.1%	52	19.3%	3	1.1%	168	62.5%	29	10.8%	3	1.1%	3	1.1%	8	3.0%	-	0.0%
Northern WF	Northern WF	6,506	1,794	27.57%	175	2.7%	149	2.3%	344	5.3%	311	4.8%	2,268	34.9%	257	4.0%	30	0.5%	57	0.9%	1,074	16.5%	47	0.7%
Northern WF	Southern WF	945	-	0.0%	12	1.3%	6	0.6%	156	16.5%	9	1.0%	663	70.2%	39	4.1%	6	0.6%	15	1.6%	36	3.8%	3	0.3%
Northern WF	Central WF	2,120	-	0.0%	27	1.3%	59	2.8%	445	21.0%	9	0.4%	1,236	58.3%	138	6.5%	12	0.6%	37	1.8%	154	7.3%	3	0.1%
Southern WF	Blackhorse Lane	189	-	0.0%	9	4.8%	12	6.4%	67	35.5%	-	0.0%	78	41.3%	14	7.4%	-	0.0%	-	0.0%	9	4.8%	-	0.0%
Southern WF	Northern WF	447	-	0.0%	18	4.0%	9	2.0%	182	40.7%	3	0.7%	178	39.8%	18	4.0%	12	2.7%	6	1.3%	21	4.7%	-	0.0%
Southern WF	Southern WF	8,049	2,297	28.54%	758	9.4%	196	2.4%	690	8.6%	93	1.2%	1,858	23.1%	206	2.6%	45	0.6%	176	2.2%	1,692	21.0%	38	0.5%
Southern WF	Central WF	2,111	-	0.00%	108	5.1%	42	2.0%	638	30.2%	12	0.6%	875	41.5%	63	3.0%	18	0.9%	76	3.6%	267	12.7%	12	0.6%
Central WF	Blackhorse Lane	376	-	0.0%	10	2.7%	6	1.6%	50	13.3%	-	0.0%	162	43.1%	9	2.4%	-	0.0%	18	4.8%	115	30.6%	6	1.6%
Central WF	Northern WF	1,193	-	0.0%	45	3.8%	49	4.1%	259	21.7%	7	0.6%	550	46.1%	66	5.5%	3	0.3%	29	2.4%	179	15.0%	6	0.5%
Central WF	Southern WF	1,965	-	0.00%	55	2.8%	24	1.2%	486	24.7%	12	0.6%	858	43.7%	92	4.7%	27	1.4%	74	3.8%	328	16.7%	9	0.7%
Central WF	Central WF	8,830	2,381	27.0%	634	7.2%	239	2.7%	570	6.5%	153	1.7%	2,308	26.1%	234	2.7%	64	0.7%	162	1.8%	2,033	23.0%	52	0.6%

Source: Office for National Statistics 2001

Figure 2-2: Journey to Work Modal Share by Sub Area for Trips with Both Origin and Destination Within Waltham Forest



Source: Office for National Statistics 2001

## 2.3 Existing Public Transport provision

Waltham Forest is relatively well served by public transport, an overview of which is presented at **Figure 2-3** which shows the existing public transport network in Waltham Forest in a map format prepared by Waltham Forest Council. An assessment of the level of public transport accessibility throughout Waltham Forest has been undertaken using TfL's Public Transport Accessibility Levels (PTAL), which presents an indication of the density of the public transport network at any location within the borough. This analysis takes account of the walk distance of a location to the public transport facilities available, the level of services then afforded and the frequencies of these services, which further incorporates a measure of the average waiting time likely to be experienced. The PTAL index ranges from 6 – excellent (red) to 1 – very poor (blue). The results of the PTAL analysis are presented in a map format at **Figure 2-4**, showing the PTAL contours superimposed on a map of Waltham Forest. It can be seen from an inspection of **Figure 2-4** that over 50% of the borough experiences PTAL ratings between 'poor' to 'very poor' public transport accessibility levels (PTAL < 3), with only those areas around district centres and key public transport access locations, (i.e. LU stations), indicating PTAL ratings between 'moderate' to 'very good' ratings (PTAL > 3 - 5), with only Walthamstow Central affording a PTAL rating of 'excellent' with a PTAL rating of 6a.

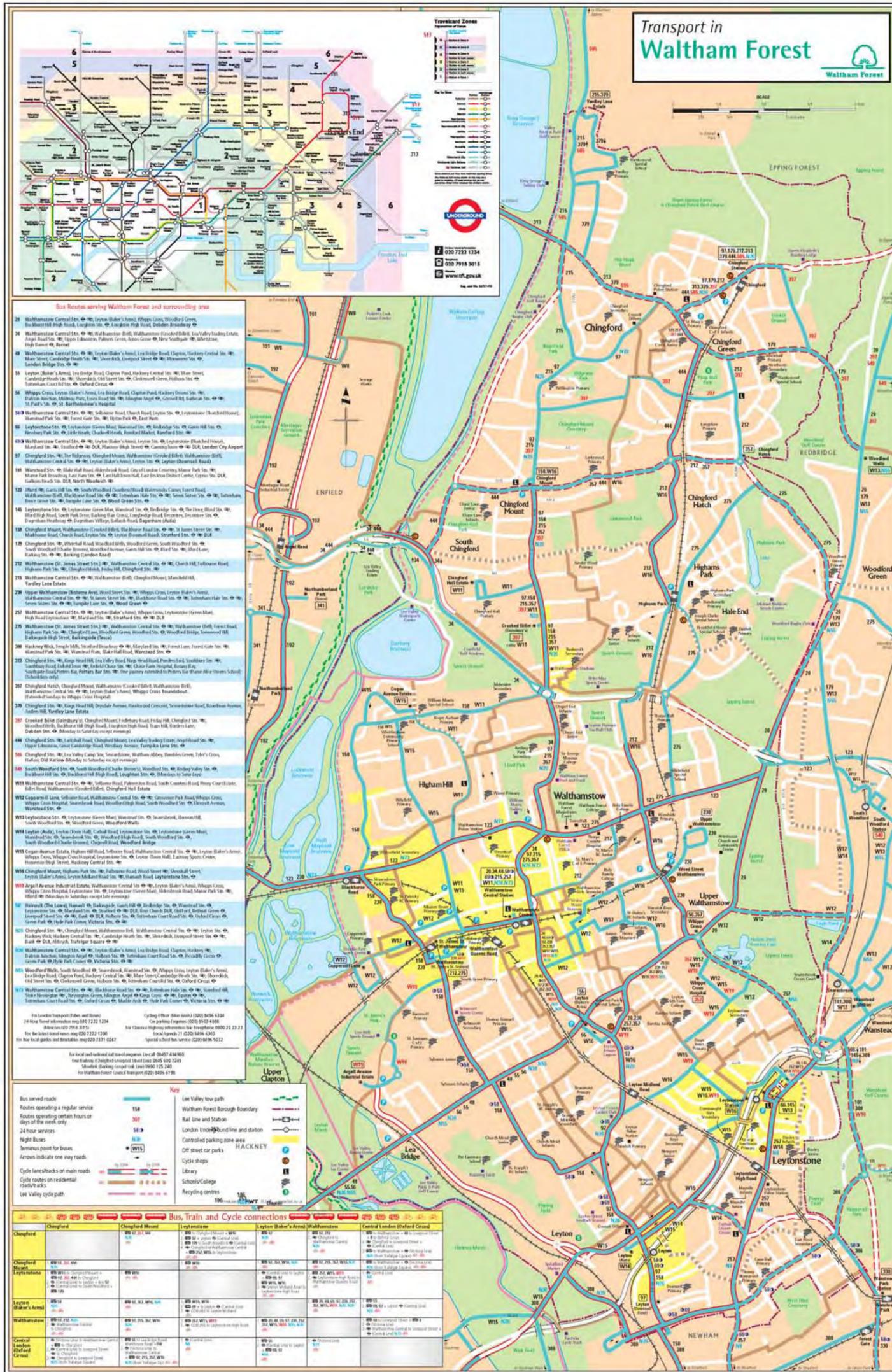
A further examination of **Figure 2-3** and **Figure 2-4** indicates that although there is a well structured public transport network covering the whole of the borough, the greater proportion of the 'moderate' to 'very good' and the one 'excellent' PTAL ratings are to be found within the southern half of the borough, whilst in the northern half of the borough, the PTAL ratings are predominantly 'poor' to 'very poor', with only marginal areas along Chingford Mount Road, Woodford Green and Chingford Green affording 'moderate' PTAL ratings. It is also noticeable that very low PTAL ratings occur along the south-western boundary of the borough between Leyton and the Walthamstow and Warwick Reservoirs, and along the western boundary of the borough between Higham Hill and Chingford.

The disparity in PTAL ratings between the southern and northern halves of the borough can be examined in respect of the spread of the population density throughout the borough and the degree of correlation between the population density and the levels of service and headway frequency of the public transport network serving the population.

**Figure 2-5** presents in map form the spread and density of the population across Waltham Forest expressed in population per square kilometre (km<sup>2</sup>). It can be clearly seen that the greatest density of population occurs in the southern half of the borough, where a maximum density of 100 people per km<sup>2</sup> occurs in Leyton, with an average population density of approximately 15 people per km<sup>2</sup> over the southern half of the borough. In the north of the borough, the average population density is approximately 5 people per km<sup>2</sup> with the greater density of population spread along the Chingford Mount Corridor at South Chingford, Chingford Mount, Chingford and Chingford Green, and along the Chingford to Liverpool Street Rail line/Larkshall Road corridor at Chingford Hatch, Highams Park and Hale End.



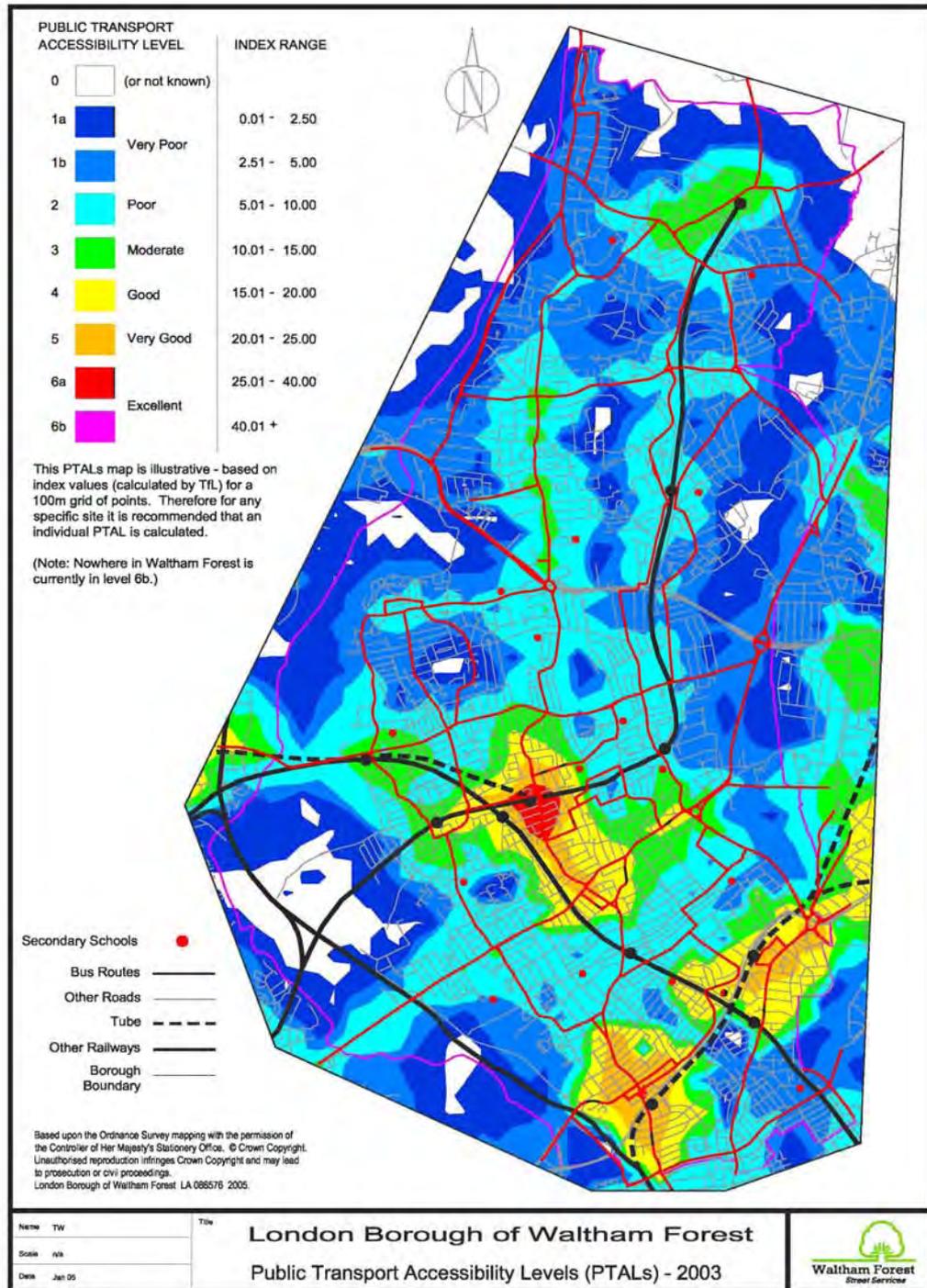
Figure 2-3: Existing Waltham Forest Transport Network



Source: London Borough of Waltham Forest 2009



Figure 2-4: Waltham Forest Public Transport Accessibility Levels (PTAL)



Source: London Borough of Waltham Forest 2003

By comparing the Population density map at **Figure 2-5** with the PTAL map at **Figure 2-4** and the transport map at **Figure 2-3**, it can be seen that there is a visual correlation

between the location of the existing population within the borough, the PTAL ratings across the borough and the existing public transport network serving the borough. It is considered that the public transport network within the borough is well structured to provide for the existing distribution of the population throughout the borough, and that the level and frequency of services provided upon the public transport network are operationally suited to the density of the population across the borough .

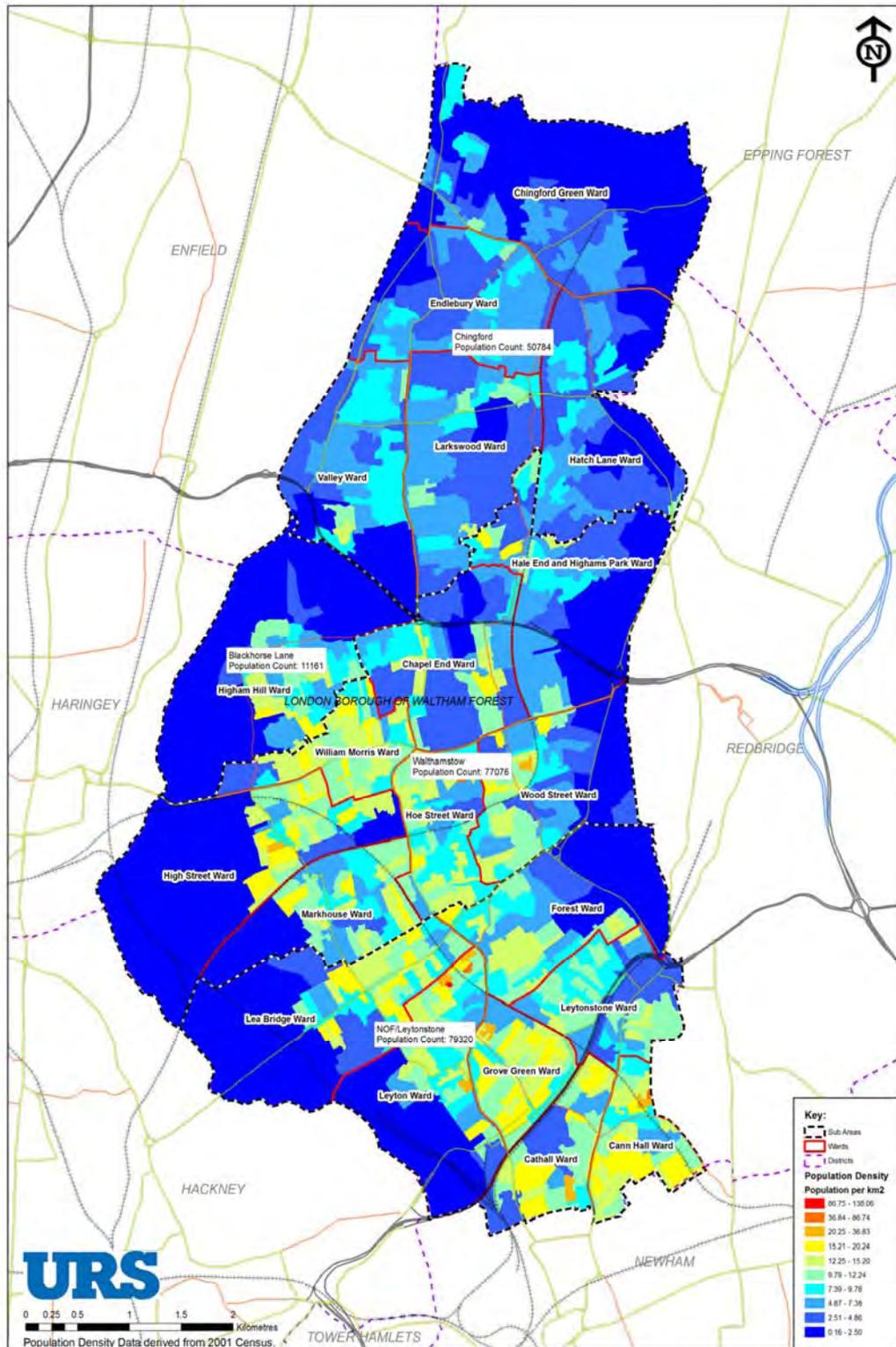
This is further reinforced by reference to **Figure A-4** which shows the coverage of the bus network within the borough and identifies those areas which are located more than 400m from a designated bus service route. In the main, these areas are located in the north of the borough adjacent to the William Girling Reservoir, the southern edge of Chingford Golf Course, Highams Park and an area from Larkswood Park to the Selwyn school sports fields, and in the southern half of the borough in the grounds of Kelmscott School, the grounds of Beaumont and George Mitchell Schools, and the grounds of Newport Junior school. It is therefore evident that the public transport coverage across the borough is good, and that the PTAL levels therefore reflect the level of service and service frequencies across the borough.

The levels of public transport bus and train, (overland and LU), services available in the south and north of the borough will form an essential requirement to the evaluation of the PTAL ratings throughout the borough. It is evident from the TfL Bus borough report<sup>1</sup> that although there are a good number of services available throughout the borough upon the public transport network, the south of the borough has significantly more 'high frequency' services than is available in the north, (a high frequency service having 5 or more buses per hour), with lower average waiting times per service. Similarly, there is a greater quantum and access provisions to LU rail services in the south of the borough than in the north, which are more frequent than afforded in the north. These factors will affect the equivalent doorstep frequency (EDF) at the point of interest (POI), the accessibility index being a function of the maximum EDF plus the average of all other EDFs at the POI. Therefore a lower level of services afforded along a corridor, plus longer service headway frequencies, will result in a lower accessibility indices and lower PTAL rating.

Having examined the public transport network within the borough, it is considered that the PTAL ratings presented at **Figure 2-4** present a reasonable coverage and level of public transport services when considered against the location and density of the population throughout the borough as presented at **Figure 2-5**.

It should be noted that PTAL ratings only measures access to the public transport services available and not the capacity available on rail and bus routes. In this way, it is a measure of the density of public transport provision at a particular point, and takes no account of the passenger demand or capacity available upon the services at that particular point. PTAL values therefore do not reflect the commercial viability of public transport services, which are a vital aspect of bus service provision and one that will be considered within this assessment.

Figure 2-5: Population Density Map of Waltham Forest



Source: URS Corporation 2009

The baseline analysis for each transport mode in the borough is presented by mode in **Appendix A**.

### 2.4.1 Northern Waltham Forest Sub Area

**UNDERGROUND:** There are no LU network services operating in the Northern WF sub area.

**RAIL:** There is one National Rail station located within the Northern WF sub area, which is Chingford. This is the terminus of the Liverpool Street to Chingford Line which currently operates a fifteen minute service during peak travel. Chingford station is considered not to have an overcrowding problem, (refer **Figure A-3**), and within the North WF sub-area, this line had a load factor ratio <0.8 in the year 2006, (refer **Figure A-2**), indicating that there was spare capacity on this section of the line in the year 2006.

**BUSES:** Six high frequency buses operate within the Northern WF sub area, which are: 97, 158, 179, 212, 275 and W16. These run with an average waiting time (AWT) of 7 minutes, and a ratio of average waiting time/scheduled waiting time (AWT/SWT) of 1.2. Compared with an average AWT of 5.5 minutes and an average AWT/SWT of 1.2 for the whole of London, it can be concluded that the Northern WF sub area is operating with a slightly lower level of service but comparable operational efficiency with London Bus services throughout the whole of the London Region.

Nine low frequency buses operate within the Northern WF sub area, which are: 20, 215, 313, 357, 379, 385, 397, 444 and W13. These services are, on average, on time 79.6% of the time. This is comparable to the average of 80% throughout the whole of London.

Two night buses operate within the Northern WF sub area which are: N26 and N55. These services are, on average, on time 87.5% of the time. This is marginally less than the average of 88.2% throughout the whole of London.

**ROAD:** From a consideration of the average journey speeds, average delays and the AADFs, (Annual Average Daily Flows), presented at **Figures A-7, A-8, A-9 and A-5** respectively in **Appendix A**, current upon the highway network within the Northern WF sub-area, it is considered that a number of junctions are significant to the capacity of the highway links within the Northern WF sub-area, these being:

- Kings head/Station Road/Kings Road
- Hall Lane/Chingford Mount Road/New Road/Old Church Road
- Hall Lane/Waltham Way roundabout
- Valley Road/Sewardstone Road/Kings Head Hill/Waltham Way

AADFs for Hall Road being 18,200, Chingford Mount Road 18,200, Chingford Lane 14,000, (these being the principal north-south routes from Northern WF sub-area), Kings Head Hill, 12,200, Sewardstone Road, 19,500 and Kings Road, 14,000, (these being the principal east-west route from Northern WF sub-area).

**PUBLIC REALM:** Chingford rail station has step-free access.

The Northern WF sub area is not well served by public transport, with only one north-south rail connection and no LU connections. The bus reliability is satisfactory, however low frequency buses are more dominant in this area.

#### 2.4.2 Central Waltham Forest Sub Area

**UNDERGROUND:** The LU network serving the Central WF sub-area is the Victoria line which operates services every four minutes during peak periods, reducing to eight minute services by midnight. Stations located within the Central WF sub area are Blackhorse Road and Walthamstow Central.

Direct access is provided to major overland rail termini at Euston, Kings Cross, St Pancras and Victoria to the north of the River Thames and Vauxhall to the south.

From an inspection of **Figure A-1** in **Appendix A**, it can be seen that the Victoria line operates within the Central WF sub area at a classification of 'Seats Taken' having 50-100% of seats taken from Walthamstow Central to Blackhorse Road and 'Some Standing' with 0 to 1 pax/sq m between Blackhorse Road and Tottenham Hale.

**RAIL:** There are four National Rail stations located within the Central WF sub area, these being: Highams Park, Wood Street, Walthamstow Central and St James Street on the Chingford to Liverpool Street route operating at a fifteen minute service frequency during peak periods, and two TfL LOL stations at Blackhorse Road and Walthamstow Queens Road on the Gospel Oak to Barking route operating at a twenty minute service frequency during peak periods.

From an inspection of **Figure A-2** at **Appendix A**, it can be seen that within the Central WF sub area, none of the overground rail routes are classified as being overcrowded, with all routes operating at a Passenger in Excess of Capacity (PIXC) ratio of less than 1 at 2006 levels. With respect to individual station overcrowding levels, as indicated in **Figure A-3** at **Appendix A**, Walthamstow Central has been identified as low priority and Blackhorse Road as unassessed.

**BUSES:** Fourteen high frequency buses operate within the Central WF sub area, which are the: 34, 48, 58, 69, 97, 123, 158, 212, 230, 257, 275, W11, W15 and W16. These run with an average waiting time (AWT) of 5.8 minutes, and a ratio of average waiting time (AWT)/scheduled waiting time (SWT) of 1.7. Compared with an average AWT of 5.5 minutes and an average AWT/SWT of 1.2 for the whole of London, it can be concluded that the Central WF sub area is operating with a comparable level of service but lower operational efficiency compared to London Bus services throughout the whole of the London Region.

Seven low frequency buses operate within the Central WF sub area, which are: 20, 215, 357, 385, 397, W12 and W19. These services are, on average, on time 75.2% of the time. This is lower than the average of 80% throughout the whole of London.

Three night buses operate within the Central WF sub area which are: N26, N38 and N73. These services are, on average, on time 90.4% of the time. This exceeds the average of 88.2% throughout the whole of London.

**ROAD:** From a consideration of the average journey speeds, average delays and the AADFs presented at **Figures A-7, A-8, A-9** and **A-5** respectively in **Appendix A**, current upon the highway network within the Central WF sub-area, it can be seen that a number of junctions are significant to the capacity of the highway links within the sub-area, these being:

- Blackhorse Road Crossroads with Forest Road
- Hoe Street Crossroads with Forest Road
- Wood Street crossroads with Forest Road
- The 'Crooked Billet' grade separated interchange with the NCR

AADFs for Forest Road being 11,554 at the Blackhorse Road crossroads and 18,648 at the Wood Street crossroads, Chingford Road 13,975 and Woodford New Road in the east of the sub-area, 32,339.

**PUBLIC REALM:** Neither Walthamstow Central nor Blackhorse Road LU stations has step-free access. Walthamstow Central and Walthamstow Queens Road rail stations have step-free access; Highams Park, Wood Street and St James Street have partial step-free access; Blackhorse Road does not have step-free access.

Walthamstow Town Centre sub area is well served by buses, LU and National Rail services. However, the reliability of bus service is low which would indicate that the area is congested.

### 2.4.3 Blackhorse Lane Sub Area

**UNDERGROUND:** The Blackhorse Lane sub-area is served by the LU Victoria Line with Blackhorse Road station located on the borders of the sub-area. The LU Victoria line operates services every four minutes during peak periods, reducing to eight minute services by midnight.

From an inspection of **Figure A-1** in **Appendix A**, it can be seen that the Victoria line operates within the Blackhorse Lane sub area at a classification of 'Some Standing' with 0 to 1 pax/sq m between Blackhorse Road and Tottenham Hale.

**RAIL:** The Blackhorse Road London Overground station is located on the borders of the sub-area with direct access between the LU underground system and the overground. The overground route forms part of the Gospel Oak to Barking commuter route, which operates a twenty minute services during peak travel periods.

From an inspection of **Figure A-2** at **Appendix A**, it can be seen that within the Blackhorse Lane sub area, the overground rail routes is not classified as being overcrowded, with the routes operating at a PIXC ratio of less than 1 at 2006 levels. With respect to station overcrowding level at Blackhorse Road, as indicated in **Figure A-3** at **Appendix A**, Blackhorse Road has been identified as unassessed.

**BUSES:** Three high frequency buses operate within the Blackhorse Lane sub area, these being the: 123, W11 and W15. These run with an average waiting time (AWT) of 5.9

minutes, and a ratio of average waiting time (AWT)/scheduled waiting time (SWT) of 1.2. Compared with an average AWT of 5.5 minutes and an average AWT/SWT of 1.2 for the whole of London, it can be concluded that the Blackhorse Lane sub area is operating with a comparable level of service and operational efficiency to London Bus services throughout the whole of the London Region.

There are no low frequency buses operating within the Blackhorse Lane sub area.

One night bus operates within the Blackhorse Lane sub area, which is the N73. This service is, on average, on time 92.7% of the time. This exceeds the average of 88.2% throughout the whole of London.

**ROAD:** From a consideration of the average journey speeds, average delays and the AADFs presented at **Figures A-7, A-8, A-9** and **A-5** respectively in **Appendix A**, current upon the highway network within the Blackhorse Lane sub-area it can be seen that a number of junctions are significant to the capacity of the highway links within the sub-area, these being:

- The Blackhorse Lane/Forest Road Crossroads;
- The southern approaches to the Crooked Billet interchange with the NCR;
- AADFs for Forest Road at the Blackhorse Road crossroad junction being 11,554 and Blackhorse Road 12,589.

**PUBLIC REALM:** The public realm in the vicinity of Blackhorse Road underground and overground rail station is considered to be good with good footway and pedestrian crossing provisions at the Blackhorse Road/Forest Road crossroad junction. These crossing provisions are favoured in respect of traffic movement through the junction, with pedestrians channelised by pedestrian guard-railing and central refuge.

It is considered that interchange between the rail services and bus transport is good with bus stops located in close proximity to the station, but cycle provision at the station appears to be inadequate with cycles chained to the pedestrian guard-railing in the vicinity of the station entrances.

#### 2.4.4 Southern Waltham Forest Sub Area

**UNDERGROUND:** The LU network serving this area is the Central line which operates services every two minutes during peak periods, reducing to five minute services by midnight. Stations located within the Southern WF sub area are Leyton and Leytonstone.

Direct access is provided to the 'City' at Liverpool Street and Bank stations and the 'West end' of London between Tottenham Court Road and Marble Arch.

From **Figure A-1** it can be seen that the Central line within the Southern WF sub area is classified as being crowded with 2 to 3 pax/sq m.

**RAIL:** There are two National Rail station located within the Central WF sub area, these being: Leyton Midland Road and Leytonstone High Road. These form part of the Gospel

Oak to Barking commuter route, which operates a twenty minute service during peak travel periods.

From an inspection of **Figure A-3** in **Appendix A** it can be seen that in the year 2006, the line within the Southern WF sub area operated with a load factor of less than 1, suggesting that the line was not operating overcrowded during peak travel periods and afforded spare capacity AT 2006 levels. Through reference to **Figure A-4** in **Appendix A** no individual stations are identified as being overcrowded.

**BUSES:** Thirteen high frequency buses operate within the Southern WF sub area, these being the: 48, 55, 56, 58, 66, 69, 97, 145, 158, 230, 257, W15 and W16. These run with an average waiting time (AWT) of 6.1 minutes, and a ratio of average waiting time (AWT)/scheduled waiting time (SWT) of 1.2. Compared with an average AWT of 5.5 minutes and an average AWT/SWT of 1.2 for the whole of London, it can be concluded that the Southern WF sub area is operating with a comparable level of service and operational efficiency to London Bus services throughout the whole of the London Region.

Seven low frequency buses operate within the Northern WF sub area, these being the: 20, 308, 357, W12, W13, W14 and W19. These services are, on average, on time 74.8% of the time. This is lower compared to the average of 80% throughout the whole of London.

Four night buses operate within the Northern WF sub area, these being the: N8, N26, N38 and N55. These services are, on average, on time 86% of the time. This is comparable to the average of 88.2% throughout the whole of London.

**ROAD:** From a consideration of the average journey speeds, average delays and the AADFs presented at **Figures A-7, A-8, A-9** and **A-5** respectively in **Appendix A**, current upon the highway network within the Southern WF sub-area, it can be seen that a number of junctions are significant to the capacity of the highway links within the sub-area, these being:

- The Markhouse Road and Lea Bridge Road crossroads
- The Hoe Street and Lea Bridge Road crossroads
- The Leyton High Road and Francis Road junction
- The Leyton High Road and Francis Road priority controlled T-junction
- The Leytonstone, Harrow Road and Cathall Road priority controlled staggered crossroad junction

AADFs for Lea Bridge Road at the Markhouse Road crossroad junction being 22,067 and at the Hoe Street junction, 19,729. At Leyton High Road and at Warren Road the figures are 16,349 and 5,210 respectively.

**PUBLIC REALM:** Neither Leyton nor Leytonstone LU stations has step-free access, with Leyton's proposed step-free scheme for 2009 having been deferred. Neither Leyton Midland road nor Leytonstone High Road rail stations have step-free access.

The Southern WF sub area is well served by the three forms of public transport with good reliability on the high frequency bus services. However, the reliability of the low frequency and night buses needs to be improved.

### 3 PLANNED INVESTMENT

#### 3.1 Introduction

The main providers of transport infrastructure in the borough of Waltham Forest are Transport for London (TfL) who have responsibility for surface transport, London Buses, London Underground and London Overground, and Network Rail. Waltham Forest itself also undertakes major schemes, for which it has been allocated £5.11 million for 2008/09 and £8.123 million for 2009/2010 by TfL.

For the purposes of defining infrastructure, the infrastructure projects have been grouped into Network Rail, TfL and Waltham Forest schemes. The schemes are also grouped by status as either under construction, committed or planned. Committed schemes have completed all statutory processes and have a funding commitment. All schemes considered would increase transport provision in Greater London.

Network Rail is responsible for the national rail network, including the major rail termini, but its spending priorities are set by the Department for Transport and the Office of the Rail Regulator. TfL is responsible for strategic roads, London buses the LU and overground rail.

#### 3.2 Planned Investment

##### 3.2.1 Waltham Forest

The Waltham Forest *LIP*, published in 2006, sets out the transport proposals which support the Mayor's *Transport Strategy*. The *LIP* identifies proposals to improve accessibility, reduce congestion, improve social inclusion, reduce the amount of traffic, reduce emissions, improve safety and security, improve air quality, reduce noise intrusion and improve the health of the population of the borough and Londoners as a whole.

The *LIP* identifies that the Councils transport policies rely on an efficient and reliable public transport systems. It outlines projects to improve local area accessibility, walking routes and infrastructure, cycle parking provisions and cycle network infrastructure, bus stop accessibility and bus priority improvements, providing streets for people and station access improvements. It includes improvements to rail and LU stations within the borough. It highlights the importance of bus priority, the need to improve bus journey times and the continuing process to secure funding for bus priority schemes. The 2006 *LIP* identifies types of bus priority improvement and proposed a list of bus priority schemes between 2006 and 2009, and also sets out the Council's aspirations to reinstate the 'Hall Farm Curve' to provide a rail route between Chingford and Stratford in conjunction with the reopening of the Lea Bridge railway station closed in 1985.

The 2006 *LIP* also identified potential bus priority schemes up to 2009, with a review of four key junctions at Hoe Street/Selbourn Road, Queens Road/Hoe Street, Church Hill/Hoe Street, and Walthamstow bus station/Selbourn Road for bus priority using

Selective Vehicle Detection (SVD) and would also seek funding for potential improvements to:

- Route 97 Leyton to Chingford station, (committed to TfL Olympic Legacy)
- Route 158 Chingford Mount to Stratford station, (Committed to TfL Olympic Legacy)
- Route 179 Chingford station to Barking
- Route 257 Walthamstow Central station to Stratford station
- Route 275 Walthamstow (St James Street station) to Barkingside
- Route W19 extension to Leyton LU station

The funding allocation for Bus priority and Bus accessibility within the 2008/2009 funding provision is; £415,000 and £90,000 respectively and the required funding provision for 2009/2010 is; £425,000 and £65,000 for Bus priority and Bus accessibility respectively, (see **Table 3-1**). Further to the 2006 *LIP*, the 2010 *LIP* funding provision of £425,000 is to provide Bus priority provisions for:-

- Lea Bridge Road Traffic Improvement Scheme,
- Bus Priority scheme along Forest Road and at the junction with Wood Street,
- Billet Road and Blackhorse Road Traffic management Study,
- Hail and Ride to fixed stops along sections of route 397
- Traffic Management Study at Billet Road on approach to Crooked Billet,
- Traffic management Study at the junction of Whipps Cross Road and James lane, and,
- Review of traffic islands throughout borough which are on Bus Routes.

The £65,000 allocation required for Bus accessibility is to facilitate a programme to ensure that all of the boroughs' 495 Bus Stops are fully accessible.

The *Core Strategy Preferred Approach* highlights that Waltham Forest will support the Crossrail 2 strategic transport scheme and will pursue Transport policies guided by the following objectives

- The provision of a fully accessible integrated public transport system;
- To encourage the location of major new development within public transport hubs and corridors;
- To pursue the policy of traffic restraint in identified vehicular corridors with the aim of achieving zero growth in the boroughs town centres;

- To minimise the number and severity of transport related accidents;
- To ensure the safe and convenient movement of people with due regard to the environment;
- To facilitate the quality and improvement of the environment;
- To ensure better accessibility to jobs and other basic facilities, particularly for socially deprived areas;
- To foster economic growth and economic regeneration;
- To encourage the most convenient and economic movement of goods;
- The sustainable use of resources.

**Table 3-1** details the schemes to be funded from the Waltham Forest *LIP* and their associated costs to the date of opening. It should be noted that this information is to some degree out of date and that the *Local Development Framework* and new *LIP* will review these projects.

**Table 3-1: Waltham Forest Planned Infrastructure Projects**

Topic Heading	Scheme	Funding Proposals (£000s)	
		2008/2009	2009/2010
Principal Road Renewal	Principal road renewal	700	540
Bridge Strengthening & Assess	Bridge Strengthening & Assessment	135	350
Local Safety Schemes	Local safety schemes	1,475	940
20 Mph Zones	20 mph zones	770	535
Education Training & Publicity	School play and other projects	8	8
Walking	Walking strategy	115	125
Cycling	Non LCN	360	230
	LCN	452	274
Bus Stop Accessibility	Improvements	90	65
School Travel Plans	borough wide development	100	260
Work Travel Plans	Work Travel Plans	15	67.5
Travel Awareness	Travel awareness events	35	27
Environment	Air quality / management	30	0
Controlled Parking Zones	CPZ programme	35	40
Local Area Accessibility	Scootability, Mobility, Shopmobility	95	105
	Car Clubs	29	0
Bus Priority	Bus routes	415	425
Streets for People	Wood Street E17	0	70
Station Access	Leyton station improvements	250	0
<b>Total</b>		<b>5,109</b>	<b>4,062</b>

*Source: London Borough of Waltham Forest 2009*

Refer to **Appendix C** for the 2010 details of scheme descriptions and initial *LIP* funding allocations.

### 3.2.2 Transport for London

TfL has varied responsibilities for transport services in London, TfL now has powers to let concessions to operate services on the London Overground network, namely the West London, North London and East London lines including the Gospel Oak to Barking

service that runs through Waltham Forest and is the sponsor for delivering the Crossrail project.

TfL operates LU stations and trains but rolling stock and signalling systems are maintained and upgraded by the Private Public Partnership (PPP) companies that in effect, make these systems available to London Underground. Payments to the PPP are based upon availability and performance. However, the recent demise of Metronet has resulted in its contractual obligations being assumed by TfL.

TfL rail and LU projects relevant to Waltham Forest are summarised in the list of schemes presented at **Table 3-2** and are taken from the *TfL Business Plan* and investment programme 2009 and includes schemes that, in most cases, will be completed by 2018 with costs specified applying only to this date.

These schemes will provide additional line capacity to the borough, particularly to and from the Central and Southern sub-areas of the borough through the capacity enhancement of the Victoria underground Line and the Barking to Gospel Oak overground rail line.

*Way to Go!* the London Mayors emerging Transport plan states that TfL will do everything in its power to facilitate an increase in the number of people walking in London. This will require the removal of physical or perceived barriers to walking including improving safety and security, the provision of high quality public space and the removal of street clutter. It states that a balance will need to be struck between pedestrian accessibility and capacity and traffic flows. Increasing the number of walking trips is anticipated to reduce the need for some shorter journeys on the LU network and reduce the need to interchange at some key stations.

Continuing programmes to increase the number of cyclists are detailed in *T2025* and include:

- Upgrade and expand the cycle network;
- Increase cycle safety, access and priority;
- Improve facilities at origin, on route and destination;
- Improve education and training;
- Promote cycling as part of a healthy lifestyle.

This is promoted by the Mayor in *Way to Go!* and in *The Mayor's Transport Strategy Statement of Intent*. In addition the introduction of the Cycle Superhighways, which will run to the west of the borough between Tottenham Hale and Liverpool Street, and to the south of the borough from Ilford to Aldgate, will further promote cycling from the borough towards Central London. Conflict between cyclists and other road users, including pedestrians will need to be addressed.

**Table 3-2: Transport for London Infrastructure Projects**

Project	Description	Status	Opening Date	Cost
Crossrail	East/West rail link	C	2017	£17 billion
London Overground	East London Line Extension Phase 1 and Phase 2	C	2012	£989 million
London Overground	Upgrade North London Railway Infrastructure and stations; Barking to Gospel Oak and Richmond (47% increase in capacity)	C	2009/11	£1.4 billion
Jubilee Line	New signalling system to allow 30 trains per hour in peak (33% increase in capacity)	U/C	2009/10	Unknown*
Victoria Line	Higher frequency and larger trains (19% increase in capacity)	C	2012	Unknown*
Northern Line	Phase 1 signalling system to improve speeds and frequency (20% increase in capacity)	U/C	2012	unknown*
	Phase 2 separation of Bank and Charing Cross lines at Kennington	P	2020	unknown*
Piccadilly Line	New signalling system and trains (25% increase in capacity)	C	2014	Unknown*
Circle and Hammersmith & City Lines	New train stock, longer trains and higher frequency with merged T-cup service (49% increase in capacity)	C	2016	Unknown*
District Line	New train stock, longer trains and higher frequency (47% increase in capacity)	C	2018	unknown
Leytonstone station	Modernisation/refurbishment	C	N/C	unknown
Bus Route 97, (Funding now removed by TfL)	Chingford to Leyton 3rd Generation Bus Priority to improve and maintain reliability. End to end improvements	Funding allocation revised, now omitted from 2009 business plan	N/C	£12 million
Bus Route 158	Blackhorse to Stratford Olympic Legacy route, improvements and	C	2012	unknown

Project	Description	Status	Opening Date	Cost
	increase in service frequency			

*Source: TfL Business Plan 2009*

During the preparation of this study, there have been changes in the funding arrangements by TfL and the availability of funds towards committed schemes presented within the TfL 2009 Business plan. The funding for the 3G route 97 bus priority improvements has been removed from the TfL business plan and will now have to be funded from the Waltham Forest *LIP* allocation under 'corridors'. Currently, *LIP* funding has been reduced by around a fifth in real terms and it is unlikely that there will be additional funding from TfL available through the *LIP* allocation for the 3G bus priority scheme for the route 97. TfL have no immediate plans to reintroduce ring-fenced funding for 3G bus priority schemes.

### 3.2.3 National Rail and Key Interchanges

Network Rail's forward plans are developed through its Route Utilisation Strategies (RUS) that are specific to each line group or franchise. A RUS covers a ten-year period – there are two that are relevant to Waltham Forest.

Rail priorities are set by the Department for Transport in its *High Level Output Statement* (HLOS), which are incorporated into the *Network Rail Strategic Business Plan*. The latter currently covers the period 2009 to 2014 and is known as Control Period 4 (CP4). **Table 3-3** summarises Network Rail projects programmed in CP4.

**Table 3-3: Network Rail Planned Infrastructure Projects**

Project	Description	Status	Opening Date	Cost
North London Line capacity enhancement	Signalling improvements to improve headways and station lengthening to accommodate East London Line Extension	U/C	2011	£67 million
Freight Gauge capacity enhancements	Freight Gauge capacity enhancement upon Barking to Gospel Oak Line to allow 'high cube' container trains to operate, doubling the number of paths to allow TfL to operate four overground trains per hour on the Barking to Gospel Oak line.	U/C	2009/2010	£18.5 million
Crossrail	New east-west rail route adding 10% to London's rail based transport capacity	U/C	2009 to 2017	£15.9 billion
CTRL Domestic Services	High speed trains on selected routes from Kent & Medway	U/C	2009	n/a

*U/C – Under Construction, C – Committed*

*Source: Cross London RUS 2006*

The North London Line capacity enhancement is a joint programme with TfL and Network Rail to facilitate the East London Line Extension. The Network Rail works encompass the upgrade of the North London Line through signalling works, overhead line and station improvements.

First Capital Connect (formerly Thameslink) is a strategically important project for Network Rail in that it will allow many more stations north and south of London to be connected by direct services. It will also enable significantly more trains to operate between Kings Cross/St Pancras and London Bridge in the peak periods than at present. Workers and residents in Waltham Forest will be able to access the First Capital Connect lines at Finsbury Park station, three stops west of Blackhorse Road on the Victoria Line.

DfT are also providing £18.5 million pounds funding for

Waltham Forest are promoting an upgrade to the Chingford to Liverpool Street rail line through the reintroduction of the 'Hall Farm Curve' which will facilitate a connection between Chingford and Stratford. WF have recently commissioned a consultancy study the output of which will include;

- Updating of the infrastructure costs,
- Planning of train paths and timetabling, and

- Further modelling work to reinforce a business case.

A final report is due to be presented mid-November 2009, following which WF will engage with the public and key stakeholders through a consultation process in order to approach the DfT and Network Rail to present a business case for the inclusion of the Hall Farm Curve re-establishment within the next national rail control period programme.

### 3.2.4 Road, Footway and Cycle Network

There are no strategic improvements proposed by TfL surface transport to provide additional capacity upon the road network.

As part of the Olympic Legacy a green (i.e. a sustainable transport link) walking and cycling link will be provided along the Lee Valley Regional Park linking directly to the Olympic park, providing a greater level of accessibility to open Space for residents within Waltham Forest, particularly those within the Blackhorse Lane sub-area.

Funding for further extensions of the GLA's' East London Green Grid initiative are being sought.

## 3.3 Future Capacity

The planned investments in transport infrastructure presented, will benefit the population and economic viability of the borough through the increased accessibility afforded to the borough through improved interchange and service level improvements upon the routes accessible to the population of Waltham Forest through interchange provision. The improvements in capacity of the planned infrastructure measures in themselves will provide the south of the borough with increased passenger capacity on the LU network, particularly within the Central WF and Blackhorse Road sub-area where planning investment in the Victoria Line will deliver a 19% increase in capacity by 2012 at the Walthamstow Central and Blackhorse Road stations. This will provide a passenger capacity increase of 2,532 passengers per hour, giving a line capacity of 15,860 passengers per hour on the Victoria Line between Walthamstow Central and Seven Sisters. The additional bus services to be provided under the Olympic Legacy programme by 2012 will improve accessibility and passenger capacity between Chingford and Leyton, and Blackhorse Road to Stratford.

The planned capacity increases upon the Circle Line are already operational with 30 trains per hour now running in each direction throughout the peak travel periods.

Increases in operational service to four trains per hour along the Barking to Gospel Oak section of the north London line in conjunction with new rolling stock, will increase passenger carrying capacity by 47% during peak travel periods using 2 car class 378 trains and limit overcrowding to 2-3 passengers standing per square metre in the medium term and 3-4 in the long term for the low growth demand, (see **Figures 3-1** and **3-2**).

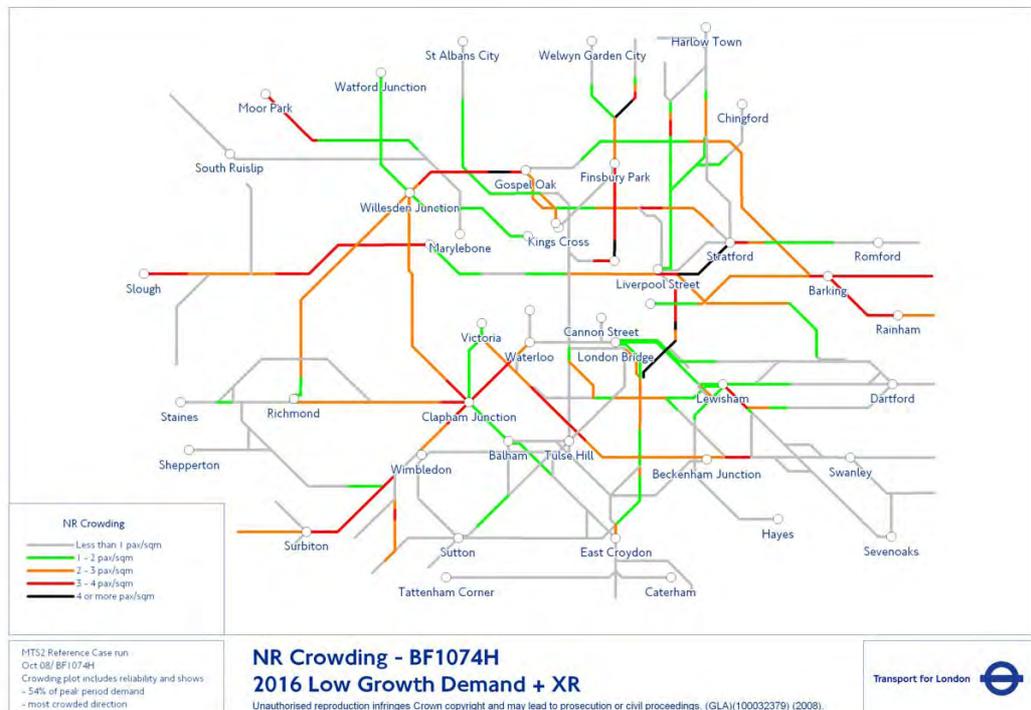
3.4 Summary

Within the borough, the direct and tangible benefits afforded to Waltham Forest as a consequence of the planned transport investment programme will deliver approximately 5,000 additional passenger movements per hour during the peak travel periods. These principally arising from the capacity increase on the Victoria Line, (2,500), the Barking to Gospel Oak LOL, (650), and the bus routes 97 and 158, (2,000), although the 3G bus priority improvements to the bus route 97 have now been removed from the TfL 2009 business plan with funding, (£12 million), now to be obtained through the LIP allocation process, which will be unlikely within the foreseeable future.

Additional benefits delivered by the planned transport investment programme, but beyond the boundaries of the borough, will be enjoyed by the population of Waltham Forest via improved interchange and line capacity afforded in relatively close proximity to the borough at Stratford, increasing accessibility and connectivity to Opportunity Areas and Central London.

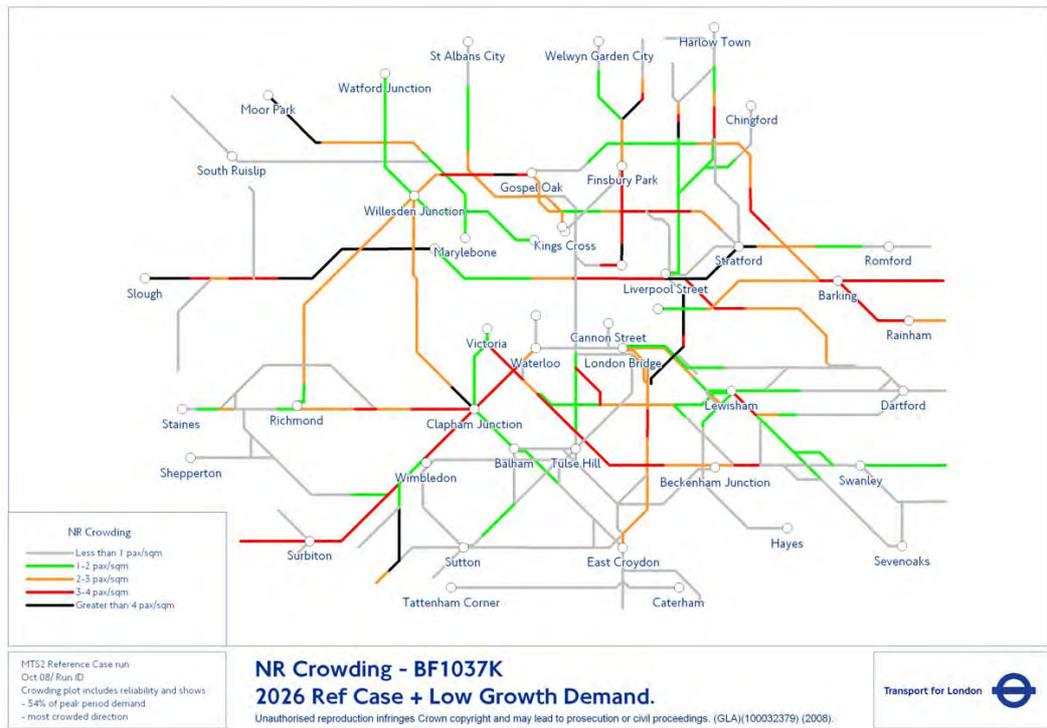
It is further noted that the greatest proportion of benefits likely to accrue from the planned investments within Waltham Forest will be derived from the south of the borough in the Central WF, Southern WF and Blackhorse Lane sub-areas, with the Northern WF sub-area deriving a benefit from the provision of a priority bus service to Leyton.

Figure 3-1: Overcrowding Level by Route in 2016



Source; London Assembly Scrutiny Committee 2009

Figure 3-2: Existing Level by Route in 2026



Source; London Assembly Scrutiny Committee 2009

## 4 TRAVEL GENERATORS

### 4.1 Introduction

Significant development opportunities within Waltham Forest will form the key driver for the reinforcement of transport infrastructure to support the increased population density and land use activities generated by new development, as will areas of opportunity and regeneration for residential and employment land use.

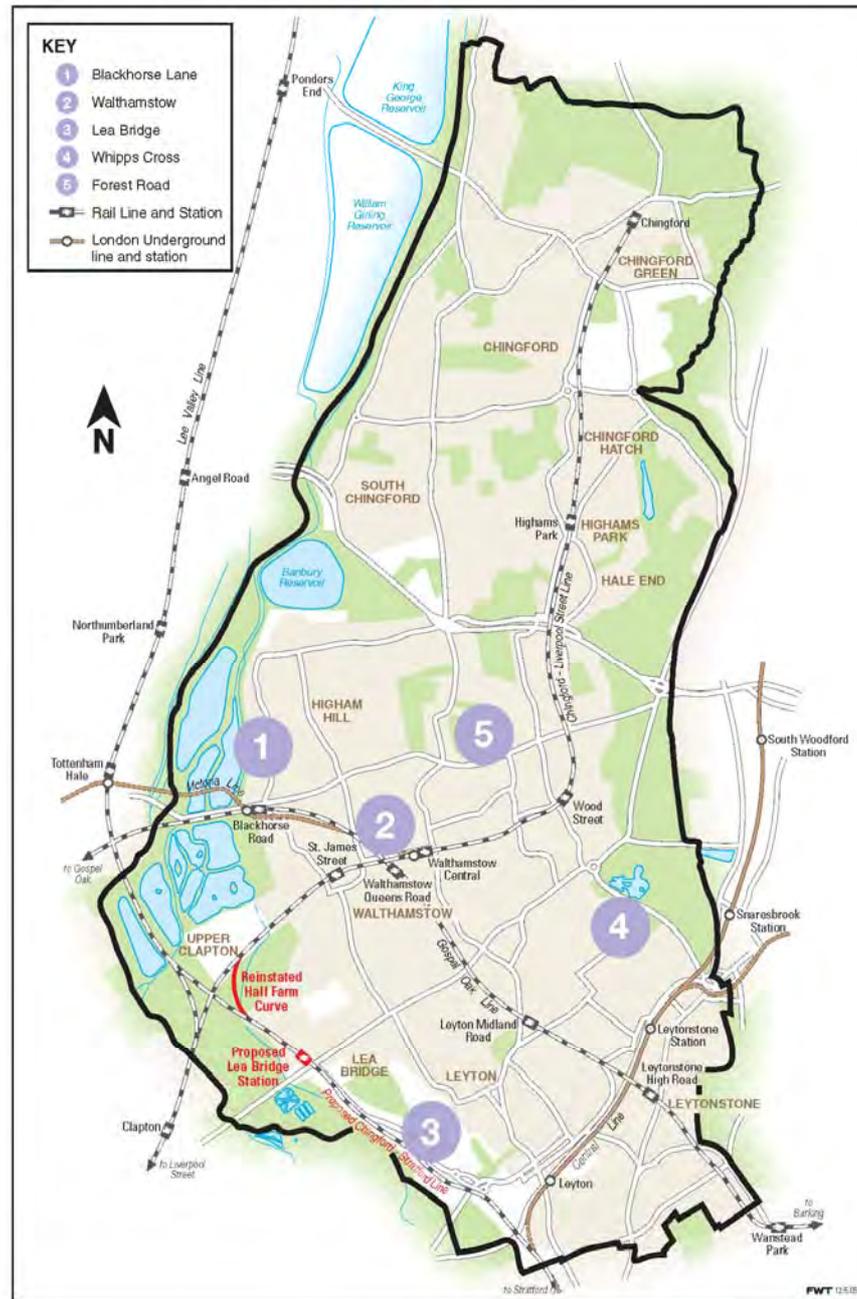
New development will generate increased population density and increase land use activity. Consequently, an increase in the number of people, goods and service movements will derive from the increase in population and/or intensification of land use activity. Such increase in movements will need to be supported by the transport infrastructure servicing the new development in a sustainable and appropriate manner.

Within Waltham Forest, five locations have been identified for significant development and employment opportunities, these being indicated at **Figure 4-1** allocated within the sub-areas and detailed in the accompanying **Table 4-1**.

It should be noted that there are no significant development opportunities within the sub-area of Northern WF.

Figure 4-1: Waltham Forest Regeneration Areas

Regeneration in Waltham Forest



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London Borough of Waltham Forest LA086576. 2005



Source: London Borough of Waltham Forest 2005

**Table 4-1: Sub-area Division and Potential of Identified Regeneration in Waltham Forest**

Sub area	Development	Description
Central WF	Walthamstow	Potential for 1,200 Homes and 2,200 new jobs
Central WF	Forest Road	Potential for sport and leisure activity
Blackhorse Lane	Blackhorse Lane	Potential for 600 Homes and 1,000 new jobs
Southern WF	Lea Bridge	Potential for 2,000 Homes
Southern WF	Whipps Cross	Potential for 400 Homes and 500 new jobs

Source: URS Corporation 2009

In addition to development opportunity within Waltham Forest, the London Plan identifies key Opportunity Areas within a realistic travel distance by public transport from Waltham Forest. These areas of opportunity together with their stated potential for employment and homes are presented at **Table 4-2** following;

**Table 4-2: Opportunity Areas in North-East London**

Opportunity Area	Indicative employment capacity 2001 - 2026	Minimum Homes 2001 - 2006
Isle of Dogs	110,000	10,000
City Fringe (Bishopsgate/South Shoreditch)	80,000	5,000
Lower Lea Valley and Stratford	50,000	32,000
Royal Docks	5,500	14,000
London Riverside	14,000	20,000
Ilford	200	6,000

Source: GLA London Plan

It is clear therefore, that the potential for travel between new Homes and employment areas will occur as a consequence of the spatial distribution of the regeneration areas and areas of opportunity within north-east London, as all are accessible by public transport to varying degrees of 'difficulty' from each of the sub-areas within Waltham Forest.

## 4.2 Spatial Assignment by Mode and Transport Infrastructure

Using the 2007 population characteristics to establish the percentage of the 'new' population as actively employed for the lower and higher growth scenarios as introduced in **Section 1** and the proportions by transport mode for the actively employed population of Waltham Forest as presented at **Tables 2-1, 2-2 and 2-3**, the predicted numbers of outbound trips by mode from each sub-area by mode of the new actively employed

population resident within Waltham Forest has been determined for both the lower and higher growth scenarios. The results derived from this analysis are presented in **Appendix B**.

Similarly, using the representative proportion from the 2001 Census data for the total non-resident workforce population people actively employed (25,970 m<sup>2</sup>), and the baseline business and retail floorspace (210,892 m<sup>2</sup>), gives a ratio of non-resident workforce population (NRWP) of 0.123 NRWP per m<sup>2</sup> of floorspace. Using the employment floorspace projections to 2026 from the *Waltham Forest Employment Land Review 2009*, URS and *Waltham Forest Retail and Leisure Study 2009*, Nathan Litchfield and Partners), the new non-resident workforce population per sub-area has been derived for each time band considered.

From the new population of the non-resident actively employed workforce, the predicted number of new inbound trips to each sub-area by mode has been determined using the modal proportions presented at **Table 2-2** for inbound trips from the Greater London Area and inbound trips from the rest of the UK. The results so determined are presented in **Appendix B**.

The outbound trips so derived for each sub-area by the new resident workforce population, for both the lower and higher growth scenarios, and the inbound trips by the new non-resident workforce population have been assigned on an all or nothing basis by mode to the nearest appropriate access and egress point for each relevant mode of public transport for inbound and outbound trips respectively. The modal assignment so determined for each of the sub-areas for rail travel is as presented at **Table 4-8**.

**Table 4-8: Public Transport Assignment by Sub Area**

Sub Area	Underground	Network Rail
Northern WF	Victoria Line	Chingford to Liverpool Street
Central WF	Victoria Line	Chingford to Liverpool Street
Blackhorse lane	Victoria Line	Barking to Gospel Oak
Southern WF	Central Line	Barking to Gospel Oak

*Source: URS Corporation 2009*

Assignment of public transport bus trips requires a more detailed location of either the origin and/or destination of the new trips before an assignment can be made to one or more bus service. As the location of the origin of bus trips are known, these being the regeneration areas identified at **Figure 4-1**, bus assignments have been based upon the nearest bus route corridor located relative to the trip origin within each sub-area. **Table 4-9** presents the bus route corridors used for the assignment of bus trips for each sub-area.

**Table 4-9: Bus Corridor Assignment**

Sub Area	Bus Corridor	Destinations
Northern WF	Chingford Mount Corridor	Walthamstow, Bakers Arms interchange, Leyton, Stratford,
Central WF	Lea Bridge Road Corridor	Upper Walthamstow, Whipps Cross, Walthamstow Central, Bakers Arms Interchange, Leyton, Stratford, Stoke Newington, Hackney
Blackhorse Lane	Markhouse Road Corridor	Walthamstow St. James St. Lea Bridge Corridor Interchange, Leyton, Stratford
Southern WF	Lea Bridge Road Corridor (No existing services Orient Way)	Upper Walthamstow, Whipps Cross, Walthamstow Central, Bakers Arms Interchange, Leyton, Stratford, Stoke Newington, Hackney

Source: URS Corporation 2009

The total number of new trips generated by the population and employment growth within Waltham Forest during the peak travel periods by mode of transport for each time band considered, has been determined and identified by sub-area. The total number of new directional trips for public transport LU, rail and bus modes, have been assigned to the public transport network as per the all or nothing route assignments presented within **Table 4-8**. The resultant numbers of new public transport trips by route and time band are presented at **Table 4-10** for both the lower and high growth scenarios.

**Table 4-10: New Public Transport Trips By Route and Time Band**

Public transport Route	Growth	2009 - 2014		2014 - 2019		2019 - 2026	
		Out	In	Out	In	Out	In
<b>Rail;</b>							
Victoria Line	Lower	545	-8	1197	41	2046	68
	Higher	1045	-8	2322	41	3261	68
Central Line	Lower	245	98	380	1234	520	171
	Higher	391	98	1302	123	2947	171
Chingford to Liverpool Street	Lower	153	48	342	88	636	177
	Higher	153	48	420	88	747	177
Barking to Gospel Oak	Lower	112	24	189	43	233	84
	Higher	328	24	788	43	1324	84
<b>Bus;</b>							

		2009 - 2014		2014 - 2019		2019 - 2026	
Chingford Mount Bus Corridor, (No. of additional buses)	Lower	12 (1)	-38 (0)	27 (1)	-14 (0)	82 (2)	-9 (0)
	Higher	12 (1)	-38 (0)	72 (2)	-14 (0)	140 (3)	-9 (0)
Markhouse Road Bus Corridor, (No. of additional buses)	Lower	40 (1)	-82 (0)	80 (1)	-83 (0)	76 (1)	-116 (0)
	Higher	243 (4)	-82 (0)	439 (6)	-83 (0)	437 (6)	-116 (0)
Lea Bridge Road Bus Corridor, (No. of additional buses)	Lower	236 (3)	228 (3)	469 (6)	294 (4)	765 (10)	410 (6)
	Higher	289 (4)	228 (3)	836 (11)	294 (4)	1698 (23)	410 (6)

Source: URS Corporation 2009

The predicted increase in motor vehicle traffic, walking and cycling by sub-area for both the lower and high growth scenarios for each of the time bands considered are presented at **Table 4-11**. It is not considered practical to assign these trips to the public transport network, as this would require the use of a trip assignment model based upon an estimated O-D matrix for the new trips and a full appraisal of traffic flows and delays upon the existing highway network to be considered within the appraisal. This being beyond the scope of this assessment which is set at a strategic level.

**Table 4-11: New Highway and Footway Trips by Sub Area and Time Band**

	Growth Scenario	Cars, Taxis & Motorcycles		Cycling		Walking	
		Out	In	Out	In	Out	In
2009 - 2014							
Northern WF	Lower	53	-276	2	-6	7	-9
	Higher	53	-276	2	-6	7	-9
Central WF	Lower	534	799	30	17	150	26
	Higher	534	799	30	17	150	26
Blackhorse Lane	Lower	123	-593	8	-12	24	-19
	Higher	752	-593	44	-12	146	-19
North Olympic Fringe/Leyton	Lower	277	855	16	18	62	28
	Higher	444	855	27	18	99	28

		2014 - 2019						
Northern WF	Lower	117	-102	4	-2	16	-3	
	Higher	320	-102	12	-2	44	-3	
Central WF	Lower	1192	1057	69	22	337	35	
	Higher	1324	1057	75	22	371	35	
Blackhorse Lane	Lower	244	-597	15	-12	48	-20	
	Higher	1366	-597	81	-12	265	-20	
North Olympic Fringe/Leyton	Lower	431	1071	25	22	97	35	
	Higher	1473	1071	87	22	332	35	
		2019 - 2026						
Northern WF	Lower	364	-65	14	-1	50	-2	
	Higher	620	-65	23	-1	79	-2	
Central WF	Lower	2013	1483	120	31	587	49	
	Higher	2725	1483	131	31	641	49	
Blackhorse Lane	Lower	237	-836	14	-17	46	-28	
	Higher	1357	-836	81	-17	264	-28	
North Olympic Fringe/Leyton	Lower	588	1484	35	31	132	49	
	Higher	3330	1484	199	31	749	49	

Source: URS Corporation 2009

### 4.3 Summary

The new movement demand generated within Waltham Forest by the lower growth and higher growth scenario housing projections in combination with the new employment floorspace provision has been predicted by sub-area for all modes of transport for 5 year time bands between 2009 and 2026.

The 2007 population characteristics for the actively employed population of Waltham Forest has been used in conjunction with the 2001 travel to work Census data to determine a reasonable assessment of the journey to work requirements of the new workforce population by sub-area, this representing the potential increase in directional travel demand over the AM and PM peak travel periods.

The 2001 Census data has been used to determine the proportional use of transport modes by the resident workforce with origins in Waltham Forest and destinations either in Waltham Forest, the Greater London area (by borough), and the rest of the UK. Similarly, the proportional use of transport modes by the non-resident workforce with origins either in the Greater London area (by borough), or the rest of the UK and destinations within Waltham Forest has been determined. The proportions so derived were applied to the projected new population generated within Waltham Forest and the resultant travel demand by mode predicted for the sub-areas for each of the 5 year time bands for both

the lower and higher growth scenarios. The results of these appraisals have been presented in tabular form and the increased demand upon public transport infrastructure determined by facility at **Table 4-10**, from where it can be seen:

- That there would likely be an additional 3,500 directional trips generated upon the Victoria Line by 2026 under the high growth scenario and that the high growth scenario represents a 60% increase in trips upon the Victoria Line over that of the lower growth scenario. The intensification of new trips upon the line will add to the current overcrowding at Blackhorse Road LU station during the first time band of 2009 to 2014, (short term).
- That there would likely be an additional 3,000 directional trips generated upon the Central Line by 2026 under the high growth scenario and that the high growth scenario represents a 467% increase in trips upon the line over that of the lower growth scenario. The intensification of new trips upon the line will add to the current overcrowding at Leyton LU station during the short term.
- That there would likely be an additional 750 directional trips generated upon the Chingford to Liverpool Street mainline rail line by 2026 under the high growth scenario and that the high growth scenario represents a 17.5% increase in trips upon the Line over that of the lower growth scenario. It is considered that the current overcrowding ratio of <0.8 would provide for the generated demand over the short to medium time frame of this plan (2009 – 2014).
- That there would likely be an additional 1,350 directional trips generated upon the Barking to Gospel Oak LOL by 2026 under the high growth scenario and that the high growth scenario represents a 450% increase in trips upon the line over that of the lower growth scenario. It is considered that the 2006 overcrowding ratio of <0.8 would provide for the generated demand over the short time frame of this plan, and the proposed service frequency improvement of 4 trains per hour by 2011 would provide for the medium term (2009 – 2016), with an increase in the number of cars per train from 2 to 3 cars providing for the long term (2016 – 2026).
- That there would likely be an additional 140 directional trips generated upon the Chingford Mount Bus Corridor by 2026 under the high growth scenario and that the high growth scenario represents a 70% increase in trips upon the bus route over that of the lower growth scenario. This represents an equivalent bus value of 3 extra buses to maintain current levels of passenger service levels.
- That there would likely be an additional 450 directional trips generated upon the Markhouse Road Bus Corridor by 2026 under the high growth scenario and that the high growth scenario represents a 475% increase in trips upon the bus route over that of the lower growth scenario. This represents an equivalent bus value of 9 extra buses to maintain current passenger service levels. An additional 5 buses would be required to maintain current passenger service levels in the short term (2009-14).
- That there would likely be an additional 1,700 directional trips generated upon the Lea Bridge Road Bus Corridor by 2026 under the high growth scenario and that the

high growth scenario represents a 122% increase in trips upon the bus route over that of the lower growth scenario. This represents an equivalent bus value of 25 extra buses to maintain current passenger service levels. An additional 5 buses would be required to maintain current passenger service levels in the short term (2009-14).

From an examination of **Table 4-11** the following statements can be made for each sub-area:

- Within the Northern WF sub-area, an additional 620 outbound trips and a nominal reduction of 65 inbound trips by motor vehicle would likely be generated upon the public highway under the high growth scenario and 365 outbound trips and a reduction of 65 inbound trips under the lower growth by 2026. 25 Cycle and 75 walking trips would likely be generated by 2026 under high growth, with 14 and 50 respectively under the lower growth scenario. In the short term, there would likely be a nominal increase of 55 outbound trips and a reduction of 275 inbound trips under both the higher and lower growth scenarios. There would likely be an improvement in the level of service upon the road network in the short term, provided that the capacity made available was not taken up by other car-borne trips.
- Within the Central WF sub-area, an additional 2,750 outbound and 1,450 inbound trips by motor vehicle would likely be generated upon the public highway under the high growth scenario and 2,000 outbound and 1,500 inbound trips under the lower growth by 2026. 150 Cycle and 700 walking trips would likely be generated by 2026 under high growth, with 150 and 650 respectively under the lower growth scenario. In the short term, an additional 550 inbound and 800 outbound trips by motor vehicles would likely occur for both the higher and lower growth scenarios.
- Within the Blackhorse Lane sub-area, an additional 1,350 outbound and a reduction of 850 inbound trips by motor vehicles would likely be generated upon the public highway under the high growth scenario and 250 outbound and a reduction of 850 inbound trips under the lower growth by 2026. An additional 65 cycle movements and 225 walking trips would likely be generated by 2026 under high growth. In the short term, an additional 750 outbound and a reduction of 600 inbound trips by motor vehicles would likely occur under the high growth scenario and 123 outbound and a reduction of 600 inbound trips under lower growth.
- Within the Southern WF sub-area, an additional 3,330 outbound and 1,500 inbound trips by motor vehicles would likely be generated upon the public highway under the high growth scenario and 600 outbound and 1,500 inbound trips under the lower growth by 2026. An additional 250 cycle movements and 800 walking trips would likely be generated by 2026 under high growth. In the short term, an additional 450 outbound and 850 inbound trips by motor vehicles would likely occur under the high growth scenario and 275 outbound and 850 inbound trips under lower growth.

In conclusion, it is considered that the high growth scenario would, with the exception of the Northern WF sub-area, be significantly detrimental to the existing and planned transport infrastructure provision over the long term period of this assessment, and in particular to the road network serving the borough.

## 5 RECOMMENDATIONS - TRANSPORT INFRASTRUCTURE REQUIRED TO SUPPORT GROWTH

### 5.1 Introduction

The additional trips generated by the projected housing and employment floorspace growth scenarios as presented within the previous section will be considered against the baseline conditions by infrastructure provision for public transport modes and by sub-area for motorised traffic, cycling and walking modes. Deficiencies established within the baseline transport network under the predicted new travel demands generated within each five year time band will be identified and, taking into account the effect of the lower and higher growth scenarios, transport solutions complying with current national, regional and local policy will be presented to mitigate the impact of the newly generated movements upon the transport network.

In the main, such policy commitment should:

- Ensure that development offers a realistic choice of access by public transport, walking and cycling;
- Promote sustainable transport choice and reduce reliance upon the car;
- Give priority to people over ease of traffic movement, with more road space allocated to pedestrians, cyclists and public transport;
- Improve road safety and the environment;
- Use traffic reduction and modal transfer to reduce emissions and improve air quality;
- Ensure that safe, convenient, accessible and direct routes are available from new developments to public transport nodes and key infrastructure requirements;
- Use traffic management measures to improve road safety and reduce congestion through reallocation of road space, increased pedestrian, cycle and public transport facilities, and improved junction control including selective vehicle priority.

It is known that both Network Rail, through its *Strategic Business Plan*, and TfL, through its *Business Plan*, are making provision for increased commuter demand on rail and LU routes serving Waltham Forest. Both deliver significant increases in capacity in the short to medium term (2009 – 2019) upon rail transport serving the population of Waltham Forest.

The LU network will see significant enhancements to its line capacity over the next 10 years across the network, providing increased accessibility and connectivity for the population of Waltham Forest to the Greater London area and major interchange termini with Network Rail. Network Rail and London overground have committed schemes that will provide significant new provision in the form of Crossrail, First Capital Connect (Thameslink), the North London orbital route and delivery of the strategic interchange at

Stratford station for the 2012 Olympic & Paralympic Games and thereafter, providing new opportunities and connectivity for the population of Waltham Forest.

It is considered unlikely that such funding and investment as currently programmed for these efficient, strategic and highly important forms of public transport will be available for further line capacity improvements in the short to medium term. It is likewise considered for Waltham Forest that any capital investment that may be available for further public transport enhancements and improvements over the period of this plan should be utilised to reinforce the surface transport links to the key interchange hubs with the improved LU and overground rail infrastructure.

It is also evident that the car-borne trips generated by the growth projections present a significant number of new trips upon the highway network. This will be contrary to current policy commitments where zero growth is being sought within town centres. It should be considered necessary within recommendations to encourage a step change philosophy in car usage in the borough so as to maximise the benefit gained from public transport, and particularly mass transit modes and thereby free up carriageway space by reducing car-borne movements. In doing so, it should be promoted within this plan that improvements recommended upon the public highway network be to the benefit of public transport, pedestrians and cyclists in the main.

borough wide, the management of travel demand will need to form an integral part of the transport strategy for the borough through planning policy and the documents that support it, as well as the Network Management Plan and the Waltham Forest cycle strategy. In conjunction with borough growth, the borough will need to continue to:

- Implement a development Travel Plan
- Promote School Travel Plans
- Reduce the impact of new developments through car free/car capped housing, travel plans, construction management plans and servicing management plans and cycle parking
- Promote the use of car clubs
- Promote travel awareness
- Promote cycling and walking including the implementation of Legible London and improving links and providing cycle stations
- Continue to improve public transport within Waltham Forest.
- Provide step free access at stations throughout the borough

Within this section of the plan, the capacity provision of the planned and committed investment programme shall be compared with the increased travel demand generated by the growth of Waltham Forest to 2026 and realistic enhancement to the transport

infrastructure within the borough promoted to provide for the projected growth and travel demands.

## 5.2 Capacity and Growth in Northern WF

The new 2026 population projection for Northern WF sub-area is for 1,936 residents under a lower growth scenario and 3,290 residents under the higher growth scenario. There is also a net reduction of 5,086m<sup>2</sup> in employment floorspace, the reduction in employment floorspace occurring over the 15-year assessment period of this plan at an approximately linear rate.

It has been shown at **Tables B-1** and **B2** at **Appendix B**, that the principal mode of travel for trips from Northern WF is the car. This is not unsurprising considering the PTAL values presented at **Figure 2-4** and the population density at **Figure 2-5**. Underground, rail and bus trips from Northern WF combined, present a total of 132 to 363 new trips by public transport modes over the short to medium period of this plan for the lower and higher growth scenarios respectively, and 400 to 700 new trips over the long term for lower and higher growth respectively.

It is considered that over the short to medium duration, the Chingford to Liverpool Street overground rail line, currently experiencing an overcrowding ratio of <0.8 at 2006 levels within the Northern WF sub-area, would accommodate the expected increase in trips over the short to long term duration of this plan for the higher growth population (150 trips expected).

It has been suggested that all LU trips would be undertaken upon the Victoria Line and that as the line already suffers from overcrowding, then the additional new trips would create further overcrowding over the duration of this plan.

Newly generated bus trips account for between 80 to 150 trips over the long-term duration of this plan for lower and higher growth respectively. Assuming that a 'typical' single decker bus carries approximately 50 passengers (max) this would equate to an equivalence of three additional buses upon the public transport network (although it is more likely to be five given the dispersion and different bus route destinations required).

The net effect of the growth within the Northern WF sub-area is that there will be an increase in car-borne travel of 110 to 300 outbound trips upon the road network to accommodate growth to the medium duration of this plan for the lower and higher growth scenarios respectively. This will increase over the long term to between 350 and 600 outbound trips for lower and higher growth respectively. It has also been determined that the greater proportion of car-borne journeys are for short journeys, with both origins and destinations being within Waltham Forest or the adjoining London Boroughs. From a consideration of the average journey speeds, average delays and the AADFs current upon the highway network within the vicinity of Northern WF, it can be seen that a number of junctions are significant to the capacity of the highway links within the Northern WF sub-area, these being:

- Kings Head/Station Road/Kings Road

- Hall Lane/Chingford Mount Road/New Road/Old Church Road
- Hall Lane/Waltham Way roundabout
- Valley Road/Sewardstone Road/Kings Head Hill/Waltham Way

AADFs for Hall Road being 18,200, Chingford Mount Road 18,200, Chingford Lane 14,000, (these being the principal north-south routes from Northern WF sub-area), Kings Head Hill, 12,200, Sewardstone Road, 19,500 and Kings Road, 14,000, (these being the principal east-west route from Northern WF sub-area).

### 5.2.1 Gap Analysis

In order to reduce the effect of the new car-borne trips associated with growth within the Northern WF sub-area, it will be necessary to promote alternative sustainable modes for the short to medium journey lengths that form the greater proportion of existing car-borne trips. These alternative modes would be overland rail and bus modes.

Currently, rail services from Northern WF sub-area are limited upon the Chingford to Liverpool Street line, serving Chingford, Highams Park, Wood Street, Walthamstow Central and St. James Street stations within Waltham Forest with a 15 minute service currently operates during peak travel periods. Provisions at Chingford station are limited, with a nominal number of cycle lockers and stands. It has interchange with a number of bus services to Chingford Mount, Walthamstow, Leytonstone and Leyton Bakers Arms. Junction delays are experienced at the road junction serving Chingford station.

Bus services from Northern WF sub-area use two main bus corridors towards the south of the borough, these being the Chingford Mount corridor, a priority bus route, and the Larkhall Road corridor. It has been established that Chingford Mount Road corridor suffers from low link travel speeds during peak periods and delays at the main traffic signal controlled crossroad junction with New Lane. Larkhall Road has acceptable travel speeds and junction delays along its length within the Northern WF sub-area. A single bus serves Chingford along the A110 to both the east and west of the borough border. To the west junction delays are experienced along Valley Road.

### 5.2.2 Proposed Solutions

Waltham Forest has sought the re-establishment of the Hall Farm Curve upon the Chingford to Liverpool Street overland rail line. This would provide a direct link between Chingford and Stratford stations, with interchange to West Ham and Canning Town, and for Pudding Mill Lane within the Lower Lea Opportunity Area via the Forest Line, and an interchange with the Central Line. The provision of a direct service into Stratford from the north of the borough would provide a strategic service passing through five of the stations within the borough. The introduction of a new service to Stratford would need support from:

- Improved pedestrian and cycle accessibility to the stations from within the Northern WF sub-area

- Improved secure cycle parking provision at the station to accommodate increased cycle patronage
- Improved public realm surrounding the station to enhance pedestrian circulation and movement
- Bus access and interchange improvement

The justification for the reinstatement of the Hall Farm curve to establish a direct route by overland rail between Chingford and Stratford, is established from a high level evaluation of the potential mode transfer from car-borne trips between the sub-areas and the London Boroughs of Newham and Hackney. **Figures 2-1** and **2-2** present the proportions of these trips at 52.4% and 50.6% for the outbound and inbound trips to/from Newham, (1,744 and 1,091), and 45.3% and 51.3% to/from Hackney (1,802 and 620). Furthermore, the employment based trip attractions of the Opportunity Areas at Stratford and the Lower Lea Valley for the new working population of Waltham Forest as indicated at **Table 4-2**, presents a significant passenger catchment along the overland rail route corridor.

However, it is considered that the provision of sufficient detailed information to validate a business case presentation for the justification of the rail infrastructure proposed, is beyond the scope of this study. At the time of writing WF Council have begun further work assessing the viability of this infrastructure.

We also consider that to promote public transport trips in the short to medium term, bus priority measures along the Chingford Mount bus corridor and at the Chingford Mount Road/New Road junction should be enhanced to promote service reliability and reduce excess waiting time. Chingford Mount Road is a relatively narrow road and unlikely to accommodate segregated bus lanes throughout its length. GPS based tracking bus priority measures and real time information systems would be a suggested alternative.

### 5.3 Capacity and Growth in Central WF

The new 2026 population projection for Central WF sub-area is for 11,751 residents under a lower growth scenario and 12,834 residents under the higher growth scenario. There is also a net increase of 38,214m<sup>2</sup> in employment floorspace (the greater proportion of which is retail), the increase in employment floorspace occurring over the 15 year assessment period of this plan with a short term increase of 9,157m<sup>2</sup>, and a total medium term increase of 21,183 m<sup>2</sup>.

It has been shown at **Tables B3** and **B4** at **Appendix B**, that the principal modes of travel for trips from the Central WF sub-area are the car and LU, with the car dominant for short journeys. Underground, rail and bus trips from Central WF sub-area combined, present a total of 1,570 to 1,726 outbound trips by public transport modes over the short and medium period of this plan for the lower and higher growth scenarios respectively, and 2,735 to 2,985 outbound new trips over the long term for lower and higher growth respectively. Over the same periods, there are 1,126 to 1,250 new outbound trips by car over the short to medium term and 1,897 to 2,163 outbound new trips over the long term for lower and higher growth respectively.

The greater proportion of public transport trips will be via the Victoria Line which currently suffers from overcrowding during the peak travel periods. TfL LU are promoting an increase in line capacity of 19% over the current capacity by 2011. The additional trips generated over the short to the long-term duration of this plan will exacerbate the current overcrowding further, and the additional capacity generated upon the line will be exceeded in the short term.

The Chingford to Liverpool Street and Barking to Gospel Oak LOL may be accessed within the Central WF sub-area at either Walthamstow Central or Walthamstow Queens Road respectively. Both lines have overcrowding ratios of <0.8 at the 2006 level. It is considered that over the short to medium term these lines would accommodate the expected increase in trips for the high growth population (345 trips expected). In the medium to long term, the planned improvements by TfL London overground to increase service frequency upon the North London orbital route incorporating the Barking to Gospel Oak line by 2011 would accommodate the expected increase in trips over the long term duration of this plan for the higher growth projection (600 trips expected), although with an increase in the level of overcrowding predicted.

Newly generated bus trips account for between 576 to 628 trips over the long-term duration of this plan for lower and higher growth respectively. Assuming that a typical double decker bus carries approximately 75 passengers (max), this would equate to an equivalence of 8 to 9 additional buses upon the public transport network, (although it is more likely to be 10 to 12 given the dispersion and different bus route destinations required).

The net effect of the growth within the Central WF sub-area is that there will be an increase in car-borne travel of 1,126 to 1,250 outbound trips upon the road network to accommodate growth to the medium duration of this plan for the lower and higher growth scenarios respectively. This increasing over the long term to between 1,897 and 2,163 outbound trips for lower and higher growth respectively. It has also been determined that the greater proportion of car-borne journeys are for short journeys, with both origins and destinations being within the Central WF sub-area or the adjoining London Boroughs. From a consideration of the average journey speeds, average delays and the AADFs current upon the highway network within the Central WF sub-area, it can be seen that a number of junctions are significant to the capacity of the highway links within the sub-area, these being:

- Blackhorse Road Crossroads with Forest Road
- Hoe Street Crossroads with Forest Road
- Wood Street crossroads with Forest Road
- The 'Crooked Billet' grade separated interchange with the NCR

AADFs for Forest Road being 11,554 at the Blackhorse Road crossroads and 18,648 at the Wood Street crossroads, Chingford Road 13,975 and Woodford New Road in the east of the sub-area, 32,339.

The NCR passes through the Central WF sub-area with a number of major structures along its route. There are two grade separated interchanges serving the NCR from the borough roads within the sub-area, these being the Crooked Billet and Waterworks Corner. The NCR forms a barrier to all movement between the north and south halves of the borough, constraining movement to three crossings within the Central WF sub-area. The nature and form of the NCR crossings limit the carriageway space within which to effect mitigating measures and the vertical separation precludes at-grade crossings for pedestrians or segregated at-grade routes for cyclists.

The 3G London Bus Priority scheme promoted by TfL within Walthamstow Town Centre is now current for the Hoe Street/Selborne Road junction within Waltham Town Centre, together with public realm improvements delivering wider benefits to pedestrians and cyclists, with further funding sought to implement the second phase for a connection to the bus station through a narrow length of Hoe Street.

### 5.3.1 Gap Analysis

The Victoria Line is a strategic public transport provision through Central WF sub-area and is currently operating at an overcrowded level. Planned line capacity improvements are planned for 2011 providing an additional 19% capacity. This additional planned capacity will be exceeded in the short term by the projected growth of the sub-area. As has been previously stated, it is considered that there will be no further line capacity improvements within the duration of this plan.

For the short journeys in which car travel currently dominates, the bus mode of public transport dominates over the overground rail mode. The principal direction of bus travel demand from the Central WF sub-area as indicated by reference to **Figure 2-2** is to and from the south along the Markhouse Road, Hoe Street and, to a lesser extent, the Wood Street bus corridors. An examination of the average travel speeds along these bus corridors and the journey delay afforded by the traffic signal controlled crossroad junctions with Forest Road previously identified clearly indicate that bus reliability may be compromised, thereby increasing excess waiting time.

There is currently no direct overland rail access to Stratford or the Lower Lea Valley Opportunity Area. Currently, access to Stratford is by bus and interchange or mainline and London Overground rail, walk and interchange to the Central Line at either Leyton or Leytonstone.

Pedestrian and cycle movements between the north and south sides of the NCR are severely constrained by the NCR to confined and traffic dominated crossing points. Improvements are necessary to provide safe routes for pedestrian and cycle movements at these wide and congested locations, preferable at-grade with the borough roads.

Public realm improvements would be necessary along key corridors to promote the walking stage of a bus journey and the interchange between Walthamstow Central on the Chingford to Liverpool Street line and Walthamstow Queens Road on the Barking oak to Gospel Oak line to assist interchange between these two rail routes.

### 5.3.2 Proposed Solutions

In order to reduce the effect of the new car-borne trips associated with growth within the Central WF sub-area, it will be necessary to promote alternative sustainable modes for the short to medium journey lengths that form the greater proportion of existing car-borne trips. Such alternative modes could be overland rail and bus modes.

The only possible solution to overcrowding on the Victoria Line would be to increase the number of trains between Seven Sisters and Walthamstow Central from the current service level of 16 trains per hour. At a train capacity of 833 passengers per train, it would be necessary to provide an additional 3 trains per hour to maintain current passenger service levels in the long term. This would require significant investment from TfL in the LU line it is considered an unlikely solution.

To promote sustainable travel by public transport in the short and medium duration and to reduce reliance upon car-borne travel, it is considered necessary to enhance bus priority measures along the bus corridors between the north and south of the borough as they pass through the Central WF sub-area. The corridors are controlled by the traffic signal controls at the key junctions and the limited carriageway space available at the grade separated crossings with the NCR, which are also controlled by traffic signal controls. It is therefore suggested that GPS based bus tracking priority methods to prioritise bus movements along the corridors and across the junctions. Real time bus information should also be provided.

In conjunction with the bus corridor improvements, the re-establishment of the Hall Farm Curve upon the Chingford to Liverpool Street mainline rail route would provide a direct link between Waltham Central and Stratford station, with interchange to West Ham and Canning Town, and for Pudding Mill Lane within the Lower Lea Opportunity Area via the Forest Line, together with an interchange with the Central Line at Stratford. The provision of a direct service into Stratford would provide direct access to the north of the borough and the Opportunity Areas to the south and would provide a strategic service passing through five of the stations within the borough. The introduction of a new service to Stratford would support Waltham Forest as a whole and not just the Central WF sub-area.

The justification for the reinstatement of the Hall Farm curve to establish a direct route by overland rail between Chingford and Stratford, is established from a high level evaluation of the potential mode transfer from car-borne trips between the sub-areas and the London Boroughs of Newham and Hackney. **Figures 2-1** and **2-2** present the proportions of these trips at 52.4% and 50.6% for the outbound and inbound trips to/from Newham, (1,744 and 1,091), and 45.3% and 51.3% to/from Hackney (1,802 and 620). Furthermore, the employment based trip attractions of the Opportunity Areas at Stratford and the Lower Lea Valley for the new working population of Waltham Forest as indicated at **Table 4-2**, presents a significant passenger catchment along the overland rail route corridor.

However, it is considered that the provision of sufficient detailed information to validate a business case presentation for the justification of the rail infrastructure proposed, is

beyond the scope of this study. At the time of writing WF Council have begun further work assessing the viability of this infrastructure.

An increase in the number of cars from two to three cars per train upon the Barking to Gospel Oak line would greatly assist in reducing the predicted overcrowding of 3-4 passengers standing per square metre upon the two car trains, and improve the capacity of the line over that currently presented by TfL.

Consideration could be given to the use of existing defined traffic lanes on approach to the grade separated junctions with the NCR for use by bus and cycle traffic to promote bus priority through the interchanges and a safe route for cyclists. This will be detrimental to traffic flows due to the loss of traffic capacity with no additional carriageway space available upon the elevated structures forming the road crossings.

Public realm improvements should be provided along key routes identified for walking and cycling modes, linking into the public transport bus network to promote interchange.

#### 5.4 Capacity and Growth in Blackhorse Lane

The new 2026 population projection for the Blackhorse Lane sub-area is for 1,413 residents under a lower growth scenario and 8,076 residents under the higher growth scenario. There is also a net reduction of 29,664m<sup>2</sup> in employment floorspace forecast. The reduction in employment floorspace occurring over the 15 year assessment period of this plan with a short term decrease of 9,647 m<sup>2</sup>, and a total medium term decrease of 19,294 m<sup>2</sup>.

It has been shown at **Tables B7** and **B8** at **Appendix B**, that the principal modes of travel for trips from Blackhorse Lane are the car and LU, with the car dominant for short journeys. Underground, rail and bus trips from Blackhorse Lane sub-area combined, present a total of 340 to 1,042 outbound trips by public transport modes over the short and medium period of this plan for the lower and higher growth scenarios respectively, and 328 to 1,881 outbound new trips over the long term for lower and higher growth respectively. Over the same periods, there are 232 to 1,294 new outbound trips by car over the short to medium term and 225 to 1,286 outbound new trips over the long term for lower and higher growth respectively.

The greater proportion of public transport trips will be via the LU Victoria Line, which currently suffers from overcrowding during the peak travel periods. TfL are promoting an increase in line capacity of 19% over the current capacity by 2011. The additional trips generated from the short to the long term will exacerbate the current overcrowding further, and the additional capacity generated upon the line will be exceeded in the short term.

Newly generated bus trips account for between 76 to 437 trips over the long-term duration of this plan for lower and higher growth respectively. Assuming that a typical double decker bus carries approximately 75 passengers (max), this would equate to an equivalence of 1 to 6 additional buses upon the public transport network (or more likely to be 2 to 8 given the dispersion and different bus route destinations required).

The net effect of the growth within the Blackhorse Lane sub-area is that there will be an increase in car-borne travel of 232 to 1,294 outbound trips upon the road network to accommodate growth to the medium duration of this plan for the lower and higher growth scenarios respectively. This remaining constant over the long term at between 225 and 1,286 outbound trips for lower and higher growth respectively. It has also been determined that the greater proportion of car-borne journeys are for short journeys, with both origins and destinations being within Waltham Forest or the adjoining London Boroughs. From a consideration of the average journey speeds, average delays and the AADFs current upon the highway network within the Central WF sub-area it can be seen that a number of junctions are significant to the capacity of the highway links within the sub-area, these being:

- The Blackhorse Lane/Forest Road Crossroads;
- The southern approaches to the Crooked Billet interchange with the NCR;
- AADFs for Forest Road at the Blackhorse Road crossroad junction being 11,554 and Blackhorse Road 12,589.

#### 5.4.1 Gap Analysis

The Blackhorse Lane sub-area is a contained area by the Lockwood and High Maynard reservoirs to the west, the Banbury reservoir and the NCR to the north and north-east the Forest Road corridor to the south and the Chingford Mount corridor to the east. The principal transport gateways serving this area being the Blackhorse Road/Forest Road crossroads in the south west corner and the Crooked Billet interchange with the NCR in the north east. Both junctions suffer from higher levels of junction delay.

Pedestrian accessibility to Blackhorse Road LU and overground rail stations is dominated by vehicular traffic at the crossroad junction between Forest Road and Blackhorse Road. The carriageway crossing widths are large with three approach lanes on Forest Road. Eastbound pedestrian movements over this crossroad junction are heavily influenced by traffic signal timings biased towards vehicular traffic movements.

The Forest Road corridor is controlled by a number of traffic signal controlled junctions, causing link delay along Forest Road. This in turn affects the reliability of bus services along Forest Road. There is restricted carriageway width along Forest Road to the east of Blackhorse Road.

There is currently no direct LU or mainline rail access to Stratford or the Lower Lea Valley Opportunity Area. Currently, access to Stratford is by bus and interchange or LU rail and interchange to the overland Lea Valley line to Stratford at Tottenham Hale station.

#### 5.4.2 Proposed Solutions

An area action plan (AAP) has been developed for the Blackhorse Lane regeneration area and a full Transport Assessment carried out in 2008. The main outcome of the transport assessment is the promotion of a new route between Forest Road eastbound and Sutherland Road. This will relieve the vehicular pressure on the Forest

Road/Blackhorse Road crossroads, releasing capacity at the junction which should be taken up by bus and pedestrian priorities.

The signal timings along Forest Road should be re-calibrated to alleviate those lengths where necessary for pedestrian and bus priority and constrain those lengths to cap vehicular growth along the corridor, providing for an enhanced pedestrian and cycle environment.

A further solution is to reinforce bus priority measures at the Crooked Billet traffic signal controlled grade separated interchange with the NCR providing greater reliability and achieving reductions to excess waiting time for bus movements through the Blackhorse Lane sub-area.

The re-establishment of the Hall Farm Curve upon the Chingford to Liverpool Street overland rail line would provide an alternative route by overland rail from Blackhorse Road station through interchange at Walthamstow Queens Road with Walthamstow Central with a direct link to Stratford station, with interchange to West Ham and Canning Town, and for Pudding Mill Lane within the Lower Lea Opportunity Area via the Forest Line, together with an interchange with the Central LU at Stratford. The re-establishment of the Hall Farm Curve on the Chingford to Liverpool Street mainline rail, would provide a public transport link via interchange to the north of the borough and the Opportunity Areas to the south, as well as a link to Liverpool Street from Waltham Central. It would provide a strategic service passing through five of the stations within the borough. The introduction of a new service to Stratford would support Waltham Forest as a whole and not just the Central WF sub-area.

The justification for the reinstatement of the Hall Farm curve to establish a direct route by overland rail between Chingford and Stratford, is established from a high level evaluation of the potential mode transfer from car-borne trips between the sub-areas and the London Boroughs of Newham and Hackney. **Figures 2-1** and **2-2** present the proportions of these trips at 52.4% and 50.6% for the outbound and inbound trips to/from Newham, (1,744 and 1,091), and 45.3% and 51.3% to/from Hackney (1,802 and 620). Furthermore, the employment based trip attractions of the Opportunity Areas at Stratford and the Lower Lea Valley for the new working population of Waltham Forest as indicated at **Table 4-2**, presents a significant passenger catchment along the overland rail route corridor.

However, it is considered that the provision of sufficient detailed information to validate a business case presentation for the justification of the rail infrastructure proposed, is beyond the scope of this study. At the time of writing WF Council have begun further work assessing the viability of this infrastructure.

## 5.5 Capacity and Growth in the Southern WF

The new 2026 population projection for the Southern WF sub-area is for 3,756 residents under a lower growth scenario and 21,315 residents under the higher growth scenario. There is also a net increase of 38,959m<sup>2</sup> of employment floorspace. The increase in employment floorspace occurring over the 15 year assessment period of this plan with a short term increase of 9,768m<sup>2</sup>, and a total medium term increase of 22,006m<sup>2</sup>.

It has been shown at **Tables B5 and B6 at Appendix B**, that the principal modes of travel for trips from Southern WF sub-area are the car and LU, with the car dominant for short journeys. Underground, rail and bus trips from Southern WF sub-area combined, present a total of 642 to 2,200 outbound trips by public transport modes over the short and medium period of this plan for the lower and higher growth scenarios respectively, and 879 to 4,980 outbound new trips over the long term for lower and higher growth respectively. Over the same periods, there are 408 to 1,395 new outbound trips by car over the short to medium term and 557 to 3,160 outbound new trips over the long term for lower and higher growth respectively.

The greater proportion of public transport trips will be via the Central LU at Leyton, which currently suffers from overcrowding during the peak travel periods. The additional trips generated from the short to the long term will exacerbate the current overcrowding further.

Newly generated bus trips account for between 189 to 1,070 trips over the long term duration of this plan for lower and higher growth respectively. Assuming that a typical double decker bus carries approximately 75 passengers (max), this would equate to an equivalence of 3 to 15 additional buses upon the public transport network (or more likely to be 5 to 20 given the dispersion and different bus route destinations required).

The net effect of the growth within the Southern WF sub-area is that there will be an increase in car-borne travel of 408 to 1,395 outbound trips upon the road network to accommodate growth to the medium duration of this plan for the lower and higher growth scenarios respectively, increasing over the long term to between 557 and 3,160 outbound trips for lower and higher growth respectively. It has also been determined that the greater proportion of car-borne journeys are for short journeys, with both origins and destinations being within Waltham Forest, primarily the Central WF sub-area or the adjoining London Boroughs. From a consideration of the average journey speeds, average delays and the AADFs current upon the highway network within the Southern WF sub-area, it can be seen that a number of junctions are significant to the capacity of the highway links within the sub-area, these being;

- The Markhouse Road and Lea Bridge Road crossroads
- The Hoe Street and Lea Bridge Road crossroads
- The Leyton High Road and Francis Road junction
- The Leyton High Road and Francis Road priority controlled T-junction
- The Leytonstone, Harrow Road and Cathall Road priority controlled staggered crossroad junction

AADFs for Lea Bridge Road at the Markhouse Road crossroad junction being 22,067 and at the Hoe Street junction, 19,729. At Leyton High Road and at Warren Road the figures are 16,349 and 5210 respectively.

### 5.5.1 Gap Analysis

It is considered that the transport demand generated by the higher growth scenario may be unsustainable in terms of the Southern WF sub-area transport network and the constraints afforded by public transport accessibility and overcrowding upon the Central LU. The Lea Bridge Road corridor carries high volumes of east-west traffic movements to the detriment of the north-south bus corridor routes along Markhouse Road and Hoe Street.

The A12 three lane dual carriageway runs through the Southern WF sub-area, providing physical separation between the northern and southern sides of the sub-area, constraining cross movement connectivity between the north and south to four overbridge locations. The A12 is separated from the borough roads, with access at the eastern end of the sub-area at the Green Man interchange at Leytonstone, and the Hackney Wick Interchange at the western end of the sub-area.

The two Central Line LU stations serving the Southern WF sub-area are both located on the southern side of the A12, served from the northern side by two of the overbridges. Leytonstone High Road overground station on the Barking to Gospel Oak line is also located on the southern side of the A12. Only Leyton Midland Road is located on the northern side of the A12 within the Southern WF sub-area, this located along Leyton High Road.

There is poor public transport accessibility along the western boundary of the Southern WF sub-area (Orient Way), within which one of the key regeneration areas is located.

There is no access to the Lea Valley overland rail which runs along the western boundary of the Southern WF sub-area.

### 5.5.2 Proposed Solutions

The demand for travel generated by growth within the Southern WF sub-area is expected to be significant. In order to reduce the effect of the new car-borne trips associated with growth within the Southern WF sub-area, it will be necessary to promote alternative sustainable modes for the short to medium journey lengths that form the greater proportion of existing car-borne trips, such as overland rail and bus modes.

There is no solution to the creation of additional line capacity upon the Central LUL, as the TfL planned programme to increase service frequency has now been implemented.

The re-opening of the Lea Bridge mainline rail station on the Lea Valley line in conjunction with the re-establishment of the Hall Farm Curve on the Chingford to Liverpool Street mainline rail would provide a direct link between the Southern WF western sub-area with Chingford in the north and Stratford to the south. The provision of a direct service into Stratford from the north of the borough would provide a strategic service passing through five of the stations within the borough. The introduction of a new service to Stratford would support Waltham Forest as a whole and not just the Southern WF sub-area. The introduction of a new service to Stratford and the re-opening of a station at Lea Bridge would need support from:

- Improved pedestrian and cycle accessibility to the stations from within the Southern WF western sub-area
- Improved secure cycle parking provision at the station to accommodate increased cycle patronage
- Improved public realm surrounding the station to enhance pedestrian circulation and movement
- Bus access and interchange improvement

The justification for the reinstatement of the Hall Farm curve to establish a direct route by overland rail between Chingford and Stratford, is established from a high level evaluation of the potential mode transfer from car-borne trips between the sub-areas and the London Boroughs of Newham and Hackney. **Figures 2-1** and **2-2** present the proportions of these trips at 52.4% and 50.6% for the outbound and inbound trips to/from Newham, (1,744 and 1,091), and 45.3% and 51.3% to/from Hackney (1,802 and 620). Furthermore, the employment based trip attractions of the Opportunity Areas at Stratford and the Lower Lea Valley for the new working population of Waltham Forest as indicated at **Table 4-2**, presents a significant passenger catchment along the overland rail route corridor. Finally it has been recognised that the Lea Bridge regeneration area as indicated on **Figure 4-1**, is located within an area of low public transport accessibility. The provision of a new access onto the Lea Valley line providing services to Opportunity Areas as well as Central London, provides a substantial passenger catchment to justify the provision of a new station at Lea Bridge.

However, it is considered that the provision of sufficient detailed information to validate a business case presentation for the justification of the rail infrastructure proposed, is beyond the scope of this study. At the time of writing WF Council have begun further work assessing the viability of this infrastructure.

Both east-west and north-south bus corridors cross within the Southern WF sub-area. Bus priority measures supporting both directional bus corridors should be reinforced through GPS Tracking bus priority measures to promote smart technology prioritising bus journeys along both sets of routes with equal effectiveness.

New bus services will need to be established to serve the regeneration area in the west of the Southern WF sub-area.

Existing bus services along Whipps Cross Road will need to be reinforced to accommodate the high travel demand from this regeneration area, in combination with enhanced bus priority measures at the Green man interchange.

## 5.6 Funding

The TfL 2009/2010 to 2017-2018 ten-year business plan was released in November 2008 and funding is expected to be available to boroughs with the *Local Implementation Plan (LIP)* process as for the previous business plan. TfL *LIP* funding aims to financially assist the 33 London Boroughs in providing “safe, integrated, efficient and economic transport

facilities or services to, from or within Greater London". It is planned for in TfL five-year investment programme (the current covers the 2005-2011 period), and is then allocated to individual boroughs on a yearly basis within TfL's business plan. The allocations follow from the annual LIP funding proposals that boroughs submit June each year, where the Councils set out their proposals for transport interventions accordingly to its five-year *LIP* (the current covers the 2005-2011 period).

Within *LIP* funding Waltham Forest has access to both a borough specific and a North Orbital Rail Partnership (NORP) component; it is also collaborating with TfL for the London Cycle Network partnership. Such funding should be considered the primary source of funding for a number of the Council's proposed initiatives. Current allocations within Waltham Forest 2006-2011 *LIP* can contribute to open space and sustainable modes of transport such as cycling and public transport. The five year life-span of the *LIP* means that Waltham Forest will be able to introduce new items identified within its I&IF table for delivery in the short to medium term of this plan, (i.e. up to 2014), in its new document for submission so as to be able to seek funding in future bidding rounds.

The *LIP* process shows a number of limitations. Firstly the annual allocation process means that there may be uncertainties over the funding of infrastructure even within the plan period until annual indicative allocations per borough by transport programme are issued. Also, *LIP* funding is unlikely to contribute to all proposed schemes, or to the entirety of their costs. This is partially the result of the current upper limit of £7 million for boroughs' applications, although there are exceptions to the limit.

The lack of forward funding has been identified as a general issue but as a critical one likely to affect the delivery of transport infrastructure items over the plan period. It is suggested that the Council engages in discussions with TfL and central government to encourage the introduction of forward funding to support growth. This should also be seen in consideration of the fact that Waltham Forest is understood to have continued to source growth area resources, but are likely to exhaust this source. Engagement with the London Development Agency is also encouraged to establish if there are plans to introduce a *Regional Infrastructure Fund* across London, following that which is due to be implemented across the South East and South West of England.

It is further suggested that the Council considers the *TIF* funding process for the promotion of public transport improvements within the borough. *TIF* funding was allied to the promotion of Congestion Charging regimes, but recent representations have been instigated to remove this constraint upon the allocation of *TIF* funding. It is considered likely that during the implementation period of this plan, an additional source of funding to replace the current *TIF* process will be forthcoming.

A more proactive approach would also encompass exploring the potential contribution of introducing a *Community Infrastructure Levy* to support the delivery of infrastructure which is likely to benefit the borough which includes both those items within and outside of the boundaries of the growth areas.

The most recently released TfL business plan identified substantial funding cuts for the next few years and identified that only the most critical of strategic transport infrastructure

such as Crossrail would be funded over the London Plan period. This makes it less likely that schemes such as the re-instatement of the Hall Farm Curve, not currently identified for committed funding will be funded by TfL and emphasis the need for the Council to promote a strong business case when lobbying Government agencies.

## 5.7 Summary

It is evident from the evaluations completed that the projected growth strategies are likely to generate significant increases in people movement during peak travel periods, particularly in the south of the borough within the Central WF and Southern WF sub-areas. It is also evident that unless constrained, the car mode of travel will likely dominate given the relatively short trip lengths to the key Opportunity Areas of Stratford and the Lower Lea Valley to the further detriment of the existing surface transport network.

Furthermore, it is considered that the higher growth scenario within the Southern WF sub-area will be unsustainable due to the constrained transport network between the northern and southern halves of the sub-area separated by the A12 TLRN route.

Informed by current national and local policy commitments, emphasis on a sustainable transport strategy has been adopted within the mitigating measures proposed within each sub-area to meet the requirements of the projected growth strategies. We therefore consider it necessary to promote a step change philosophy in the attitude apparent within the borough by:

- Maximising the benefits gained from the planned investment in strategic public transport provision within and in the vicinity of the borough
- Enhancement and increase of public transport links along identified corridors serving the sub-areas to enable interchange with the strategic public transport network via a reliable and sustainable surface transport mode

In the main, the surface transport links identified relate to the existing bus corridors primarily along the north-south routes serving the sub-areas, such routes being constrained by the segregation afforded to these routes by the North Circular Road and the A12 TLRN roads crossing the borough along an east-west orientation.

We recommend that bus priority measures along the key corridors identified should reflect the constraints afforded by the inadequate carriageway widths prevalent along these routes and precluding the provision of segregated bus lanes. GPS tracking technology has been suggested with SVD on approach to the many signalised junctions along the routes. We suggest that existing carriageway space should be given up to bus lanes on approach to key junctions where insufficient or unviable land take precludes the provision of additional bus lanes.

We also suggest that car borne trips along the corridors should be capped to restrain further growth and to prevent such capacity as may become available through enhanced public transport provisions, from being taken up by suppressed demand for car trips along the corridors. Such restraint could take the form of a reduction in lane capacity at

pedestrian crossings incorporating build-outs, or the provision of lengths of segregated bus lane along stretches of the corridor where the carriageway can accommodate the overall width required.

In support of these public transport road links to provide reliable interchange with the strategic public transport investments, We recommend that the public realm and footway links should be enhanced to provide for the walk stage of the total trip, with Real Time Passenger Information provided along the routes at appropriate locations and key interchange sites, together with improved pedestrian road crossing provisions along the desire lines providing access between the homes and the bus stop sites.

The cycle network has also been identified for enhancement with additional facilities provided at destinations and interchange sites in sufficient quantity to provide for the increased demand necessary to effect a significant modal shift from car to cycle.

We also recommend that Waltham Forest continue to support the reinstatement of the Hall Farm Curve on the Chingford to Liverpool Street LOL to provide a direct rail route through the borough to the strategically important interchange hub at Stratford. This new link would serve the key Opportunity Areas of Stratford and the Lower Lea Valley to the south of the borough, and will also provide a reliable and sustainable link between the north and south of the borough with sufficient existing capacity to accommodate growth over the long term duration of this plan. We consider that the provision of this additional service route will provide the mechanism for significant mode transfer from car borne trips originating in the Northern WF sub-area at Chingford, upper Walthamstow and Walthamstow Central and provide the missing public transport provision within the south-eastern sector of the Southern WF sub-area at Lea Bridge.

## 5.8 Strategic Transport Infrastructure Plans

**Figure 5-1** below summarises the infrastructure requirements for each type of infrastructure covered by this report required to support the possible growth in population over the Core Strategy planning period.

**Tables 5-1** gives the details of each type of infrastructure requirement, by type and phase, and also propose the level of priority (1-4) of how critical the consultants consider the infrastructure item is to ensuring delivery of development in the borough in the context of the entire Strategic Infrastructure Plan:

- Priority level 1 – these are infrastructure items that enable basic functionality and cover utilities such as gas, electricity, sewerage and water
- Priority level 2 – these are infrastructure items that the Council has a current or upcoming legislative requirement to provide. This includes ensuring that all resident children have places at local schools; that waste is disposed of; that surface water run-off is reduced; and sustainable energy generation that will contribute to the achievement of zero carbon development (by 2016 for domestic and 2019 for non-domestic development)

- Priority level 3 – these items are considered critical to ensure that development is sustainable and include primary and secondary healthcare facilities, primary transport improvements necessary to overcome unacceptable levels of congestion, emergency services and telecommunications
- Priority level 4 – these items are considered very important for sustainable development and include burial space in the borough, community meeting spaces, places of worship, leisure facilities (child play space, open space, indoor leisure facilities, swimming pools, allotments, libraries), secondary transport improvements and employment brokerage space

**Table 5-1** is relevant for both the lower growth and higher growth scenarios considered within this study, particularly in respect to the planned rail provision, (both overland and underground), where the planned capacity improvements are constrained by the existing permanent way infrastructure. Similarly for the highway infrastructure requirements identified, limitations and constraints afforded by land availability restrict the capacity improvements that could be promoted whilst maintaining conformity with national and local transport policy. The improvements promoted within the public realm, walking and cycling networks, are unlikely to address capacity issues, but are promoted to afford accessibility and connectivity to the public transport services available within the Borough, thereby enhancing the strategy promoted within this study for a modal shift towards public transport.

With regards to the public transport bus provisions identified within **Table 5-1**, the strategic nature of this study is such that the assignment of additional trips on the bus services has been made on an ‘all or nothing’ basis using the key regeneration areas identified at **Figure 4-1** as the trip origin and the bus corridors presented at **Table 4-9** as the assigned routes. These figures are based on the estimates in **Table 4-10** and represent an upper limit of new services required. They use the higher growth scenario statistics and assume that there is no current spare capacity in the system.

We recommend that further assessment of the bus corridors promoted within this study should be undertaken, such recommendations are discussed in more detail in the next section.

The tables also set out where possible: when and where the infrastructure is required; who is responsible for delivery and funding; where the infrastructure is accounted for in the range of existing plans and investments strategies of the respective responsible agencies; and potential costs as identified by the provider and/or by URS. These dimensions of the analysis inform and add detail to the assessment of infrastructure priority.

## 5.9 Next Steps

The recommendations promoted within this study primarily relate to enhancing the capacity and operational efficiency of the public transport systems serving the borough’s population. In particular, the recommendations promote the further enhancement of the

surface transport public bus services and the bus corridors along the public highways through the borough along which the bus fleet operates.

It is considered that there are four key features pertinent to the surface transport bus services that will be fundamental to the success and passenger carrying capacity of the bus services within the borough, these being;

- The bus fleet, service frequencies, service routes and road side bus infrastructure
- The passenger supply capacity provided by the bus fleet and the passenger demand upon that capacity along each service corridor by user classification and period of day
- The operational efficiency, capacity and constraints of the public highway network over which the bus services operate, and
- The fare structure

The existing bus fleet, service routes and operational frequencies are well defined and readily identified within the borough. Service quality indicators are available and regularly updated by TfL surface transport. A bus stop accessibility programme has been promoted by WF with £65,000 of funding sought within the *LIP* allocation for the year 2009/2010. The physical layout and operational efficiency of the public highway network is well documented and supported by link counts and AADFs' upon relevant roads throughout the borough as presented at **Figures A5 and A6**. Average link speeds and delays are presented at **Figures A7 and A8** and those junctions whose operational efficiency is considered to significantly contribute to the overall link delay have been identified within this study in **Appendix A**.

It is worthy of note to state the greater proportion of these junctions are traffic signal controlled, with a minor proportion being priority controlled roundabouts or junctions. It is also worthy to note that WF wish to undertake a review of all traffic islands located on bus routes within the borough, to review the impact of these islands upon traffic and in particular Bus movements and the waiting and loading restrictions adjacent to the islands, for which funding of £45,000 is sought within the LIP programme for the year 2009/2010.

It is also our considered opinion that the fare structure for bus trips within the borough should be such as to encourage the population to use bus trips for the majority of the short journeys contained within the borough boundaries as identified within **Section 2** of this study and presented diagrammatically at **Figure 2-2**. However, it is acknowledged that the fare structure of the bus companies operating the services within the borough, may be influenced by the Council, but will be driven by commercial viability. It is therefore suggested that such measures as would be necessary by the Council to influence the bus companies with regards to a fare structure to promote sustainable travel through a mode shift towards bus trips, is outside the scope of this study.

We therefore recommend that in order to implement the measures promoted within this study to provide a sustainable borough wide transport strategy to support the growth strategies considered, the establishment of the available capacity and passenger demand

of the bus services by route corridors should be established through trip length distributions along the transport corridors and the boarding to stages ratio, the establishment of the demand to capacity ratio throughout the trip length and the peak to base ratio of trips by period of day, from which the existing bus trip per head of population per sub-area per time band and user classification may be established.

Such information may be available from:

- The operators, particularly those accepting the Oyster card payment system which provides a recorded transaction and enables linked journeys to be investigated<sup>3</sup>
- The National Travel Survey (NTS) from which boarding ratios by stages may be available
- The London Area Travel Survey (LATS), and
- By specific and defined surveys along the bus corridors identified within this study

We suggest that all available data is obtained from the sources identified, assessed to determine the level of relevant information and a gap analysis performed to identify additional information necessary to determine the measures required to establish the bus provision necessary to accommodate the increased demand generated by the growth strategies, and the increase in route journey speeds through corridor improvements necessary to provide increased service frequencies and hence additional capacity. Such additional information required should be sourced through specific road-side and on-board bus surveys.

We therefore recommend that further bus corridor and service route evaluations should be undertaken upon the:

- Chingford Mount Bus Corridor,
- Markhouse Road Bus Corridor, and
- Lea bridge Road Bus Corridor

These will identify measures required to reduce service headway times and increase service frequencies through minimising delays to bus services through traffic congestion and link/junction delays, and also to determine the passenger supply to demand levels along the routes evaluated.

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<sup>3</sup> However, these generally only record boardings and not alightings, so trip lengths may not be determinable

Figure 5-1 Summary of Strategic Transport Infrastructure Requirements

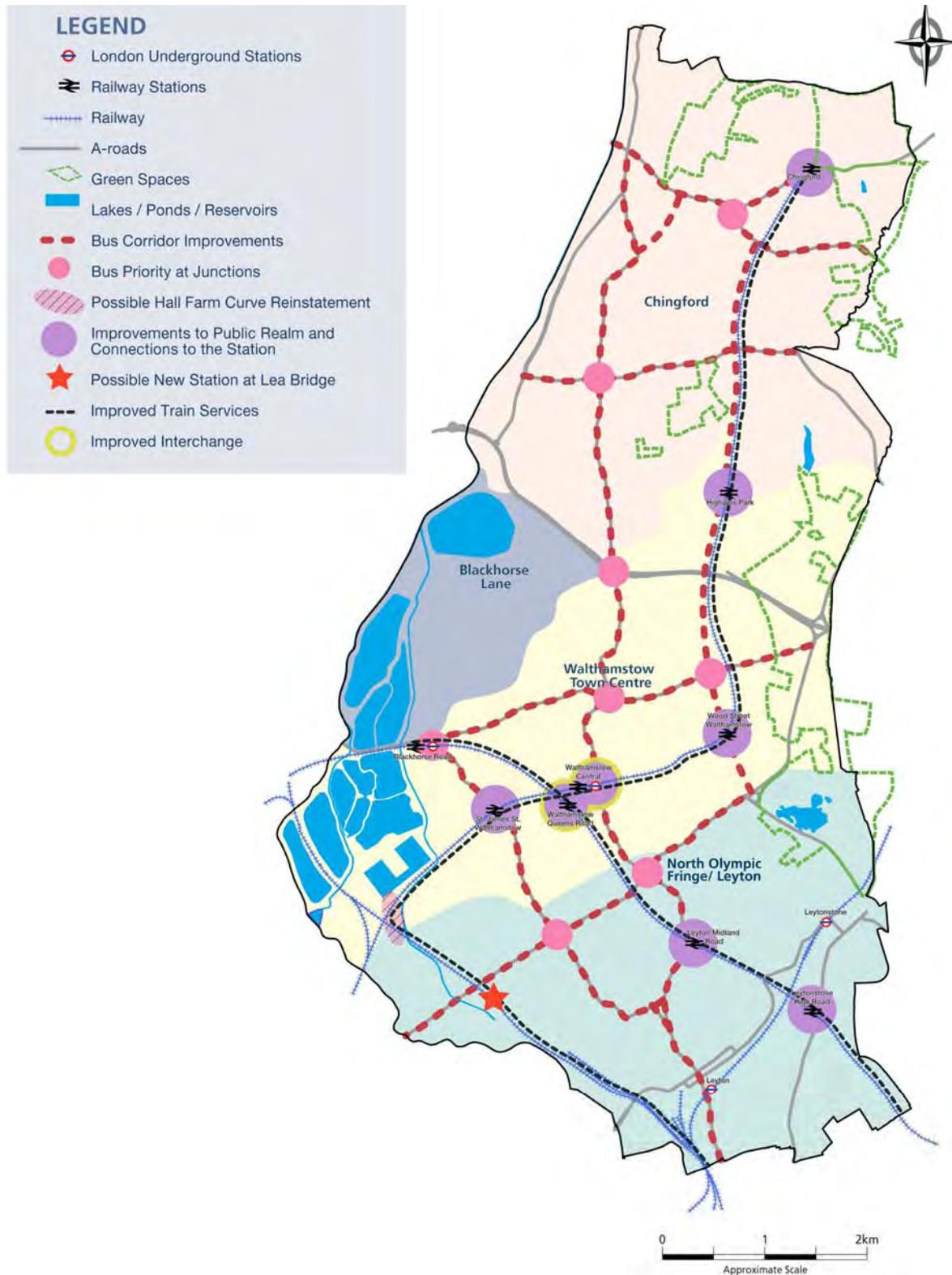


Table 5-1: Summary of Transport Infrastructure Requirements

*Shaded cells indicate the investment is currently programmed*

Infrastructure Area	Infrastructure schemes and actions	Recommended level of priority (1-4)	Rationale for inclusion/risk if not included	Drivers			Phasing	Location	Responsibility and Funding			Costs	Notes
				Policy	Existing gap/ replacement/ upgrade	Forecast demand for development			When should the infrastructure items be delivered by?	Where should the infrastructure item be delivered?	Responsible Delivery Agency		
Rail	Crossrail	3	To alleviate pressure on the LU system and provide a faster east to west rail link connecting Heathrow in the west with the Thames Gateway in the east	✓	✓	✓	Delivery by 2017 (M)	Stratford (close to the Southern WF sub area)	TfL/Network Rail	TfL/Network Rail/Businesses/Developers	Facilitator	£17b	Committed Scheme Crossrail Levy
	Crossrail 2	3	To provide additional capacity		✓	✓	Delivery 2021-2026 (M-L)	Stratford (close to the Southern WF sub area)	Network Rail/TfL	Network Rail/TfL/Businesses/Developer contributions	Facilitator	Undetermined	Line safeguarded/subject to powers and funding.
	North London Line	3	Freight Gauge capacity enhancement on Barking to Gospel Oak Line allowing 'high cube' container trains to operate, doubling number of paths allowing TfL to operate 4 overground trains per hour on the Barking to Gospel Oak line.	✓	✓		Delivery by 2010	Barking to Gospel Oak line	Network rail	DfT	Facilitator	£18.5M	Due for completion Dec. 2009
	North London Line	3	New 2 car service per train, 4 trains per hour to provide additional capacity and connectivity along North London orbital route	✓	✓	✓	Delivery by 2011	Barking to Gospel Oak line (passing through Walthamstow Central and Blackhorse Road station)	TfL	TfL	Facilitator	£75m	
	North London Line	4	Increase service from 2 to 3 car service per train to provide additional capacity		✓	✓	Delivery by 2014-2019	Barking to Gospel Oak line (passing through Walthamstow Central and Blackhorse Road station)	TfL	TfL	Facilitator	Undetermined	Uncommitted proposal if demand justified and funding available
	Possible reinstatement of Hall Farm Curve on Chingford to Liverpool Street Line	3	To provide new service route infrastructure for direct service between Chingford and Stratford			✓	Delivery by 2014-2019	Southern WF sub area	Network rail	Network rail	Facilitator	Not Identified	Planned improvement to be detailed for submission under Network rails CP5 programme of works. Subject to more detailed business plan for more evidence base
	Possible reinstatement of Lea Bridge railway station on Lea Valley Line	3	To provide new access to new service route provided between Chingford and Stratford			✓	Delivery by 2014-2019	Southern WF sub area	Network rail	Network rail	facilitator	Not Identified	Station provision to be provided to serve south-west sector within Southern WF sub-area. Subject to more detailed business plan for more evidence base

Shaded cells indicate the investment is currently programmed

Infrastructure Area	Infrastructure schemes and actions	Recommended level of priority (1-4)	Rationale for inclusion/risk if not included	Drivers			Phasing	Location	Responsibility and Funding			Costs	Notes
				Policy	Existing gap/ replacement/ upgrade	Forecast demand for development			When should the infrastructure items be delivered by?	Where should the infrastructure item be delivered?	Responsible Delivery Agency		
London Underground	Victoria line	3	To provide additional capacity. Services are currently operating at, close or above full capacity particularly during peak hours.		✓	✓	Delivery by 2012	Blackhorse Lane and Central WF sub areas	TfL	TfL	Facilitator	Costs of specific line upgrades yet to be determined but overall programme is currently estimated to be £30b	Higher frequency and larger trains (19% increase in capacity)
Rail and Underground stations	Step free access at LU stations	4	To improve accessibility	✓	✓	✓	2015-2026 (M-L)	borough wide	TfL	TfL	Facilitator	Not identified	
	Step free access at rail stations	4	To improve accessibility		✓	✓	2015-2026 (M-L)	borough wide	TfL/NR	TfL/NR	Facilitator	Not identified	
Bus	Chingford to Leyton 3 <sup>rd</sup> Generation Bus Priority	3	To improve and maintain reliability		✓	✓	Delivery by 2009-2014	Chingford to Leyton	TfL	LBWF/TfL	Planning authority/facilitator	£12m	Funding regime revised, now removed from TfL business plan, now funded through LBWF LIP allocation
	Blackhorse to Stratford Olympic legacy Route	3	Improvements and increase in service frequency			✓	Delivery by 2009-2014	Blackhorse Lane to Stratford	TfL	ODP	facilitator	TBD	
	Corridor Bus Priority	3	To improve capacity, accessibility and connectivity		✓	✓	Delivery 2014-2019	See Figure 5-1 for proposed corridors	TfL	TfL	facilitator	TBD	
	Junction Bus priority	3	To reduce delay and improve reliability		✓	✓	Delivery 2014-2019	See Figure 5-1 for proposed locations	TfL	TfL	facilitator	TBD	
	Improvements to Bus Stops – public realm, safe design, GPS tracking	4	To improve utilisation rates		✓	✓	2009-2026 (S-L)	borough wide	TfL	TfL	facilitator	TBD	
	Bus service enhancement	3	Upto one additional bus to maintain current service levels		✓	✓	2009 – 2014 (Short term)	Chingford Mount bus corridor	TfL	LBWF/TfL	Facilitator	TBD	
	Bus service enhancement	3	Upto 2 additional buses to maintain current service levels, (3 in total)		✓	✓	2014 – 2026 (Medium to Long term)	Chingford Mount bus corridor	TfL	LBWF/TfL	Facilitator	TBD	Planned improvement to be detailed for submission under TfL allocations. Subject to more detailed assessment & business plan for more evidence.

Shaded cells indicate the investment is currently programmed

Infrastructure Area	Infrastructure schemes and actions	Recommended level of priority (1-4)	Rationale for inclusion/risk if not included	Drivers			Phasing	Location	Responsibility and Funding			Costs	Notes
				Policy	Existing gap/ replacement/ upgrade	Forecast demand for development			When should the infrastructure items be delivered by?	Where should the infrastructure item be delivered?	Responsible Delivery Agency		
	Bus service enhancement	3	Upto 4 additional buses to maintain current service levels	✓	✓	✓	2009 – 2014 (Short term)	Markhouse Road bus corridor	TfL	LBWF/TfL	Facilitator	TBD	
	Bus service enhancement	3	Upto 2 additional buses to maintain current service levels, (6 in total)	✓	✓	✓	2014 – 2026 (Medium to Long term)	Markhouse Road bus corridor	TfL	LBWF/TfL	Facilitator	TBD	Planned improvement to be detailed for submission under TfL allocations. Subject to more detailed assessment & business plan for more evidence.
	Bus service enhancement	3	Upto 7 additional buses to maintain current service levels	✓	✓	✓	2009 – 2014 (Short term)	Lea Bridge Road bus corridor	TfL	LBWF/TfL	Facilitator	TBD	
	Bus service enhancement	3	Upto 22 additional buses to maintain current service levels, (29 in total)	✓	✓	✓	2014 – 2026 (Medium to Long term)	Lea Bridge Road bus corridor	TfL	LBWF/TfL	Facilitator	TBD	Planned improvement to be detailed for submission under TfL allocations. Subject to more detailed assessment & business plan for more evidence.
Public Realm	Improvement to public realm at public transport interchanges	3	To improve accessibility and connectivity	✓	✓	✓	borough wide – 2009 – 2026 (S-L)	See Figure 5-1 for proposed locations	TfL/Network rail/LBWF/Development Contributions	TfL/Network rail/LBWF/Development Contributions	Facilitator	TBD	
Walking	Pedestrian environment improvements	4	To improve accessibility, connectivity, capacity and safety	✓	✓	✓	2014-2026 (M-L)	borough Wide	LBWF	LB WF/Developer contributions	Planning Authority/facilitator	TBD	
Cycling	Cycle pathways	4	To improve cycle links to public transport interchanges	✓	✓	✓	2009-2026 (S-L)	See Figure 5-1 for proposed locations	TfL/LB WF	TfL/LB WF/developer contributions	Planning Authority/facilitator	TBD	
	Cycle Parking	3	To increase provision of cycle parking at public transport interchange and town centres	✓	✓	✓	2009-2026 (S-L)	See Figure 5-1 for proposed locations	LB WF	LB WF/developer contributions	Planning authority/facilitator	TBD	
Road Junction Improvements	To support bus priority corridor measures	3	To improve reliability, reduce delays, constrain traffic growth			✓	2014 - 2026	borough Wide	TfL/LBWF/Developer contributions	TfL/LBWF/Developer contributions	Planning authority/facilitator	TBD	
	Blackhorse Road Junction Improvement	3	To accommodate development, improve pedestrian facilities and bus reliability	✓	✓	✓	2014	Royal Standard Junction, Blackhorse Road	Developer contributions	Developer contributions	Planning authority/facilitator	TBD	
Road Link Improvements	To support bus priority corridor measures	3	To relieve vehicular pressure on the Royal Standard Junction, Blackhorse Road	✓	✓	✓	2014 - 2019	Forest Road at Royal Standard Junction	Developer contributions	Developer contributions	Planning authority/facilitator	TBD	



## **Appendix A - Assessment of Baseline Conditions on Transport Modes in Waltham Forest**



### London Underground

The LU network serving Waltham Forest, comprises the Central Line with access to the LU network via two stations at Leytonstone and Leyton within the Southern WF sub-area, and the Victoria Line with access to the LU network via two stations at Walthamstow Central and Blackhorse Road within the Central WF sub-area, Walthamstow Central being the last and northernmost station on the Victoria Line.

East and westbound Central Line services through the borough operate every two minutes during peak periods reducing to five minutes by midnight. It provides for direct access to central London including the City at Liverpool Street and Bank stations and the West End of London between Tottenham Court Road and Marble Arch. It also provides for a key interchange hub at Stratford station with the Jubilee Line and the Dockland Light Rail (DLR) network. Together the Jubilee Line and the DLR provides access to the Canary Wharf employment region, two major transport termini at London Bridge and Waterloo, and areas to the south of the River Thames at North Greenwich, Canada Water, Southwark, Greenwich and Lewisham. Investment in transport infrastructure at and connecting through Stratford interchange will be of increasing relevance to the future transport provision of Waltham Forest over the period of this infrastructure needs assessment.

The existing passenger capacity of the Central Line at Leyton and Leytonstone stations is 892 passengers per train. With 27 eastbound and 30 westbound trains per hour during peak periods, the eastbound AM peak and westbound PM peak hour line capacity through Waltham Forest will be 26,760 passengers per hour.

South and northbound services on the Victoria Line through the borough operate every four minutes during peak periods reducing to eight minutes by midnight.

The existing passenger capacity of the Victoria Line at Walthamstow Central and Blackhorse Lane is 833 passengers per train. With 28 north and southbound trains per hour during the peak periods, but with only 16 trains per hour each way between Seven Sisters and Waltham Central all day, the southbound AM peak and northbound PM peak hour line capacity through Waltham Forest will be 13,328 passengers per hour.

**Table A-1** presents the passenger capacity per hour of the Central and Victoria LU lines through the Borough during the AM and PM peak travel periods and the interpeak period.

It is pertinent to note that from an examination of the Waltham Forest transport map presented at **Figure 2-3** (in the main body of the report), access to the LU network is concentrated within the south-east via the Central Line and the south-west via the Victoria Line of the borough, with no station access to the LU in the north of the borough. This therefore reduces the accessibility of the LU network for a significant proportion of the Waltham Forest population, as to use the LU they would first have to undertake a portion of their trip by other modes prior to accessing the LU at one of the four stations located in the south of the borough.

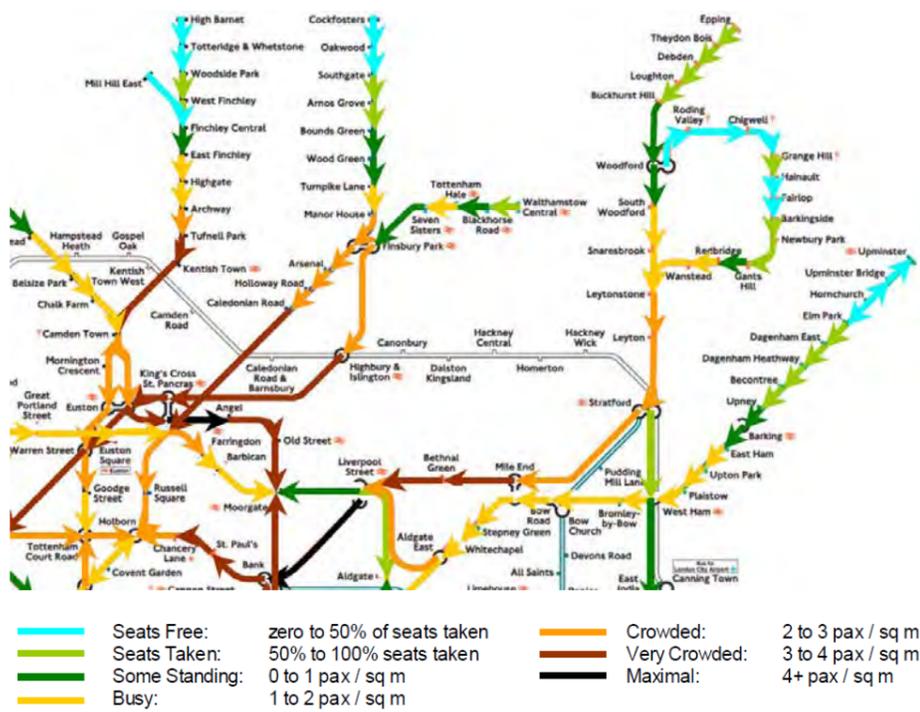
In the paragraphs following, transport capacity maps produced by TfL (TfL) are used to indicate existing conditions on overland rail and LU lines on a consistent basis. The very crowded criterion corresponds to the LU planning standard and is the level at which passenger conditions reach an unacceptable level of congestion. TfL assesses conditions on National Rail services on a consistent basis but this differs from how Network Rail assesses capacity, where the limit of acceptability is reached at lower levels of crowding.

Existing levels of crowding on the LU network including those within Waltham Forest are shown in **Figure A-1** (the worst direction is shown). The black bands represent severely crowded conditions and the red bands indicate very crowded conditions, i.e. which are over planning capacity.

It can be seen from **Figure A-1** that the LU lines that serve the south-west area, Victoria Line, are classified as having 'Seats Taken' on between Walthamstow Central and Blackhorse Road; and as being 'Crowded' on the Central line serving the south-east area between Leytonstone and Leyton. However, 2008 passenger loadings at the four LU stations located in Waltham Forest obtained from TfL LU. and presented at **Table A-1**, suggest that during the AM peak period, the westbound Central LU: experiences overcrowding levels of 13% and 20% in excess of the line capacity at Leyton and Stratford stations, whilst the southbound Victoria Line experiences overcrowding levels of 13.5% and 47.5% in excess of the line capacity at Blackhorse Road and Tottenham Hale stations during the AM peak period. During the PM peak period, only the eastbound line at Stratford station is presented as experiencing significant overcrowding levels of 43% in excess of the line capacity of the Central Line.

It can also be seen from the passenger numbers alighting and boarding the Central Line at Leytonstone and Leyton stations during the AM and PM peak periods as presented at **Table A-2**, that a significantly greater number of passengers board the westbound line during the AM peak period than alight and conversely during the PM peak period, whilst at Stratford station, the numbers of passengers alighting and boarding the Central Line are much closer numerically, both movements exceeding the number of passengers boarding and alighting at both Leyton and Leytonstone stations, thereby reinforcing Stratford's importance as a major interchange hub for passengers using the Central Line through Waltham Forest. Similarly for the southbound and northbound Victoria Line during the AM and PM peak periods respectively, it can be seen that the respective numbers of passengers boarding and alighting at each station are significantly different numerically, confirming that the Victoria Line passing through Waltham Forest operates as a commuter line for southbound trips and northbound trips during the AM and PM peak travel periods.

Figure A-1 London Underground Crowding in Autumn 2007 (AM Peak)



Source: London assembly, Rail Overcrowding in London 2009

Table A-1: LU Passenger Capacity

	passengers Per Train	Trains Per Hour						Passenger Capacity Per Hour					
		AM Peak		Interpeak		PM Peak		AM Peak		Interpeak		PM Peak	
		EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
<b>Central Line</b>													
W of Leytonstone	892	27	30	21	21	30	27	24,084	26,760	18,732	18,732	26,760	24,084
E of Leytonstone:	892	13.5	15	10.5	10.5	15	13.5	12,042	13,380	9,366	9,366	13,380	12,042
<b>Victoria Line</b>													
N of Seven Sisters	833	16	16	16	16	16	16	13,328	13,328	13,328	13,328	13,328	13,328
S of Seven Sisters	833	28	28	20	20	28	28	23,324	23,324	16,660	16,660	23,324	23,324

Source: URS Corporation 2009

**Table A-2 LU Passenger Loadings by Station, 2008;**

*Shaded cells denote capacity has been exceeded*

Station	Line	Direction	7am-10am	AM Peak Running Total	4pm-7pm	PM Peak Running Total	Boarding/Alighting
Walthamstow Central	Victoria	S	10,478	10,478	2,772	10,478	Boarding
Blackhorse Road	Victoria	S	59	10,419	288	10,419	Alighting
Blackhorse Road	Victoria	S	4,706	15,125	1,390	15,125	Boarding
Tottenham Hale	Victoria	S	879	14,246	257	14,246	Alighting
Tottenham Hale	Victoria	S	5,414	19,660	2,199	19,660	Boarding
Tottenham Hale	Victoria	N	219	3,395	324	17,031	Boarding
Tottenham Hale	Victoria	N	1,020	2,375	4,860	12,171	Alighting
Blackhorse Road	Victoria	N	94	2,469	246	12,417	Boarding
Blackhorse Road	Victoria	N	725	1,744	3,631	8,786	Alighting
Walthamstow Central	Victoria	N	1,744	-	8,786	-	Alighting
Snaresbrook	Central	W	26	14,886	37	3,273	Alighting
Snaresbrook	Central	W	2,566	17,452	519	3,792	Boarding
Leytonstone	Central	W	792	16,660	774	3,018	Alighting
Leytonstone	Central	W	6,271	22,931	2,065	5,083	Boarding
Leyton	Central	W	392	22,539	774	4,309	Alighting
Leyton	Central	W	7,645	30,184	2,214	6,523	Boarding
Stratford	Central	W	8,532	21,652	2,197	1,601	Alighting
Stratford	Central	W	10,391	32,043	4,922	3,798	Boarding
Stratford	Central	E	2,622	6,800	7,096	35,981	Boarding
Stratford	Central	E	2,652	4,148	13,167	22,814	Alighting
Leyton	Central	E	199	4,347	519	23,333	Boarding
Leyton	Central	E	1,111	3,236	6,681	16,652	Alighting
Leytonstone	Central	E	713	3,949	1,267	17,919	Boarding
Leytonstone	Central	E	1,103	2,846	6,054	11,865	Alighting
Snaresbrook	Central	E	22	2,868	34	11,899	Boarding
Snaresbrook	Central	E	449	2,419	1,201	10,698	Alighting
Wanstead	Central	W	35	18,092	122	3,442	Alighting
Wanstead	Central	W	1,665	19,757	280	3,722	Boarding
Leytonstone	Central	W	792	18,965	774	2,948	Alighting

*Shaded cells denote capacity has been exceeded*

Station	Line	Direction	7am-10am	AM Peak	4pm-7pm	PM Peak	Boarding/Alighting
				Running Total		Running Total	
Leytonstone	Central	W	6,271	25,236	2,065	5,013	Boarding
Leyton	Central	W	392	24,844	774	4,239	Alighting
Leyton	Central	W	7,645	32,489	2,214	6,453	Boarding
Stratford	Central	W	8,532	23,957	2,197	1,531	Alighting
Stratford	Central	W	10,391	34,348	4,922	3,728	Boarding
Stratford	Central	E	2,622	6,341	7,096	38,294	Boarding
Stratford	Central	E	2,652	3,689	13,167	25,127	Alighting
Leyton	Central	E	199	3,888	519	25,646	Boarding
Leyton	Central	E	1,111	2,777	6,681	18,965	Alighting
Leytonstone	Central	E	713	3,490	1,267	20,232	Boarding
Leytonstone	Central	E	1,103	2,387	6,054	14,178	Alighting
Wanstead	Central	E	170	2,557	202	14,380	Boarding
Wanstead	Central	E	314	2,243	1,300	13,080	Alighting

*Source: TfL London Underground 2009*

Levels of station crowding at any of the four LU stations located within Waltham Forest, have not been identified as presenting a significant problem at either the station gate lines or on the station platforms.

None of the LU stations within Waltham Forest have step-free access and it has been confirmed that the 2009 step free scheme proposed for Leyton station has been deferred due to a recent review by LU of affordability following the demise of the Metronet PPP contract.

As is shown within **Table 2-1** (in the main body of the report) the LU network passing through Waltham Forest provides a significant mode of transport for the actively employed resident population of Waltham Forest, with 27.6%, (26,960), of the boroughs actively employed population using this mode for daily work related trips. This being the second most used mode of transport, only being surpassed by the car with 32.8% of the mode share for work related trips undertaken by the actively employed population resident within Waltham Forest.

However, it can also be seen that for work related trips by the non-resident actively employed population, the LU network is not as important a mode of transport with only 6.7%, (1,745), of the actively employed non-resident population using it for work related trips into Waltham Forest. This being surpassed by the car, with 51.3% of the mode

share, and the bus and walking modes with 11.2% and 11.2% of the mode share respectively.

### **National Rail and Key Interchanges**

Two mainline/overground (LOL) rail lines run through and serve the population of Waltham Forest by providing for access, these being:

- The Chingford to Liverpool Street Line, a radial line run by National Express East Anglia services with termini at Chingford and Liverpool Street; and
- the Barking to Gospel Oak LOL, a TfL London overland outer London orbital route operating between Barking and Gospel oak where interchange provision can provide for destinations to Stratford in the east and Richmond in the west.

Both of these routes are main commuter routes serving London.

A further mainline rail service runs through the south-west corner of Waltham Forest but does not provide for access within the borough. This line being the Lea Valley line running between Stratford or Liverpool Street to Stansted Airport via Tottenham Hale, Waltham Cross and Harlow, run by national Express East Anglia. This line although providing a frequent service between Tottenham Hale and Liverpool Street, does not provide for any stops within Waltham Forest, but provides for an interchange with the Victoria Line for trips to Liverpool Street or Stratford.

In total, there are nine overground stations located within Waltham Forest, these being;

#### **Chingford to Liverpool Street Line Mainline (National Express East Anglia):**

- Chingford, Highams Park, Wood Street, Walthamstow Central and St. James Street.

A 15 minute service currently operates during peak travel periods.

#### **Gospel Oak to Barking Rail LOL (TfL London Overground):**

- Blackhorse Road, Walthamstow Queens Road, Leyton Midland Road and Leytonstone High Road.

A 20 minute service currently operates during peak travel periods. Travel from Barking to Gospel Oak in Camden takes 34 minutes

#### **Stratford to Stansted Airport (National Express East Anglia):**

- There are currently no operational stations within Waltham Forest upon this line, but there is one 'redundant' station at Lea Bridge station which was closed to passengers in 1985.

This line provides a service of three trains per hour from Stratford to Stansted and ten trains per hour between Tottenham Hale and Liverpool street during the peak travel periods

Total station passenger usage per annum on the two rail line services with stations within Waltham Forest are presented at **Table A-3** for the years 2006-2007 and 2007-2008.

**Table A-3: Chingford to Liverpool Street Station Passenger Totals**

Station Name	Station Facility Owner	Entries Total	Exits Total	07-08 Entries & Exits	06-07 Entries & Exits	Change
Chingford	National Express East Anglia	684,171	676,965	1,361,136	1,341,535	growth
Highams Park	National Express East Anglia	810,230	799,747	1,609,977	1,671,640	decline
Wood Street	National Express East Anglia	329,305	323,226	652,531	653,816	decline
Walthamstow Central	National Express East Anglia	1,106,110	1,098,619	2,204,729	2,357,043	decline
St James Street	National Express East Anglia	303,491	297,408	600,899	609,645	decline
Barking to Gospel Oak						
Blackhorse Road	London Underground	43,611	42,939	86,550	169,067	decline
Walthamstow Queens Road	London Overground	32,845	35,836	68,681	62,520	growth
Leyton Midland Road	London Overground	111,048	112,999	224,047	285,208	decline
Leytonstone High Road	London Overground	97,063	99,665	196,728	261,238	decline

Source: Office of Rail regulation, Station Usage 2009

It can be seen from **Table A-3** that all stations with the exception of Chingford on the Chingford to Liverpool St. line and Walthamstow Queens Road on the Barking to Gospel Oak line, experienced a decline in the number of passenger movements per annum between 2007 and 2008, with Blackhorse Road experiencing the greatest decline of 82,517 passenger movements per annum, (approximately 160 passengers per weekday), and Chingford experiencing the greatest increase of 19,601 passenger movements per annum, (approximately 38 passengers per weekday).

An indication of the current capacity available upon the overground rail services provided through Waltham Forest is given by an indication of the levels of passenger overcrowding upon those services. **Figures A-2** and **A-3** shows a visual indication of the level of overcrowding experienced in 2006 upon those services providing for Waltham Forest and station crowding hotspots respectively.

It can be seen from an inspection of **Figure A-2** that the level of overcrowding upon the Chingford to Liverpool Street mainline within Waltham Forest has a ratio < 0.8, indicating that there is spare capacity upon this section of the line at 2006 levels, with the remaining section into Liverpool Street having a ratio between 0.8 and 1.0, indicating that capacity is utilised. Similarly, the Gospel Oak to Barking LOL can be seen to be operating at a level of overcrowding < 0.8 at the 2006 levels, again suggesting that there is some spare capacity available upon this line at 2006 levels. However, following the instigation of Oyster card usage and the inclusion of the North London Line upon the LU network map, the usage of the barking to Gospel oak line has increased since 2006.

Currently, the Barking to Gospel Oak line has a threshold capacity of 260 passengers per two-car train, operating a peak period service of 3 trains per hour, giving a capacity threshold of 780 passengers per hour. At 2009 levels, passenger counts on board trains departing stations in the busiest direction yielded the following results shown in **Table A-4**.

**Table A-4 Barking to Gospel Oak Passenger Loadings by Station, 2009**

	AM Peak Period Westbound	PM Peak period Eastbound
Departing Station	7 services over peak period	9 Services over peak period
Leytonstone High Street	1,471	1,608
Leyton Midland Road	1,532	1,765
Walthamstow Queens Road	1,527	1,878
Blackhorse Road	1,271	1,709

Source TfL 2009

During the AM peak period, seven two-car train services provide a threshold capacity of 1,820, although three of the services recorded a passenger loading of 260 passengers per train, i.e at threshold capacity. During the PM peak period, nine two-car train services provide a threshold capacity of 2,340, with two services recording passenger loadings exceeding 260 during the PM peak period. It can therefore be stated that at 2009 levels, the Barking to Gospel Oak line is operating at a load factor of 0.8 on average over the three hour AM peak period, although a number of services are operating at peak capacity at the peak travel time.

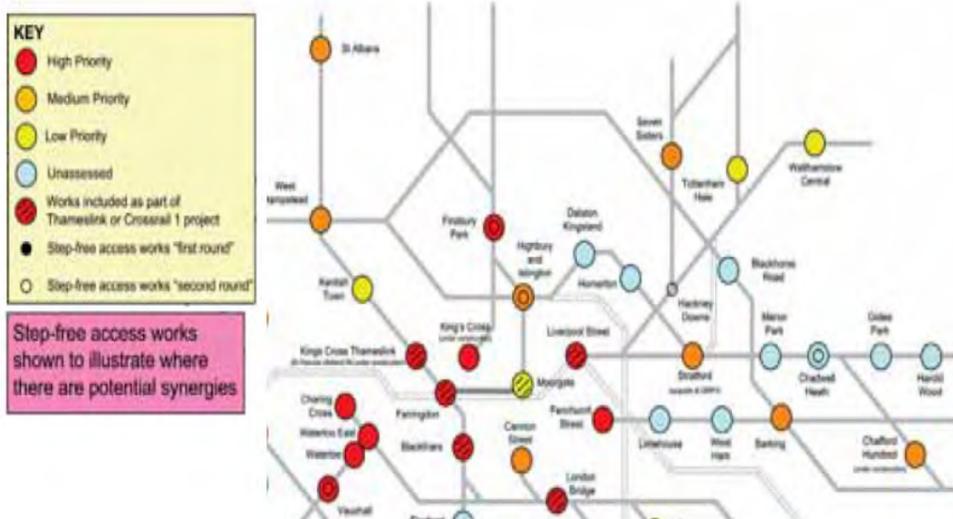
With respect to individual stations and overcrowding, Walthamstow Central has been identified as low priority and Blackhorse Road as unassessed, whilst both Tottenham Hale and Stratford are identified as low and medium priority respectively.

Figure A-2: Existing Overcrowding Level by Route in 2006



Source: TTL analysis from Railplan model output 2008

Figure A-3: Stations With Overcrowding Problems



Source: TTL London Rail analysis, DfT Railways for All 2008

### Interchange Plan – Improving Interchange in London, August 2002

Although now outdated and overtaken by the Walthamstow Masterplan and Interim Planning Policy Framework (2008), both Walthamstow Queens Road and Leytonstone High Road had been identified as being in the top 10 most highly ranked interchanges within the local interchange category (E). Being in the top 10 constituted the basis for the development of a programme of works at the interchanges, which were priorities for investment identified through the works described in the *Interchange Plan*. In 2002-3 a total of £0.4m was the proposed budget for the “Walthamstow Group” of interchanges. The reconstructed bus station at Walthamstow now provides a modern, safe and fully accessible provision within the public transport network.

An inspection of the transport map presented at **Figure 2-3** (in the main body of the report) identifies the interchange provisions available within Waltham Forest between bus, train and cycle modes at Chingford, Chingford Mount, Leytonstone, Leyton and Walthamstow, from which it can be seen that there is a reasonable level of interchange available within Waltham Forest for modal change within a trip.

It has been shown at **Table 2-1** (in the main body of the report) that the rail mode of transport is used for work related trips by 9.3%, (9,104), of the actively employed population resident within Waltham Forest and 4.2%, (1,078), of the actively employed population non-resident within Waltham Forest. It is therefore concluded that on average across the borough, the current mainline and LOL rail service network has sufficient capacity to accommodate the existing workforce population of Waltham Forest as indicated by the current levels of <0.8 overcrowding ratio upon the network.

### Step Free Access

A number of LOL Rail stations do not have step free access within Waltham Forest, these being:

- Blackhorse Road
- Leyton Midland Road
- Leytonstone High Road

Also, Highams Park, Wood Street and St James Street have only partial step free access.

### Bus Services

There are currently 39 bus services operating within Waltham Forest and the surrounding area, of which, 21 services are high frequency (non-timetabled) routes, 13 are low frequency (timetabled) routes and 5 are timetabled night time services. The routes of these current services are identified upon the transport map presented at **Figure 2-3**.

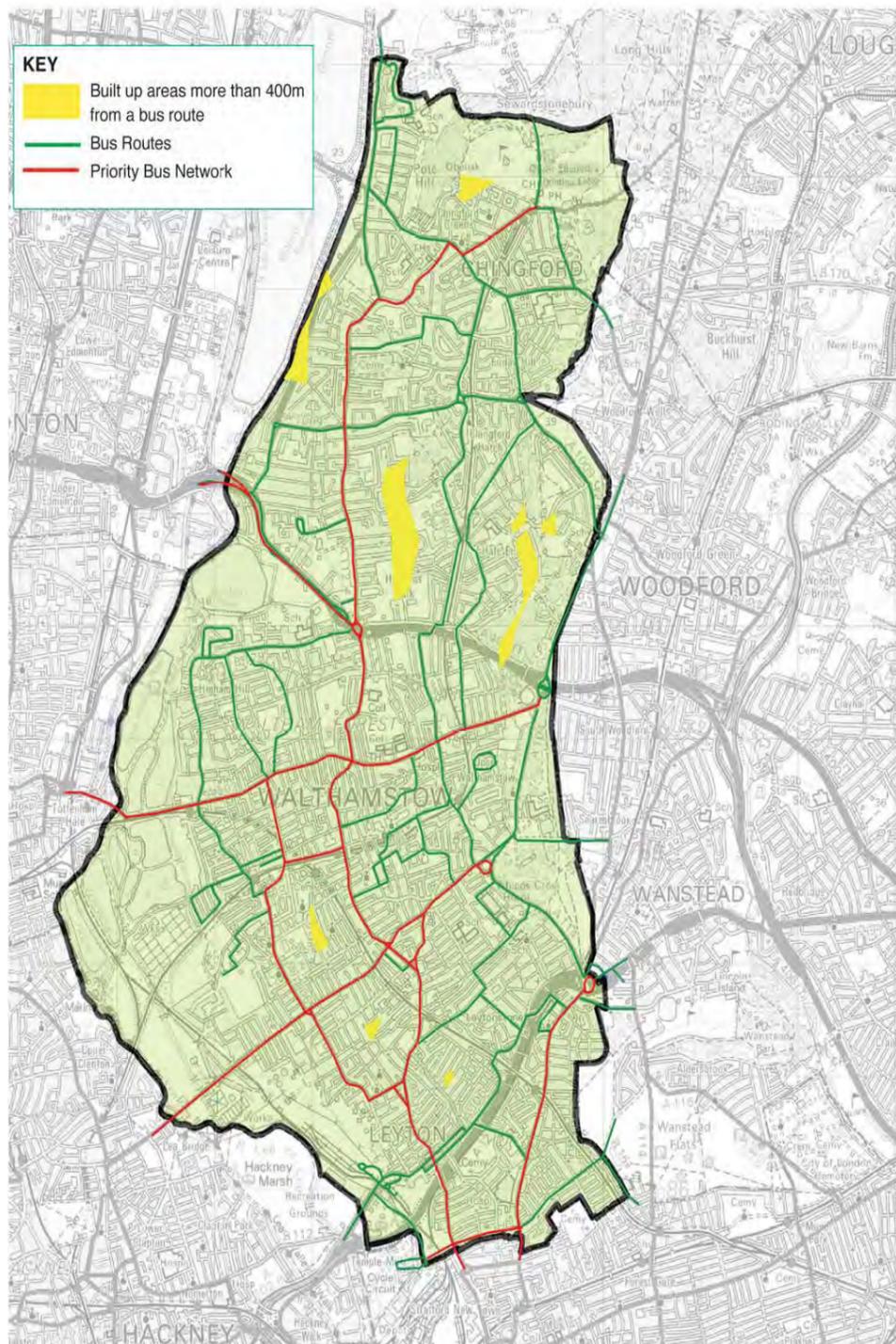
The bus network throughout the borough is well developed with bus priority networks evident connecting Chingford in the north with Walthamstow and Leyton in the south. These priority network and bus routes are identified upon **Figure A-4**, which also

indicates those areas within the borough located more than 400m from a bus service, these areas having previously been discussed in relation to the PTAL values. There are 'extremes' of accessibility to the bus network provided, such as that from Waltham Way which has access to a mobility bus service on only two days of the week.

An examination of the bus services operating within the borough, indicates that a significant proportion of the bus services providing services to the north of the borough are low frequency services associated with routes along the Woodford New Road, Winchester Road/Larkshall Road and Chingford Mount Road corridors. This, as previously identified, contributes towards the low PTAL values presented in the north of the borough at **Figure 2-4**, but also reflects the spatial distribution of the population density throughout the borough.

The operational performance of the bus network within Waltham Forest has been assessed from an examination of the London Buses quarterly quality of service indicators for the fourth quarter 2008/09.

Figure A-4: Waltham Forest Bus Priority Network and Bus Routes



Source: London Borough of Waltham Forest 2008

It is considered that high frequency bus services within Waltham Forest are operating with a comparable level of service and operational efficiency with London Bus services throughout the whole of the London region.

Similarly, the quarterly results for low frequency bus services throughout the whole of London over the same period gives the following indicators; on average, 80% of the scheduled services were on time, with a spread of 71.1% to 100%. There was an average 1.9% of buses arriving 8 to 2 minutes early and an average of 13.4% arriving 5 to 15 minutes late with an average of 4.7% of non-arrivals. It is therefore apparent that the low frequency services within Waltham Forest are operating with a slightly less operational efficiency than that of the London Bus services throughout the whole of the London region. It is considered that two services within Waltham Forest have contributed towards this, the W12 with only 58.5% of scheduled services arriving on time, 12.8% non-arrivals and with 26.1% arriving 5 to 15 minutes late, and the 385 with 23.4% of services arriving between 5 to 15 minutes late.

It is estimated that there are approximately 235 high frequency buses upon the bus network routes within Waltham Forest during the peak travel hours, giving a seated bus capacity of approximately 17,500 passengers per hour in each direction per hour. There are also approximately 45 low frequency buses upon the bus network routes during the peak travel hours, giving a further bus capacity of approximately 2,250 passengers per hour in each direction per hour.

It has been shown at **Table 2-1** (in the main body of the report) that the bus mode of transport is used for work related trips by 9.5%, (9,289), of the actively employed population resident within Waltham Forest and 11.2%, (2,909), of the actively employed population non-resident within Waltham Forest.

It may therefore be concluded that the total bus capacity of 19,750 seated passengers in each direction available across the borough, is sufficient to accommodate the directional movements of the total active workforce population of 12,200 using the bus mode of travel, with a 38% surplus capacity to accommodate the variation in passenger loading densities across the borough.

It should be noted however, that the figures presented do not include for the non-workforce population using the bus mode for trips during the peak travel periods, with education based trips forming a significant proportion of the AM peak travel period, and all other trips forming the remainder. It has been suggested within Travel in London, key Trends and Development, that during the AM peak travel period, the proportions of travel by London residents are approximately proportional between commuting, educational and all other trips. It can therefore be hypothesised, that during the AM peak travel period, approximately 25,000 residents within Waltham Forest may rely upon the bus network for trips.

This would, on average, take up all of the 'seated' bus capacity available upon the bus network in one direction, but would likely be accommodated by the additional standing capacity that would be provided during the peak bus travel periods, and the variation in directional movements likely to be experienced by trips within the borough. However, it is

considered that the total number of trips likely to be undertaken during the AM peak travel period is likely to take up the full bus capacity available upon the bus network.

### Road Network

The road transport network within Waltham Forest was primarily developed in its current spatial form during the Victorian and Edwardian periods for the purpose of transporting people and goods to inner and central London. The shape and man-made physical characteristics of the borough as it now stands was formed through the then land uses being related either to the historical railway network or the intersection of the then major roads. Car ownership within the borough is continuing to rise with projected levels forecast to increase to 0.95 cars per household by 2011.

The hierarchy of the road network in Waltham Forest is described below:

- TfL Road Network (TLRN)

This is the Red Route network made up of London's most strategic roads, of which there are two in Waltham Forest: the A406 North Circular Road (NCR) running approximately along an east-west orientation through the middle of the borough, and the A12 Hackney to M11 Link Road running along a north-east to south west orientation in the south of the borough past Leytonstone and Leyton. Within Waltham Forest these roads comprise dual three lane carriageway with grade-separated interchanges onto the borough road network. These two roads present severe segregation to cross movement for both vehicular and pedestrian traffic.

- Strategic Road Network (SRN)

This is a new category of road introduced by TfL under the Traffic Management Act 2004 by which TfL have increased powers over any works proposed to these routes. Within Waltham Forest there are two Strategic Roads, the A104 (Lea Bridge Road) provides a strategic highway link between Waterworks corner on the NCR in the east of the borough with the A12 at the Hackney Wick interchange, and the A112 (Chingford Road/High Road Leyton) linking Waltham Abbey and the M25 motorway with Chingford in the north of the borough, passing through Walthamstow and Leyton and providing a strategic highway link to the major transport hub at Stratford to the south of the borough, are both classified as part of the Strategic Road Network.

- Local Distributor Roads

These comprise main road links throughout the borough, usually providing bus routes and town centre access.

- Local Routes

All other roads in the borough, usually residential.

The highway network through Waltham Forest is restricted by the geographical constraints along the western side of the borough, these being the River Lea Valley and

the associated waterways and reservoirs, restricting road routes across the western boundary to five road crossings, two rail crossings and two additional crossings for pedestrians and cyclists. The restrictions afforded along the western boundary, constrains the road links through Waltham Forest to predominantly north-east to south-west orientations towards the traditionally historic destination of Central London.

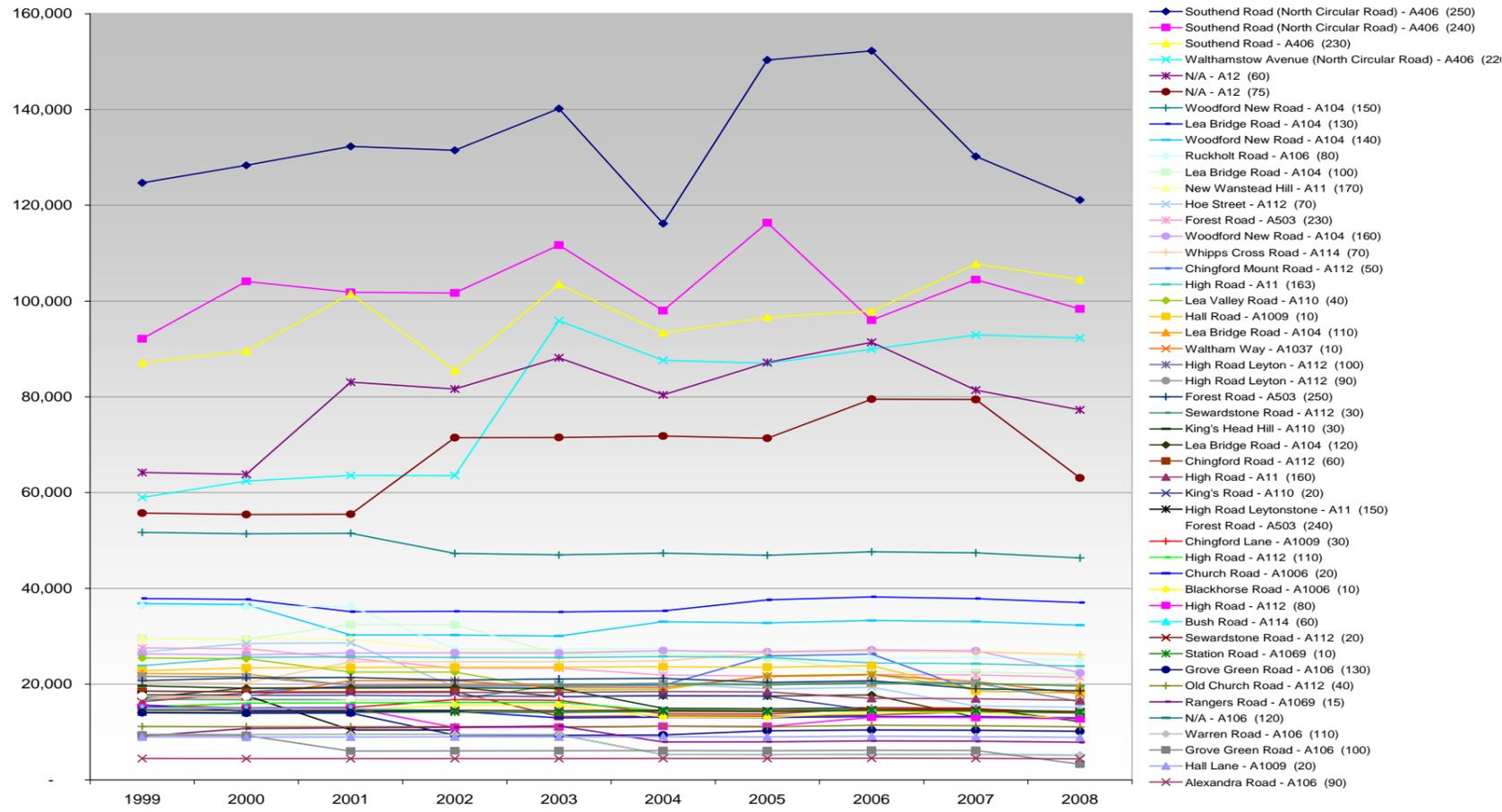
Traffic data in addition to that presented within the Waltham Forest Local Improvement Plan (LIP) has been assessed to evaluate the operational performance of the highway network through Waltham Forest. This provides additional data relating to Annual Average Daily Flows (AADF) along the principal road network through the borough obtained from:

- The Department for Transport database over the a ten year period commencing from 1999 (the year of opening of the A12 improvement);
- The AM and PM peak period average speeds along the principal highway network through the borough as derived from the TfL ITIS surveys for July 2005;
- The AM and PM peak period average vehicular delay along the principal highways through the borough as derived from the TfL ITIS survey for May 2007.

The additional link flow data upon the principal road network is presented at **Figures A-5**, with the location of the traffic count sites presented at **Figure A-6**. **Figure A-7** presents the average AM and PM peak hour speeds upon the principal road network and **Figures A-8** and **A-9** presents the average vehicular delay upon the principal road network during the AM and PM peak travel periods respectively.

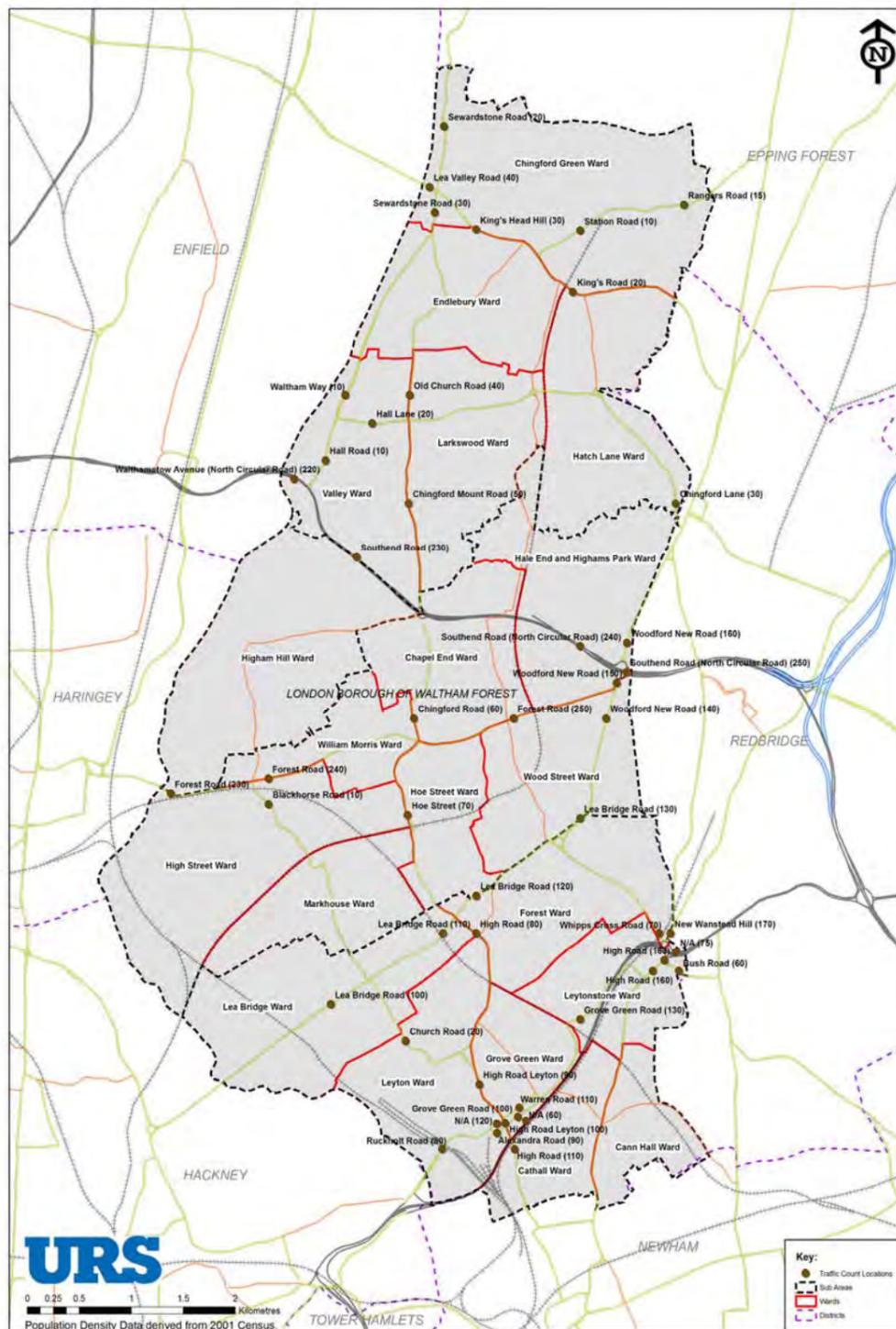
From **Figure A-5**, it can be seen that the TLRN road network carries a greater volume of daily traffic flow, with over 100,000 vehicles per day using the NCR and the A12 through Waltham Forest. The high usage of these strategic highways reflects at the interchanges with the borough roads at Waterworks corner and the Crooked Billet interchanges on the NCR, both experiencing high volumes of traffic flow through the interchange, and similarly for the Green Man interchange on the A12. In the main, the levels of traffic flow upon the borough roads within Waltham Forest generally experience AADF rates of less than 20,000 vehicles per day at 2008 levels. There are exceptions to this, with Woodford New Road and Lea Bridge Road along the eastern boundary with the London Borough of Redbridge experiencing AADF rates exceeding 32,000 on the approach to the Whipps Cross roundabout, New Wanstead Hill experiencing an AADF exceeding 25,000 on the approach to the Green Man interchange on the A12, Lea Bridge Road and Forest Road crossing the western boundary into Hackney and Haringey both experiencing AADF rates exceeding 20,000, and Sewardstone Road crossing the northern boundary of Waltham Forest on the approach to Lea Valley Road experiencing an AADF approaching 20,000 vehicles per day.

Figure A-5: AADF Through Selected Roads in Waltham Forest



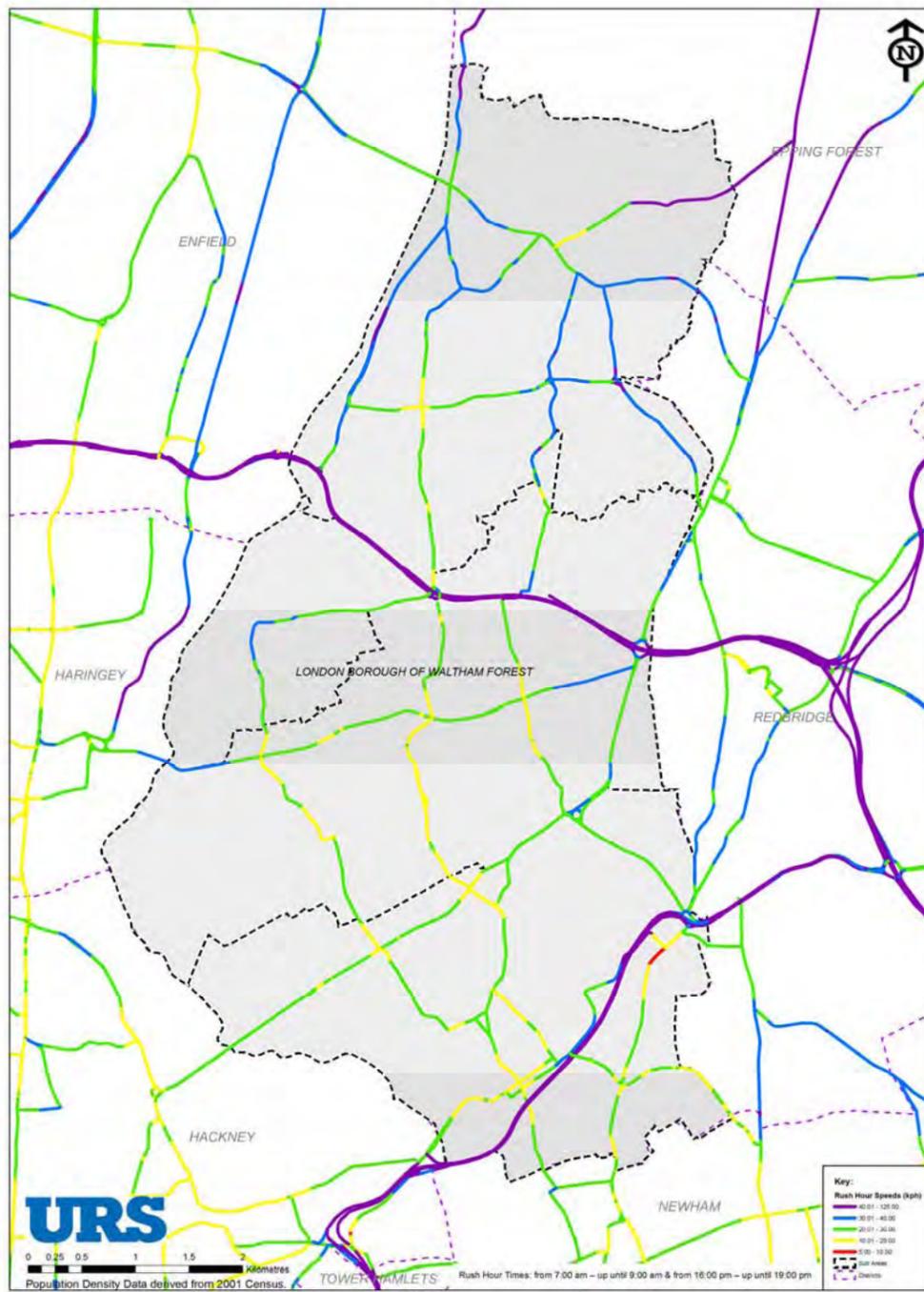
Source: URS Corporation 2009

**Figure A-6: AADF Traffic Count Location Sites**



Source: URS Corporation 2009

Figure A-7: Average AM and PM Vehicular Speeds



Source: URS Corporation 2009

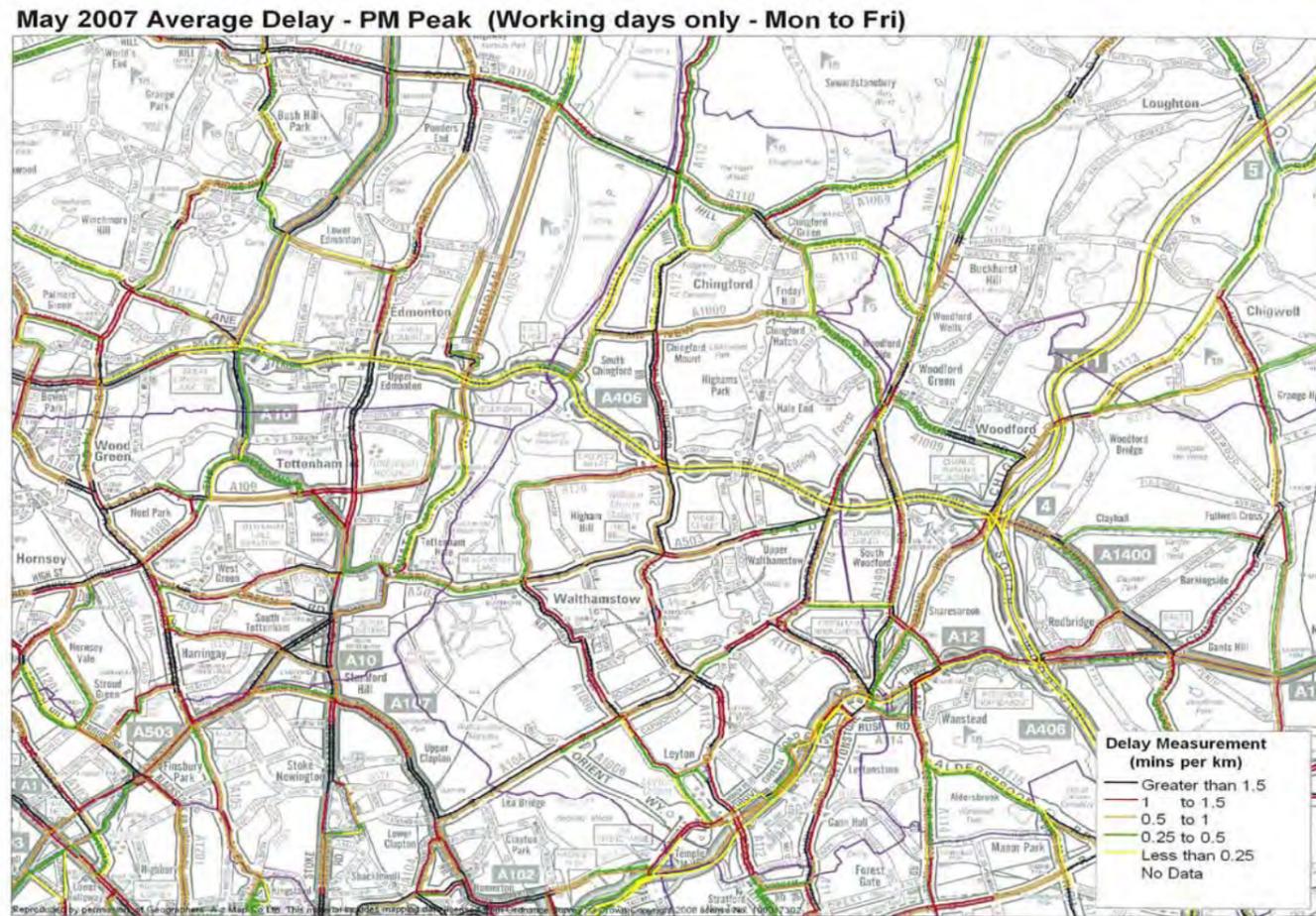
Figure A-8: Average AM Peak Period Link Delay

May 2007 Average Delay - AM Peak (Working days only - Mon to Fri)



Source: TfL Road Network and Performance 2008

Figure A-9: Average PM Peak Period Link Delay



Source: TfL Road Network and Performance 2008

In the north of the borough, the north to south traffic flows tend to be greater than the east to west movements, with the A112 Waltham Way and Chingford Mount Road experiencing AADF rates exceeding 18,000 at 2008 levels, whilst Kings Head Hill and Hall Lane do not exceed AADF rates of 12,000. In the higher population density areas to the south of the NCR, all traffic flows upon the road network tend to exceed AADF rates greater than 12,000, with Hoe Street at Walthamstow exceeding 15,000 AADF and High Road Leyton exceeding 16,000 AADF.

**Figures A-7, A-8 and A-9** may be used in conjunction with **Figure A-5** to identify road links experiencing levels of congestion as indicated by low average speeds and high levels of delay. It can be seen from **Figure A-7** that across the borough the greater majority of roads within Waltham Forest experience average speeds greater than 15 mph during the AM and PM peak travel periods, with a significant proportion of roads experiencing average speeds exceeding 20 mph.

Those road links exhibiting average speeds less than 15 mph tend to be located to the south of the NCR along links with a high density of land use activity and population, i.e. local centres and transport hubs such as Walthamstow Central, Leyton High Road etc. and also on the approaches to key junctions between the north-south and east-west routes along Forest Road and Lea Bridge Road. To the north of the NCR, traffic speeds on the approaches to the Hall Lane crossroad junction with Chingford Mount Road also exhibit speeds of less than 15 mph.

**Figures A-8 and A-9** indicates those areas upon the road network experiencing levels of delay exceeding 0.25 minutes per Km. It can be seen that most of the strategic road network operates with levels of delay not exceeding 0.5 min/km, whilst the greater proportion of the borough roads in Waltham Forest operate with levels of delay not exceeding 1 min/km.

However, there are a number of locations where the level of delay experienced upon the road network exceed 1 min/km and it is considered that these areas represent areas upon the road network experiencing increasing levels of congestion upon road links. It can be seen that in many instances, those road links experiencing significant levels of link delay correlate reasonably well with those links experiencing low average link speeds. In the main these tend to be associated with road junctions at the following locations;

- Kings Head/Station Road/Kings Road
- Hall Lane/Waltham Way roundabout
- Hall Lane/Chingford Mount Rd./New Rd./Old Church Road
- Woodford New Rd./Chingford Lane
- Chingford Mount Rd./NCR/Chingford Rd.
- Chingford Rd./Forest Rd./Hoe Street
- Blackhorse Lane/Forest Rd./Blackhorse Rd.

- Hoe Street/Lea Bridge Rd./Leyton High Rd.
- Lea Bridge Rd./Clapton Rd. (outside Waltham Forest)
- Markhouse Rd./Lea Bridge Rd.
- Whipps Cross roundabout
- Green Man roundabout
- Woodford New Rd./Forest Rd./Waterworks Corner

The greater proportion of these junctions are traffic signal controlled, (including signalised roundabout controls with the NCR and the A12), with the remainder being priority controlled roundabouts or junctions.

Finally, it is noticeable from an inspection of **Figure A-5** that over the 10 year period considered, traffic flows upon the majority of roads surveyed have, in the main, experienced a relatively steady AADF rate over the ten year period examined. There are some noticeable exceptions to this;

- Forest Road in the Blackhorse Lane sub-area exhibiting a decrease from an AADF rate of 25,500 in 2000 to 21,500 in 2008;
- Hoe Street in the Central WF sub-area exhibiting a decrease from an AADF rate of 28,500 in 2000 to 15,000 in 2008; and
- Whipps Cross Road in the Southern WF sub-area exhibiting an increase in AADF rate of 20,000 in 2000 to 26,000 in 2008.

Between 2006 to 2008 it is noticeable **Figure A-5** that there is a slight general decrease in AADF rates over the greater majority of roads examined within the borough. Given that car ownership rates within Waltham Forest have continued to increase and it has been identified that there is a high dependency for car-borne travel for work related trips within Waltham Forest, It is suggested that the observed trend of a general decrease in traffic flow rates between 2006 and 2008, could be associated with an increase in the levels of congestion upon the roads and improved public transport accessibility and reliability.

Historically, average speed and link delay data suggests that there has been no increase in average traffic speed across the borough, or reduction in link delay associated with the perceived reduction in traffic flows. It is therefore hypothesised that the current general trend for decreasing levels of link traffic flow may be a factor of the increasing levels of congestion occurring upon the borough road network associated with a decrease in average link speeds and increase in link delay.

It is therefore concluded that there is very little, if any, reserve link capacity available upon the borough road network during the peak travel periods, and that the borough road network is operating on the verge of instability resulting from the increasing levels of congestion now occurring upon the road network within Waltham Forest.

However, it has been previously shown that there is a high dependency upon the car-borne mode for work related trips for both the resident and non-resident actively employed population of Waltham Forest, with a particularly high dependency for car-borne trips between the sub-areas within Waltham Forest as indicated by **Figure 2-2**. It has also been stated that car ownership rates have continued to increase since 2001, with a projected level of 0.95 cars per household by 2011. It is therefore considered that the proportions by car mode made by the actively employed workforce population of Waltham Forest as determined from the 2001 travel to work Census data, are still relevant and, without constraint being applied, may be used to present forward projections of generated trips by car mode for the growth scenarios considered.

### Walking and Cycling

Walking is seen as an increasingly important mode of transport in its own right. Walking relieves pressure on the public transport network and can reduce car-borne trips, particularly short work and education related trips. Walking, particularly in the central congested areas in the south sub-area, and for cross boundary trips between adjacent sub-areas, would present a viable mode of transport within Waltham Forest.

It has been previously described that the existing road network has created severe severance to pedestrian traffic, particularly over the NCR and A12 TLRN roads passing through the borough. At these roads, pedestrian movements are constrained to grade separated facilities. Many of the interchanges between these TLRN roads and the borough networks comprise of very large signalised roundabout junctions, presenting an extreme barrier to the safe crossing of pedestrians at street level. Many of the pedestrian overbridges and underpasses present an 'unpleasant' environment for pedestrian movements. This is borne out through an examination of **Figure 2-2** (in the main body of the report) which indicates the very low level of pedestrian and cycle movement between sub-areas with segregation afforded by the NCR.

Although much of the borough is accessible for pedestrian movement, supported by the availability of bus services to the greater proportion of the population within 400m of their home, the pedestrian public realm and surface crossing provisions are still dominated by vehicular traffic.

**Table 2-1** (in the main body of the report) indicates that walking is used as the principal mode of transport for 7.1% (6,896) of the work related trips of the actively employed population resident within Waltham Forest and 11.2%, (2,919), of the actively employed population non-resident within Waltham Forest. The greater proportion of work related walking trips relate to trips with origins and destinations within Waltham Forest as indicated at **Figure 2-2** (in the main body of the report).

It is therefore considered that walking as a mode of transport is a valid proposition within Waltham Forest, with road safety being a key determinant for the provision of pedestrian infrastructure, and that the capacity and potential modal transfer of trips, particularly the short trips currently made by car within and between the sub-areas, could be targeted through public realm improvements and bus priority measures to present a sustainable

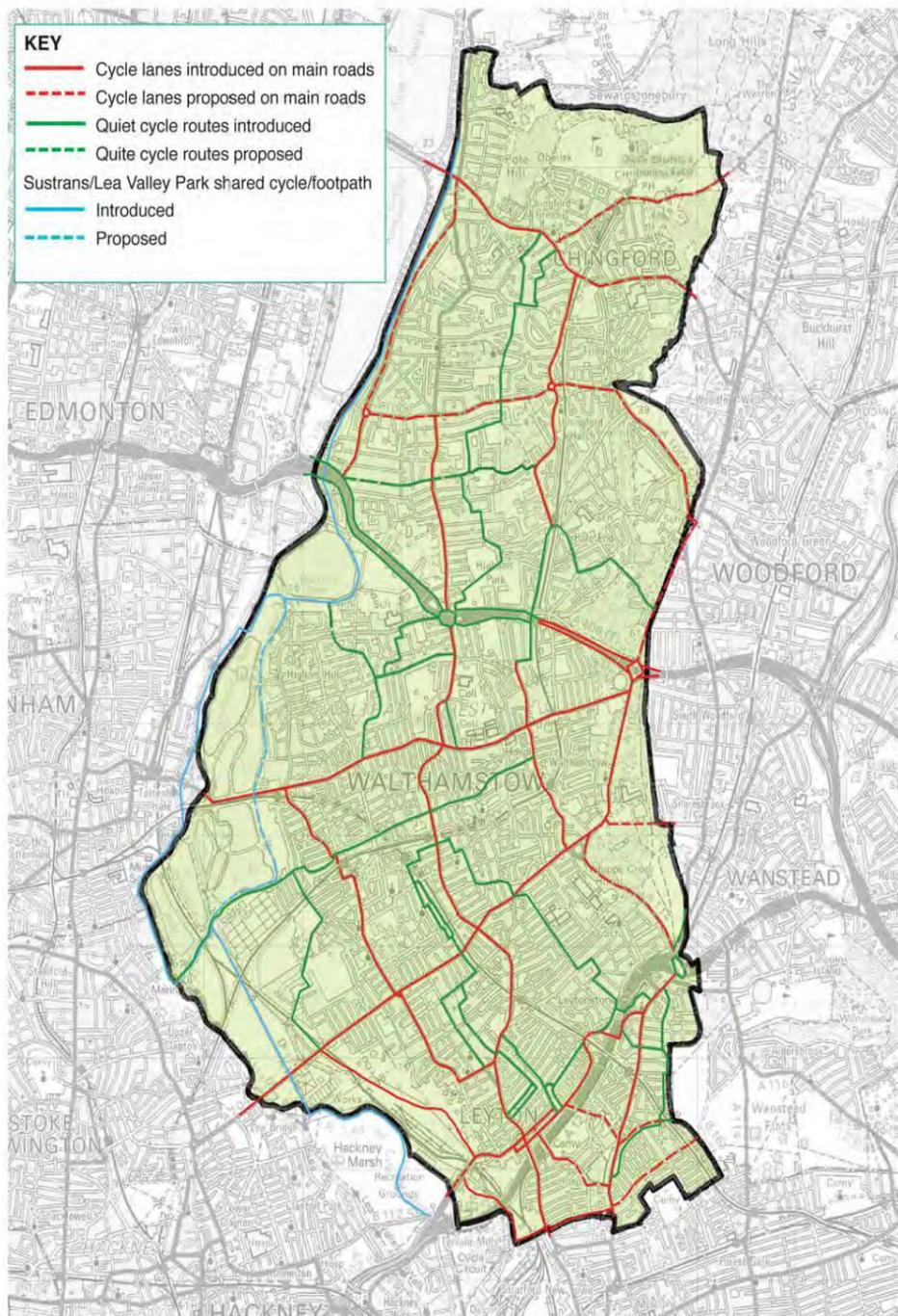
and reliable alternative mode of travel for that proportion of the actively employed population.

Waltham Forest has a well established cycle network with almost 21 miles of network covering all main roads throughout the borough as well as having almost 20 miles of 'quiet' cycle provisions using residential roads and greenways, the cycle network being presented at **Figure A-10**. The later provision and improvements to the cycle network are concentrated in the Epping Forest and Lea Valley regions.

It is considered that the cycle network currently provided throughout the borough is underutilised and that there is sufficient capacity available upon the cycle network to accommodate a significant modal shift from car to cycle mode of transport. It is also considered that further enhancement to the existing cycle network is unlikely to promote the level of modal shift that could be accommodated upon the cycle network on its own. A continuation of the 'hearts and mind' policy actively promoted by Waltham Forest for cycling as a mode of transport, should be continued alongside the introduction of further cycle infrastructure.

In support of the existing cycle network across the borough, a number of cycle parking facilities have been provided at key interchange hubs including Walthamstow Central, Chingford, Highams Park station, Leytonstone station, Blackhorse Road station, St. James Street station and Leyton station, as well as in town centre locations at Walthamstow and Leytonstone. There is a continuing programme of work committed for future provision at shopping centres, railway stations and leisure centres.

Figure A-10: Waltham Forest Cycle Network



Source: London Borough of Waltham Forest 2008

As with walking, it is considered that cycling as a mode of transport is a valid proposition within Waltham Forest, with both road safety and provision of facilities at destinations being a key determinant for the provision of cycle infrastructure. It is also considered that increased cycle capacity and potential modal transfer of trips, particularly for those short trips currently made by car within and between the sub-areas, could be targeted through public realm improvements, increased cycle network infrastructure and providing cycle priority through junctions to present a sustainable and reliable alternative mode of travel for that proportion of the actively employed population currently undertaking short trips by car.

## Appendix B - Trip Generation and Modal Split Results



**Trip Generation and modal split for projected lower and higher population growth to 2026, outbound trips**

**Table B-1 Northern WF sub area – Lower Growth**

	Trips within LB Waltham Forest			Trips to the GLA			Trips to the rest of the UK			TOTAL		
	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026
Population	48	107	334	80	178	556	7	15	46	135	300	936
<b>MODE</b>												
Underground	1	2	7	34	75	235	1	1	5	36	78	247
Rail	1	2	7	11	24	76	1	1	4	13	27	87
Bus	5	11	34	7	15	46	0	1	2	12	27	82
Car	21	47	147	23	52	162	5	10	32	50	109	341
Taxi	2	4	11	0	0	1	0	0	0	2	4	12
Motorcycle	0	1	2	1	3	9	0	0	0	1	4	11
Cycle	1	1	4	1	3	10	0	0	0	2	4	14
Walk	6	14	43	1	2	6	0	0	1	7	16	50
Other	0	1	2	0	0	1	0	0	0	0	1	3

Source: URS Corporation 2009

**Table B-2 Northern WF sub area – Higher Growth**

	Trips within LB Waltham Forest			Trips to the GLA			Trips to the rest of the UK			TOTAL		
	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026
Population	48	292	568	80	486	946	7	41	79	135	819	1611
MODE												
Underground	1	6	12	34	206	400	1	4	8	36	216	420
Rail	1	6	13	11	66	129	1	3	6	13	75	148
Bus	5	30	58	7	40	78	0	2	4	12	72	140
Car	21	129	250	23	142	276	5	28	54	49	299	580
Taxi	2	10	19	0	1	2	0	0	0	2	11	21
Motorcycle	0	2	3	1	8	15	0	0	1	1	10	19
Cycle	1	3	6	1	9	17	0	0	0	2	12	23
Walk	6	38	73	1	5	10	0	1	1	7	44	84
Other	0	2	3	0	1	2	0	0	0	0	3	5

Source: URS Corporation 2009

**Table B-3 Central WF sub area – Lower Growth**

	Trips within LB Waltham Forest			Trips to the GLA			Trips to the rest of the UK			TOTAL		
	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026
Population	517	1165	2030	861	1940	3380	72	162	282	1450	3267	5692
MODE												
Underground	39	88	153	364	820	1429	7	16	28	410	924	1610
Rail	17	38	66	117	264	460	6	13	23	140	315	549
Bus	72	162	282	71	160	279	4	9	15	147	331	576
Car	204	459	800	251	556	986	49	111	194	504	1126	1897
Taxi	9	20	35	2	4	7	0	0	1	11	24	43
Motorcycle	5	11	19	13	30	52	1	1	2	19	42	73
Cycle	15	34	58	15	35	61	0	0	1	30	69	120
Walk	140	314	548	9	20	34	1	3	5	150	337	587
Other	4	9	15	1	3	6	0	1	1	5	13	22

Source: URS Corporation 2009

**Table B-4 Central WF sub area – Higher Growth**

	Trips within LB Waltham Forest			Trips to the GLA			Trips to the rest of the UK			TOTAL		
	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026
Population	517	1282	2217	861	2135	3691	72	178	308	1450	3595	6216
MODE												
Underground	39	97	168	364	903	1560	7	18	30	410	1018	1758
Rail	17	41	72	117	290	502	6	14	25	140	345	599
Bus	72	178	308	71	176	304	4	9	16	147	363	628
Car	204	505	874	251	623	1077	49	122	212	504	1250	2163
Taxi	9	22	39	2	5	8	0	0	1	11	27	48
Motorcycle	5	12	21	13	33	57	1	2	3	19	47	81
Cycle	15	37	64	15	38	66	0	0	1	30	75	131
Walk	140	346	598	9	22	38	1	3	5	150	371	641
Other	4	10	16	1	4	6	0	1	1	5	15	23

Source: URS Corporation 2009

**Table B-5 Southern WF sub area – Lower Growth**

	Trips within LB Waltham Forest			Trips to the GLA			Trips to the rest of the UK			TOTAL		
	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026
Population	307	476	649	511	792	1080	43	66	90	861	1334	1819
MODE												
Underground	25	39	54	216	335	457	4	6	9	245	380	520
Rail	7	11	16	69	108	147	3	5	7	79	124	170
Bus	45	69	95	42	65	89	2	4	5	89	138	189
Car	85	132	180	149	231	315	29	45	62	263	408	557
Taxi	3	5	6	1	2	2	0	0	0	4	7	8
Motorcycle	2	3	5	8	12	17	0	1	1	10	16	23
Cycle	7	11	16	9	14	19	0	0	0	16	25	35
Walk	56	88	120	5	8	11	1	1	1	62	97	132
Other	1	2	3	1	1	2	0	0	0	2	3	5

Source: URS Corporation 2009

**Table B-6 Southern WF sub area – Higher Growth**

	Trips within LB Waltham Forest			Trips to the GLA			Trips to the rest of the UK			TOTAL		
	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026
Population	489	1627	3682	814	2708	6131	68	226	511	1371	4561	10324
MODE												
Underground	40	135	305	344	1145	2592	7	22	50	391	1302	2947
Rail	12	39	88	111	368	834	5	18	41	128	425	963
Bus	71	238	538	67	223	505	4	12	27	142	473	1070
Car	135	450	1019	238	790	1789	47	155	352	420	1395	3160
Taxi	5	16	31	2	6	13	0	1	1	7	23	45
Motorcycle	3	11	26	13	42	95	1	2	4	17	55	125
Cycle	12	39	88	15	48	110	0	0	1	27	87	199
Walk	90	300	678	8	28	63	1	4	8	99	332	749
Other	2	8	17	1	5	10	0	1	2	3	14	29

Source: URS Corporation 2009

**Table B-7 Blackhorse Lane sub area – Lower Growth**

	Trips within LB Waltham Forest			Trips to the GLA			Trips to the rest of the UK			TOTAL		
	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026
Population	127	252	244	212	419	406	18	35	34	357	706	684
MODE												
Underground	7	15	14	90	177	172	2	3	3	99	195	189
Rail	3	5	5	29	57	55	1	3	3	33	65	63
Bus	22	43	41	17	35	33	1	2	2	40	80	76
Car	43	86	83	62	122	119	12	24	23	117	232	225
Taxi	2	3	3	0	1	1	0	0	0	2	4	4
Motorcycle	1	2	2	3	6	6	0	0	0	4	8	8
Cycle	4	7	7	4	8	7	0	0	0	8	15	14
Walk	22	43	41	2	4	4	0	1	1	24	48	46
Other	1	2	2	0	1	1	0	0	0	1	3	3

Source: URS Corporation 2009

**Table B-8 Blackhorse Lane sub area – Higher growth**

	Trips within LB Waltham Forest			Trips to the GLA			Trips to the rest of the UK			TOTAL		
	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026
Population	772	1403	1395	1286	2336	2323	107	195	194	2165	3934	3912
MODE												
Underground	45	82	82	543	987	982	11	19	19	599	1088	1083
Rail	16	29	29	175	318	316	9	16	16	200	363	361
Bus	131	237	236	106	192	191	6	10	10	243	439	437
Car	263	478	475	375	682	678	74	134	133	712	1294	1286
Taxi	10	18	17	3	5	5	0	0	0	13	23	22
Motorcycle	6	11	11	20	36	36	1	2	2	27	49	49
Cycle	21	39	39	23	42	42	0	0	0	44	81	81
Walk	131	238	237	13	24	24	2	3	3	146	265	264
Other	6	11	11	2	4	4	0	1	1	8	16	16

Source: URS Corporation 2009

Trip Generation and Modal Split for projected Lower and Higher Population Growth to 2026, Inbound Trips

**Table B-9 Southern WF sub area**

Southern WF sub area									
Mode	GLA			Rest of UK			Total		
	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026
London Underground	92	115	159	7	8	11	98	123	171
national Rail	54	67	93	24	31	42	78	98	191
Bus	112	140	194	7	8	12	118	148	205
Car	526	659	913	311	389	539	837	1048	1452
Taxi	2	2	3	0	0	1	2	3	4
Motorcycle	10	13	18	6	7	10	16	20	28
Bicycle	17	21	30	1	1	1	18	22	31
Walk	24	30	41	4	5	7	28	35	49
Other	2	3	4	0	1	1	2	3	4

Source: URS Corporation 2009

**Table B-10 Central WF sub area**

Central WF sub area									
Mode	GLA			Rest of UK			Total		
	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026
London Underground	85	113	159	6	8	11	92	122	171
national Rail	50	66	93	23	30	42	73	97	190
Bus	104	138	194	6	8	12	110	146	205
Car	489	650	913	293	384	539	782	1034	1451
Taxi	2	2	3	0	0	1	2	3	4
Motorcycle	10	13	18	5	7	10	15	20	28
Bicycle	16	21	30	1	1	1	17	22	31
Walk	22	29	41	4	5	7	26	35	49
Other	2	3	4	0	1	1	2	3	4

Source: URS Corporation 2009

**Table B-11 Blackhorse Lane sub area**

Blackhorse Lane sub area									
Mode	GLA			Rest of UK			Total		
	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026
London Underground	-63	-64	-90	-5	-5	-6	-68	-69	-96
national Rail	-37	-38	-53	-17	-17	-24	-54	-55	-107
Bus	-77	-78	-109	-5	-5	-7	-82	-83	-116
Car	-363	-367	-514	-217	-217	-304	-580	-584	-818
Taxi	-1	-1	-2	0	0	0	-2	-2	-2
Motorcycle	-7	-7	-10	-4	-4	-6	-11	-11	-16
Bicycle	-12	-12	-17	-1	-1	-1	-12	-12	-17
Walk	-16	-17	-23	-3	-3	-4	-19	-20	-28
Other	-2	-2	-2	0	0	0	-2	-2	-2

Source: URS Corporation 2009

**Table B-12 Northern WF sub area**

Chingford sub area									
Mode	GLA			Rest of UK			Total		
	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026	2009-2014	2014-2019	2019-2026
London Underground	-30	-11	-7	-2	-1	0	-32	-12	-7
National Rail	-17	-6	-4	-8	-3	-2	-25	-9	-13
Bus	-36	-13	-8	-2	-1	-1	-38	-14	-9
Car	-169	-63	-40	-101	-37	-24	-270	-100	-64
Taxi	-1	0	0	0	0	0	-1	0	0
Motorcycle	-3	-1	-1	-2	-1	0	-5	-2	-1
Bicycle	-5	-2	-1	0	0	0	-6	-2	-1
Walk	-8	-3	-2	-1	-1	0	-9	-3	-2
Other	-1	0	0	0	0	0	-1	0	0

Source: URS Corporation 2009

## **Appendix C - London Borough of Waltham Forest – 2010 LIP Funding**



**Waltham Forest LIP Initial Allocation 2010**

Programme	Scheme	Description	£
<b>20mph Zones</b>	<b>TOTAL</b>		<b>535,000.00</b>
	LANGTHORNE AREA E11	Implementation of area-wide traffic calming schemes / 20mph zones as designed during 2008/09	200,000.00
	FALMOUTH AVENUE AREA E4		250,000.00
	WESTWARD ROAD AREA E4	Undertaking of detailed design and consultation for area-wide traffic calming schemes / 20mph zones to be implemented in subsequent years.	35,000.00
	LAURENCE AVENUE AREA E4		35,000.00
	WOODSTOCK ROAD AREA E17		15,000.00
<b>Bridge Assessment &amp; Strengthening</b>	<b>TOTAL</b>		<b>350,000.00</b>
	RUCKHOLT ROAD BRIDGE	Undertaking of bridge strengthening works based on assessments undertaken in 2008/09	50,000.00
	RAILWAY BRIDGES	Bridge assessments at railway bridges and implementation of interim measures where required	300,000.00
<b>Bus Priority</b>	<b>TOTAL</b>		<b>425,000.00</b>
	LEA BRIDGE ROAD TRAFFIC IMPROVEMENT SCHEME	Review bus lane hours of operation on Lea Bridge Road and consider providing inset parking/loading bays	120,000.00
	BUS PRIORITY SCHEME ALONG FOREST ROAD AND AT THE JUNCTION WITH WOOD STREET	Design only. Review the operation of the junction with Wood Street. Investigate the possibility of replacing the two pedestrian refuge islands with one puffin crossings. The puffin crossing will be located on the pedestrian desire line.	30,000.00
	BILLET ROAD AND BLACKHORSE ROAD TRAFFIC MANAGEMENT STUDY	Review operation of waiting and loading along the route. Additionally, restrictions along the route should be reviewed and new restrictions provided, particularly at and around junctions.	15,000.00
	HAIL & RIDE TO FIXED STOPS ALONG SECTIONS OF 397	Provide 14 fixed stops along parts of route 397 (at Chingford Avenue, Heathcote Grove, Endlebury Road and Simmons Lane)	120,000.00

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Programme	Scheme	Description	£
	HAIL & RIDE TO FIXED STOPS ALONG SECTION OF 397	Provide 6 fixed stops along parts of route 397 (at Rangers Road and Forest Side)	50,000.00
	TRAFFIC MANAGEMENT STUDY AT BILLET ROAD ON APPROACH TO CROOKED BILLET	Review options to re-mark carriageway markings and possible minor carriageway re-alignment to provide an additional vehicle lane on Billet Road between Crooked Billet Roundabout and approximately adjacent Waltham Park Way.	10,000.00
	TRAFFIC MANAGEMENT STUDY AT THE JUNCTION OF WHIPPS CROSS ROAD AND JAMES LANE	Review parking restrictions and hours of operation.	20,000.00
	REVIEW OF TRAFFIC ISLANDS IN WHOLE BOROUGH	Carry out a review of all traffic islands within the borough (which are on bus routes), to review the necessity for the islands and the waiting and loading restrictions adjacent to the islands. Scheme to include providing double yellow lines and amending TMOs.	45,000.00
	BOROUGH ADMINISTRATION	borough administration	15,000.00
<b>Bus Stop Accessibility</b>	<b>TOTAL</b>		<b>65,000.00</b>
	BSA	Programme to ensure that the borough's 495 bus stops are fully accessible. This includes improvements at bus stops with enforceable measures to ensure that they are fully accessible to all members of the community.	65,000.00
<b>Controlled Parking Zones</b>	<b>TOTAL</b>		<b>40,000.00</b>
	FUTURE CPZS	Design, consultation and implementation of future CPZs in the borough	40,000.00

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Programme	Scheme	Description	£
<b>Education, Training &amp; Publicity Schemes</b>	<b>TOTAL</b>		<b>8,000.00</b>
		Commissioning of anti drink driving school play - 'Too much Punch for Judy'	6,000.00
		Production of 'First Car Magazine' and interactive road safety education resource for teenagers	2,000.00
<b>London Cycle Network</b>	<b>TOTAL</b>		<b>274,000.00</b>
	LINK 204 - JUNCTION OF LEA BRIDGE ROAD, ARGALL WAY AND ORIENT WAY	Improved access to advanced stop line (ASL) through provision of dropped kerbs and widening of cycle lane markings.	4,000.00
	LINK 205 - OLIVER ROAD/RUCKHOLT ROAD JUNCTION	Implementation of improvements for cyclists at a difficult junction.	50,000.00
	LINK 204 - LEA BRIDGE ROAD CROSSING NEAR WESTERN RD	Remove central reservation in order to provide additional width for continuation of cycle lane through crossing.	40,000.00
	LINK 202 - SECTION BETWEEN THE GREEN MAN AND THE GROVE	Widening of path through cemetery.	40,000.00
	LINK 204 - WHIPPS CROSS ROUNDABOUT	Signalisation of all arms of the roundabout with ASL's and feeder lanes as a long term option	140,000.00
<b>Local Area Accessibility</b>	<b>TOTAL</b>		<b>105,000.00</b>
	SCOOTABILITY	Continuation of Scootability scheme that was launched in May 2008, which offers the short-term hire of mobility scooters and powerchairs to residents of the borough for up to four days at a time.	40,000.00

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Programme	Scheme	Description	£
	MOBILITY FORUM	Support for the Waltham Forest mobility forum - an arena for disabled and older people living or working in the borough to have a say on transport accessibility.	5,000.00
	SHOPMOBILITY	Support for Shopmobility scheme which provides the hire of mobility scooters for those shopping in Walthamstow town centre. The scheme is operated by Shopmobility Waltham Forest, a registered charity.	20,000.00
	OUTLINE WORK PROGRAMME 09/10	Implementation of small scale works designed to improve access for disabled people and those with mobility problems at key locations across the borough (e.g. dropped kerbs, tactile paving, public seating etc).	40,000.00
<b>Local Safety Schemes</b>	<b>TOTAL</b>		<b>940,000.00</b>
	HOE ST BOUNDARY RD TO FIRST AVE	Accident Investigation and Prevention package, including implementation of improved pedestrian facilities and speed reduction measures	35,000.00
	BLACKHORSE RD - ST JAMES ST		250,000.00
	BLACKHORSE LA - HIGHAM HILL TO FOREST RD		250,000.00
	HIGH RD LEYTON - HAINAULT TO LEYTON GRN		25,000.00
	MARKHOUSE RD/QUEENS RD JUNCTION	Installation of new traffic signal controlled junction	130,000.00
	LEA BRIDGE RD/CHURCH RD JUNCTION	Implementation of safety measures at the junction including improved facilities for pedestrians	5,000.00
	LEA BRIDGE RD/EASTERN RD JUNCTION	Implementation of safety measures at the junction including improved facilities for pedestrians	81,000.00
	WILMOT ROAD/ROSEDENE TERRACE JUNCTION	Implementation safety measures at the junction including improved facilities for pedestrians	15,000.00

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Programme	Scheme	Description	£
	HIGH RD LEYTON - ST GEORGES TO WINDSOR	Design of scheme during 2009/2010 for implementation in 2010/2011	15,000.00
	WOOD ST - VALLENTIN RD TO LEA BRIDGE RD	Design of scheme during 2009/2010 for implementation in 2010/2011	15,000.00
	FUTURE SCHEMES	Design of schemes during 2009/2010 for implementation in 2010/2011	40,000.00
	STAGE 3 ROAD SAFETY AUDITS	Undertaking of road safety audits and supporting traffic surveys at various locations across borough as deemed necessary	4,000.00
	TRAFFIC SURVEYS		6,000.00
	HALE END ROAD E4	Accident Investigation and Prevention package, including implementation of improved pedestrian facilities and speed reduction measures	54,000.00
	MARKHOUSE ROAD	Design of scheme during 2009/2010 for implementation in 2010/2011, between Tudor Avenue and Harris Street	15,000.00
<b>Non-LCN+ Cycling Schemes</b>	<b>TOTAL</b>		<b>230,000.00</b>
	CYCLE TRAINING	Provision of cycle training to the national standards in primary schools, secondary schools and for adults	110,000.00
	MARSH LANE CYCLE/FOOTBRIDGE	Provision of new ramps connecting to bridge for the benefit of cyclists and disabled users	50,000.00
	CYCLE PARKING IN SHOPPING CENTRES	Programme for introducing secure cycle parking facilities at main shopping areas in the borough	20,000.00
	HOE STREET / SELBORNE ROAD JUNCTION	Significant improvement of cycling facilities at the major bus priority scheme proposed at the junction	25,000.00
	LOCKWOOD WAY TO COPPERMILL LANE LINK	New cyclepath and footpath (including lighting, fencing and signing) between Lockwood Way and Coppermill Lane, running underneath the railway line via the existing (but currently closed) subway. Feasibility work funded by the LDA, with the aim of opening up the area for widescale regeneration. Implementation over 2	25,000.00

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Programme	Scheme	Description	£
		years.	
<b>Principal Road Renewal</b>			
	<b>TOTAL</b>		<b>540,000.00</b>
	A104 LEA BRIDGE ROAD E10	Reconstruct sections of carriageway, resurface carriageway with Stone Mastic Asphalt and replace Anti skid surfacing as necessary	540,000.00
	A503 FOREST ROAD E17	Reconstruct sections of carriageway, resurface carriageway with Stone Mastic Asphalt and replace Anti skid surfacing as necessary	0
<b>School Travel Plans</b>			
	<b>TOTAL</b>		<b>260,000.00</b>
	BOROUGH WIDE REVIEW	borough wide review and monitoring of School Travel Plans, with assistance to update STPs if required	40,000.00
	STP 2	Undertaking of engineering works and implementation of 'soft' measures identified within each approved school travel plan	80,000.00
	SCHOOL TRAVEL PLAN ADVISOR POST	Continuation of funding for School Travel Plan Advisor post and full time support post	55,000.00
	WALK TO SCHOOL WEEK	Resources for children including badges & postcards certificates for participating in national walk to school campaign	5,000.00
	GRANTS FOR SCHOOLS - STPS	Grants for all 89 schools in the borough for the review/rewrite of STPs (match funding of facilities to encourage walking and cycling)	50,000.00
	WALK ON WEDNESDAY CAMPAIGN	Resources for children including badges, postcards and certificates certificates for participating in WOW	30,000.00

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Programme	Scheme	Description	£
<b>Streets for People</b>	<b>TOTAL</b>		<b>70,000.00</b>
	WOOD ST, E17	Completion of detailed design and consultation for major refurbishment of local shopping centre including pedestrian improvements, raised crossings and full cycling facilities. Implementation will be undertaken in subsequent years.	70,000.00
<b>Travel Awareness</b>	<b>TOTAL</b>		<b>27,000.00</b>
	BIKE WEEK	Contribution towards Tour de Waltham Forest event during Bike week in June 2009.	7,000.00
	CYCLE 50% CHALLENGE	Scheme designed to encourage staff to cycle to work, targeting major employers in the borough	5,000.00
	CAR FREE DAY	Annual Car Free Day to be held in September 2009	15,000.00
<b>Walking</b>	<b>TOTAL</b>		<b>125,000.00</b>
	LOCKWOOD WAY TO COPPERMILL LANE LINK	New footpath and cyclepath (including lighting, fencing and signing) between Lockwood Way and Coppermill Lane, running underneath the railway line via the existing (but currently closed) subway. Feasibility work funded by the LDA, with the aim of opening up the area for widescale regeneration. Implementation over 2 years.	75,000.00
	LEA BRIDGE ROAD PEDESTRIAN CROSSING	Undertaking of modelling and detailed design for a new puffin crossing on Lea Bridge Road, outside Forest Rise, enabling residents to access bus stop. The crossing will be of particular benefit to school children travelling to Forest School and to elderly residents travelling to nearby residences and a doctors surgery. Implementation to be undertaken in year 2.	10,000.00

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Programme	Scheme	Description	£
	LEYTON HIGH RD - CROWNFIELD RD KWR	Undertaking of Community Street Audit (CSA) and detailed design for improvement of walking routes from north-east corner of Olympic Park site to Leyton Station and Thatched House Neighbourhood Centre. The outcome of the CSA will help to identify a programme for improvement of these two important walking routes, which are expected to experience a significant increase in use during and after the 2012 Games. Following the undertaking of the CSA and detailed design, implementation will be undertaken in years 2 and 3.	40,000.00
<b>Work Travel Plans</b>	<b>TOTAL</b>		<b>67,500.00</b>
	TRAVEL PLAN ADVISOR	Continuation of funding for Business Travel Plan Advisor post covering Waltham Forest, Barnet and Enfield to implement Enterprise Scheme of travel plan measures aimed at cutting congestion and pollution by promoting sustainable modes of transport.	47,500.00
	WORK PLACE TRAVEL PLANS - SUPPORT	Budget to provide businesses with grants to help overcome barriers to sustainable transport.	20,000.00

*Source: London Borough of Waltham Forest 2009*