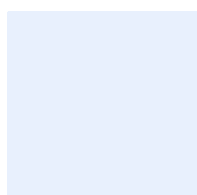


TRANSPORT EVIDENCE BASE – FINAL DRAFT



SYSTRA

LONDON BOROUGH OF BARKING AND DAGENHAM LOCAL PLAN

TRANSPORT EVIDENCE BASE – FINAL DRAFT

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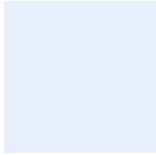
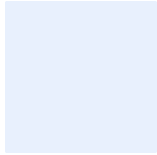
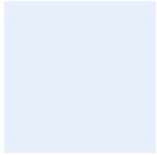


Table 8. Parking Mitigation AM Peak Journey Times

1. EXECUTIVE SUMMARY

1.1.1 The London Borough of Barking and Dagenham (LBBD) is in the process of preparing a new Local Plan for Regulation 19 public consultation in 2020. This will set out the policies and proposals for the development of the Borough up to 2034.

1.1.2 This document acts as an Evidence Base for the forecast impacts of the Local Plan growth proposals on the transport network.

1.2 What the Borough Wants to Achieve

1.2.1 The council has stated its ambition to deliver 50,000 new homes and 20,000 new jobs in the borough over the next 20 years. It is essential that this growth is delivered in a sustainable manor therefore the transport network, along with proposed mitigation measures, must be able to accommodate this additional growth without any significant increase in congestion and crowding.

1.2.2 The borough's aspiration for improving transport provision within and to/from the borough within the Local Plan is as follows:

- Deliver Healthy Streets and encourage mode-shift away from the private car
- Meeting cycle and not exceeding car parking provision standards in new developments
- Provide good access to industrial sites along the A13
- Improve North – South access
- Deliver upgrades to stations and rail services
- Town Centre re-design to reduce highway dominance
- Examine the Case for new long-term transport improvements

1.3 Impact of Local Plan Growth

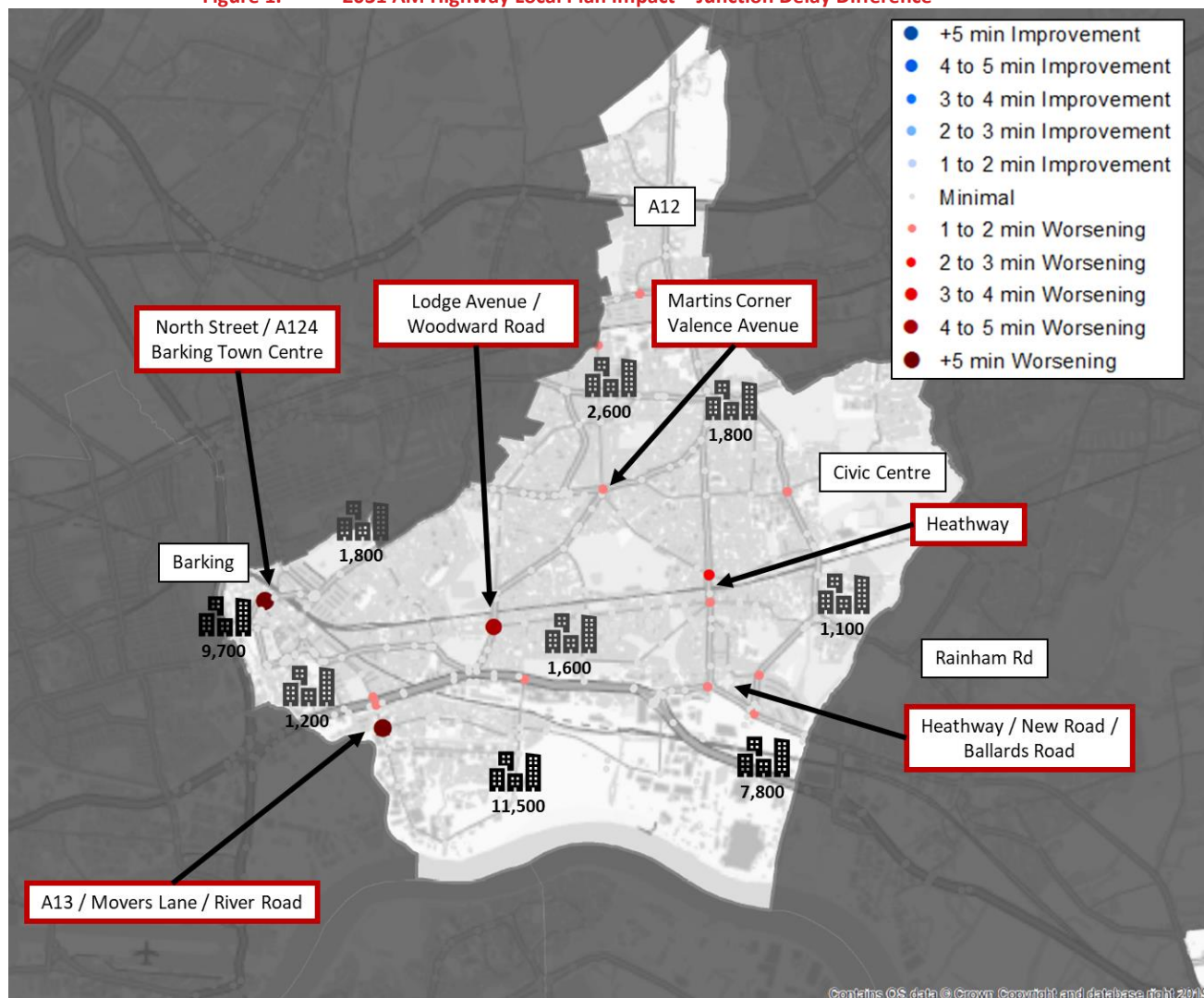
The impact of the proposed Local Plan growth has been modelled in TfL's strategic transport models:

- LTS was used to forecast Local Plan growth impact on demand by mode;
- ELHAM was used to model the impact of the resulting Local Plan growth on the borough's Highway network; and
- Railplan was used to assess the impact on the Public Transport network

1.3.1 By 2031 the borough's highway network is forecast to be operating at close to full capacity with congestion and delays expected across the borough, especially along the A13. This is before Local Plan growth is even added to the network.

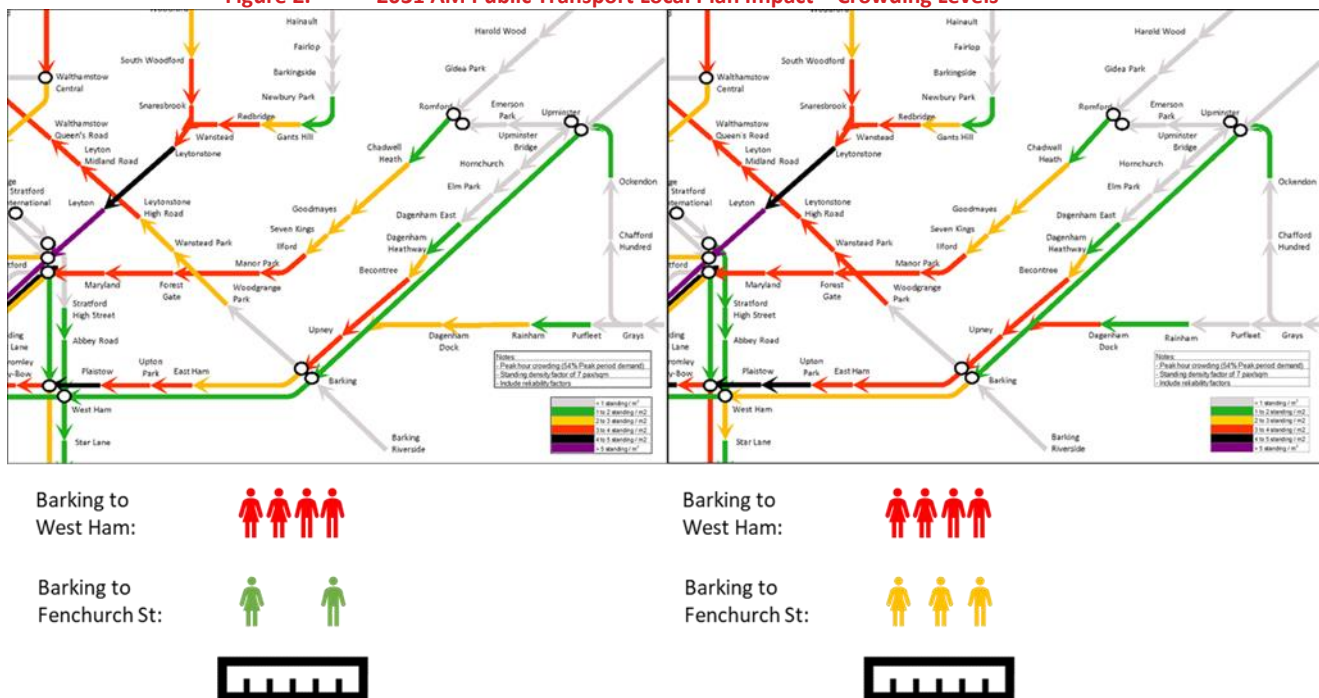
1.3.2 Figure 1 below displays the change in junction delays across the borough once Local Plan demand is added. It is clear that there is a significant increase in delays across the borough. The number of junctions expected to experience an average of delay of plus five minutes increases from just one (Renwick Road / A13) to seven. If left un-mitigated this increase in delays would not be acceptable.

Figure 1. 2031 AM Highway Local Plan Impact – Junction Delay Difference



- 1.3.3 The figure below displays forecasted crowding levels on the rail network around the borough. In the Without Development scenario (left) crowding levels are expected to be quite high on the Hammersmith & City / District line corridors. It is estimated that there will 3-4 passengers standing per square metre travelling into Central London on this corridor.
- 1.3.4 Once Local Plan growth is added (right), crowding levels increase on both the LUL and C2C rail corridors into Central London from Barking. This suggests that extra capacity will be required to accommodate Local Plan growth.

Figure 2. 2031 AM Public Transport Local Plan Impact – Crowding Levels



1.4 How to Deliver this Growth

1.4.1

A long-list of potential mitigation measures to enable the delivery of the borough's Local Plan growth aspirations has been developed and is displayed in Figure 3. Of these the following have been tested as part of a mitigations option in this study. Details on why certain mitigation measures were modelled or not is provided in the full document.

- Reduction in available on-street parking across the borough
- C2C Frequency Improvements
- C2C Capacity Increase (new rolling stock)
- Lower Roding Crossing (Bus/Walk/Cycle only)
- Castle Green Overground Station
- East London Transit expansion (including increased North-South routes)
- A13 Junction Improvements
- Thames Road Junction Improvements
- Mode shift in development demand from highway to public transport (high-level 10% shift assumed)

1.4.2

The mitigation package tested was able to reduce highway delays and public transport crowding but not to the levels forecast in the Without Development scenario. Therefore at present the Local Plan growth is not having a neutral/manageable impact on the transport network, especially for highway.

1.4.3

In order to effectively manage the impact of Local Plan growth on the Barking and Dagenham transport network the following will need to be investigated further:

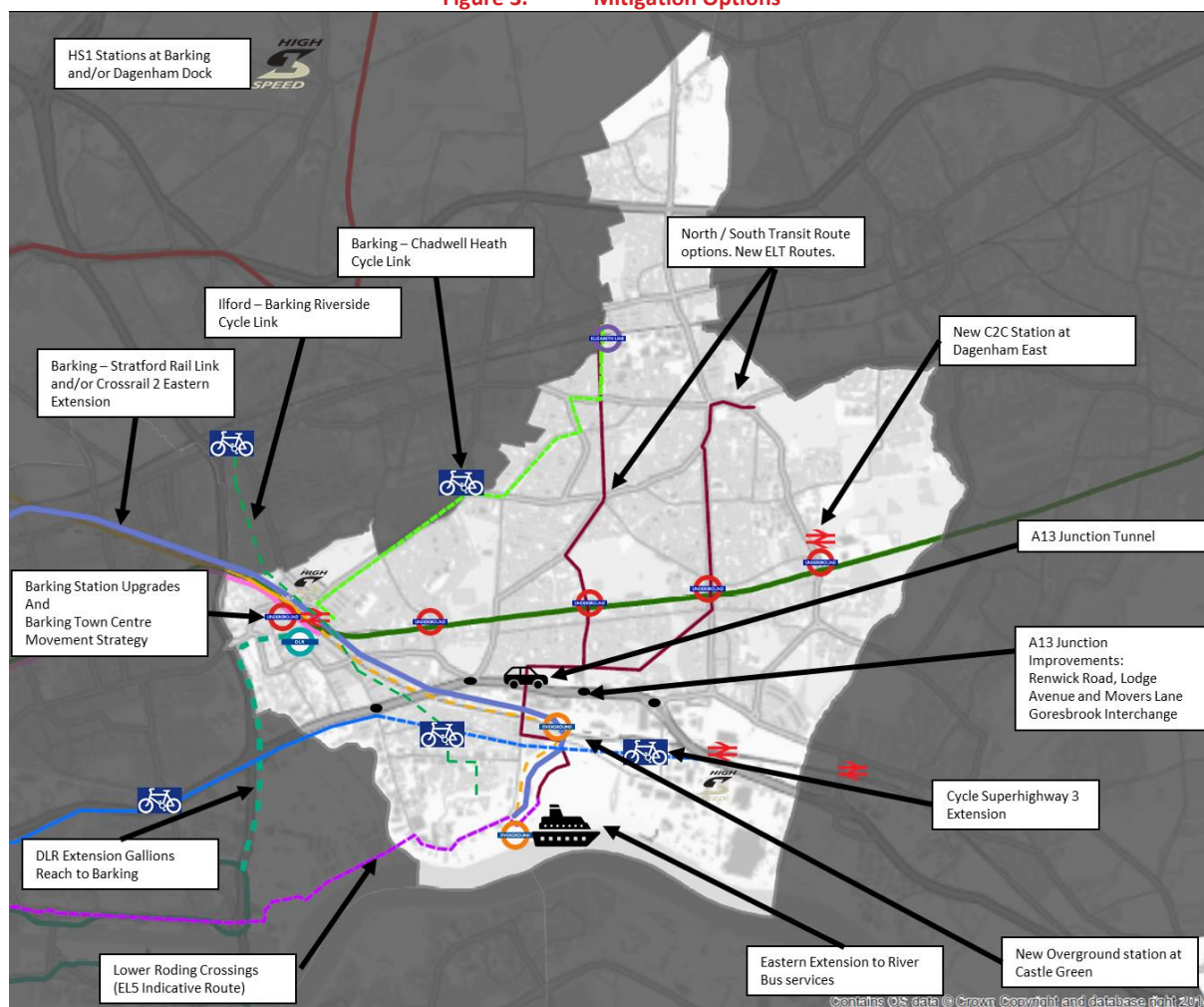
- Achieve significant mode/distribution shift away from highway through public transport and walk/cycle improvements;

- A13 and associated junctions improvements will be a priority as this will allow trips to leave the new development sites (although significant highway upgrades are not expected to be a borough or TfL priority)
- Significant improvements to Public Transport and Walk/Cycle infrastructure throughout the borough in order to meet the Mayor of London's mode share of 80% for non-car trips by 2040

1.4.4 This Transport Evidence Base document has identified that the following will be required to ensure that the Local Plan growth impact on the transport network is manageable:

- Junction improvements will need to be considered at the following locations:
 - A13 / Movers Lane / River Road
 - A13 / Renwick Road
 - Lodge Avenue / Woodward Road
 - Dagenham Heathway
 - Martins Corner – Valence Avenue
 - North Street / A124 – Barking Town Centre
- Capacity enhancements on public transport corridors to/from Central London will need to be further investigated to assess their ability to alleviate high levels of crowding forecast on the District and Hammersmith & City lines:
 - C2C capacity enhancement
 - Frequency improvements on C2C services
 - Crossrail 2 Eastern Extension
 - Gallions Reach – Barking DLR extension
- Public Transport and Walk/Cycle schemes to encourage a mode-shift away from the private car:
 - East London Transit extensions/enhancements with increased emphasis on North-South routes
 - Upper and Lower Roding crossings for bus, walk and cycle modes
 - Barking – Chadwell Heath Cycle link
 - Ilford – Barking Riverside Cycle link
 - Cycle Superhighway 13 extension
 - Liveable Neighbourhoods urban realm improvements
- Stricter Parking standards to encourage a reduction in overall car use within and to/from the borough
 - Encourage lower parking standards than the draft London Plan for new developments and where feasible consider car-free developments
 - Limit number of on-street car parking spaces

Figure 3. Mitigation Options



1.5 Next Steps

- 1.5.1 Highway congestion presents a clear obstacle to ensuring the Local Plan growth can be adequately accommodated by the borough's transport network. In addition, there is also a worsening of crowding levels on the District/Hammersmith & City Line between Barking – West Ham even after mitigation has been included.
- 1.5.2 It is recommended that a preferred mitigation package is developed (possible through a sifting exercise) and is run through LTS in order to forecast the modal shift that can be achieved before then assessing the impact of the Local Plan growth on the Highway and Public Transport networks.
- 1.5.3 The London Riverside Strategic Transport Study is due to commence in February 2020 with the aim to provide a 20 year phased programme of transport improvement to accommodate the planned levels of growth in the London Riverside Opportunity Area. It is recommended/envisaged that this will include a shifting exercise to test the mode-share impact of the various mitigation options highlighted in this report.

2. INTRODUCTION

2.1 Transport Study

- 2.1.1 SYSTRA were commissioned by BeFirst Regeneration Ltd, working on behalf of the London Borough of Barking and Dagenham, to undertake a high-level strategic transport assessment to help inform the development of the borough's new Local Plan. This study has made use of existing strategic transport models that were provided by Transport for London (TfL) to prepare an evidence base of the potential transport impact of the development. This also includes a proposal of potential mitigations.
- 2.1.2 The London Borough of Barking & Dagenham (LBBD) is in the process of preparing a new Local Plan for Regulation 19 public consultation in 2020. Once adopted, it will replace the current Local Development Framework (LDF) and set out policies and proposals for the development of the Borough up to 2034.
- 2.1.3 Following an Issues and Options consultation in 2015, the council has stated its ambition to deliver 50,000 new homes and 20,000 new jobs in the borough over the next 20 years. BeFirst are undertaking a review of the preferred growth option of this emerging Local Plan, with the key consideration being to establish whether current and committed transport provision in the borough has sufficient capacity to support the level of growth, and identify and prioritise additional infrastructure or services required.

2.2 Study Objectives

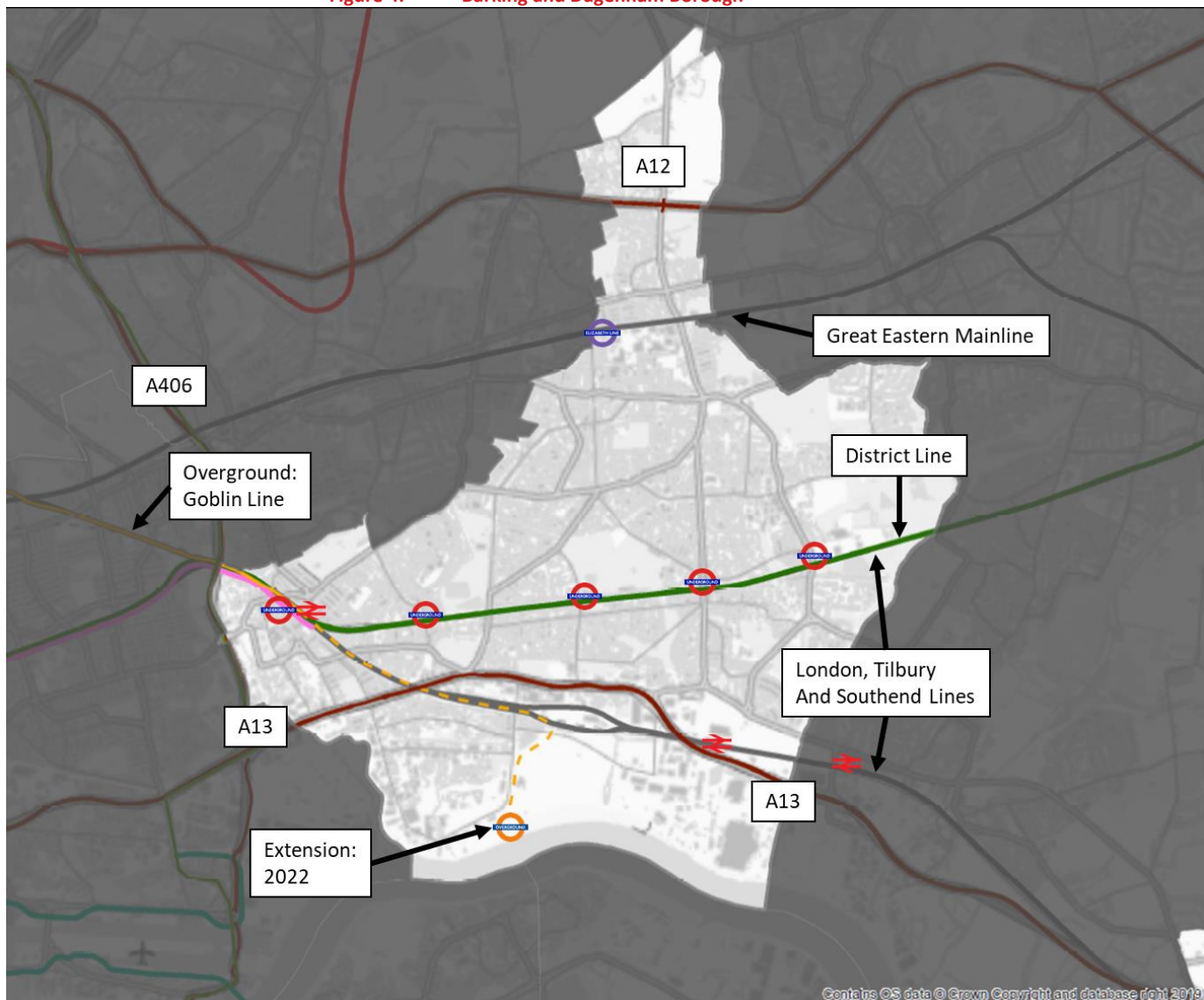
- 2.2.1 The purpose of this study is to understand the transport impacts of the emerging Local Plan proposals, using the East London Highway Assignment Model (ELHAM) and Railplan public transport model. The objectives of the Strategic Transport Assessment as described in the study brief are as follows:
- Baseline review of the existing highway and public transport models used in support of the recent 'Transforming London Riverside' Housing Infrastructure Fund (HIF)¹ bid, and update as necessary
 - 2031 Reference Case model run (Without Development) - future year forecast to include current and committed transport provision, alongside removal of high growth scenario from planning assumptions
 - 2031 LB Barking & Dagenham preferred Higher growth option model run (With Development) – future year forecast considering the LTS modelling already undertaken for the HIF bid and updating LTS for the revised Local Plan
 - Identification of key potential highway and public transport mitigation measures required to address current and future year issues and constraints

¹ This is a £5.5 billion Housing Infrastructure Fund which was available to local authorities for infrastructure to unlock housing.

2.3 Project Background

- 2.3.1 Much of the planned development in Barking and Dagenham is focussed in the south of the borough, and falls within the London Riverside Opportunity Area. This incorporates Barking Town Centre and the southern part of the borough, and is identified within the London Plan as a site with capacity for large scale development - creating thousands of new homes and jobs.
- 2.3.2 The starting point for this piece of work, agreed with both LBBD and TfL, was to use the models developed to support the recent GLA/TfL 'Transforming London Riverside' HIF bid. Models were available for both Railplan (public transport) and ELHAM (highways), alongside the need to update additional demand modelling work required for the LTS model to ensure that current Local Plan development proposals were fully captured in the demand modelling. The figure below shows the study area for the transport modelling.

Figure 4. Barking and Dagenham Borough



2.4 This Report and Associated Documents

2.4.1 This report contains the following chapters:

- **Chapter 3** summarises current transport provision and issues within the borough;
- **Chapter 4** outlines the Borough's aspiration for transport improvements;
- **Chapter 5** reviews the Local Plan growth assumptions and the impact these are forecast to have on the Highway and Public Transport networks;
- **Chapter 6** considers potential mitigation options to ensure the planned growth can be accommodated; and
- **Chapter 7** provides a summary and next steps

2.4.2 This Transport Evidence Base report is then supported by the following, more detailed/technical, documents:

- **Appendix A:** Full List of Mitigation Options considered in Chapter 5
- **Appendix B:** Local Model Validation Report
- **Appendix C:** Demand Forecasting Report
- **Appendix D:** Local Plan Evidence Base – Highway Modelling
- **Appendix E:** Local Plan Evidence Base – Public Transport Modelling

3. CURRENT TRANSPORT PROVISION AND KEY ISSUES

3.1 Borough Overview

- 3.1.1 The London Borough of Barking and Dagenham is situated in east London and is located at the heart of the Thames Estuary Growth Corridor area for regeneration and economic development in London. It is bordered by the London Boroughs of Newham to the west, Havering to the east and Redbridge to the north, whilst the River Thames forms the borough's southern boundary.
- 3.1.2 Barking and Dagenham has a population of around 210,000² with a strong industrial heritage. Nowadays, the borough is principally residential in character but with large areas of industrial land to the south. The A13 trunk road forms a significant barrier running through the borough between the predominantly residential areas to the north and the industrial areas to the south.
- 3.1.3 Barking is the borough's one major town centre, whilst Dagenham Heathway, Chadwell Heath and Green Lane serve as the borough's main districts. In addition, the new Barking Riverside Development near the Thames is creating a new district centre with 10,000 new homes served by the new Barking Overground rail extension opening 2022/3.
- 3.1.4 Barking and Dagenham's key advantages are its proximity to the main employment, retail and leisure centres of Docklands, Stratford and Romford; its good road and rail links to central London; and its proximity to the Thames; Crossrail, the M25 Motorway and London City Airport. In addition, the borough is predominantly flat which is advantageous for walking and cycling trips.

3.2 Local Transport Provision

- 3.2.1 Current Transport provision is summarised as follows:

Highway

- There are 396km of roads in Barking and Dagenham comprising:
 - 3km of trunk roads managed by TfL (including the A13 managed via a DBFO agreement)
 - 51km of borough principal and 324km of minor roads managed by the Council
- There are 106 bridges, culverts and other major structures located in the borough. The Council also has responsibility for the upkeep of 15,000 street lights across the borough
- There are 118 sets of traffic signals in the borough, operated and maintained by TfL
- A network of 39 on-street electric vehicle charging points at 13 locations across the borough is managed by Source London

² Wikipedia

National Rail / Tube

- Barking and Dagenham is served by an extensive east-west radial rail network comprising:
 - National Rail services, operated by C2C, connecting London and Southend serving Barking and Dagenham Dock. By 2021 it is expected that new rolling stock will provide increased capacity on these routes.
 - London Underground services via the District and Hammersmith & City Lines provide a link with Central and West London. District Line trains serve Barking, Upney, Becontree, Dagenham Heathway and Dagenham East whilst Hammersmith & City lines terminate at Barking. By 2023 the Four Lines Modernisation programme will allow up to 32 trains per hour in Central London and to/from Barking during peak times.
 - London Overground connects Barking to Gospel Oak (GOBLIN line) which connects to the North London Line. By December 2021 the line will be extended to/from Barking Riverside.
 - TfL Rail, which runs suburban services between London and Shenfield serves Chadwell Heath station. These services will be incorporated into the Crossrail (Elizabeth Line) scheme from 2021 (expected).
- There are several active rail freight facilities in the borough. These are located on the Tilbury Line around the Renwick Road area and include the following sites:
 - DB Cargo;
 - HS1 Exchange Sidings;
 - Eurohub;
 - Stobart;
 - City Markets;
 - Ford; and
 - Hanson Aggregates

Bus

- The bus network in Barking and Dagenham comprises:
 - 26 regular bus routes providing links to a range of local destinations, as well as to the major centres of Rainham, Romford, Ilford and Stratford in neighbouring boroughs
 - This includes the East London Transit which is a part segregated bus rapid transit connecting the borough with Barking Town Centre. There are currently three routes:
 - ELT1: Ilford-Barking-Barking Riverside
 - ELT2: Becontree-Barking-Dagenham Dock
 - ELT3: Chadwell Heath-Barking-Barking Riverside

River

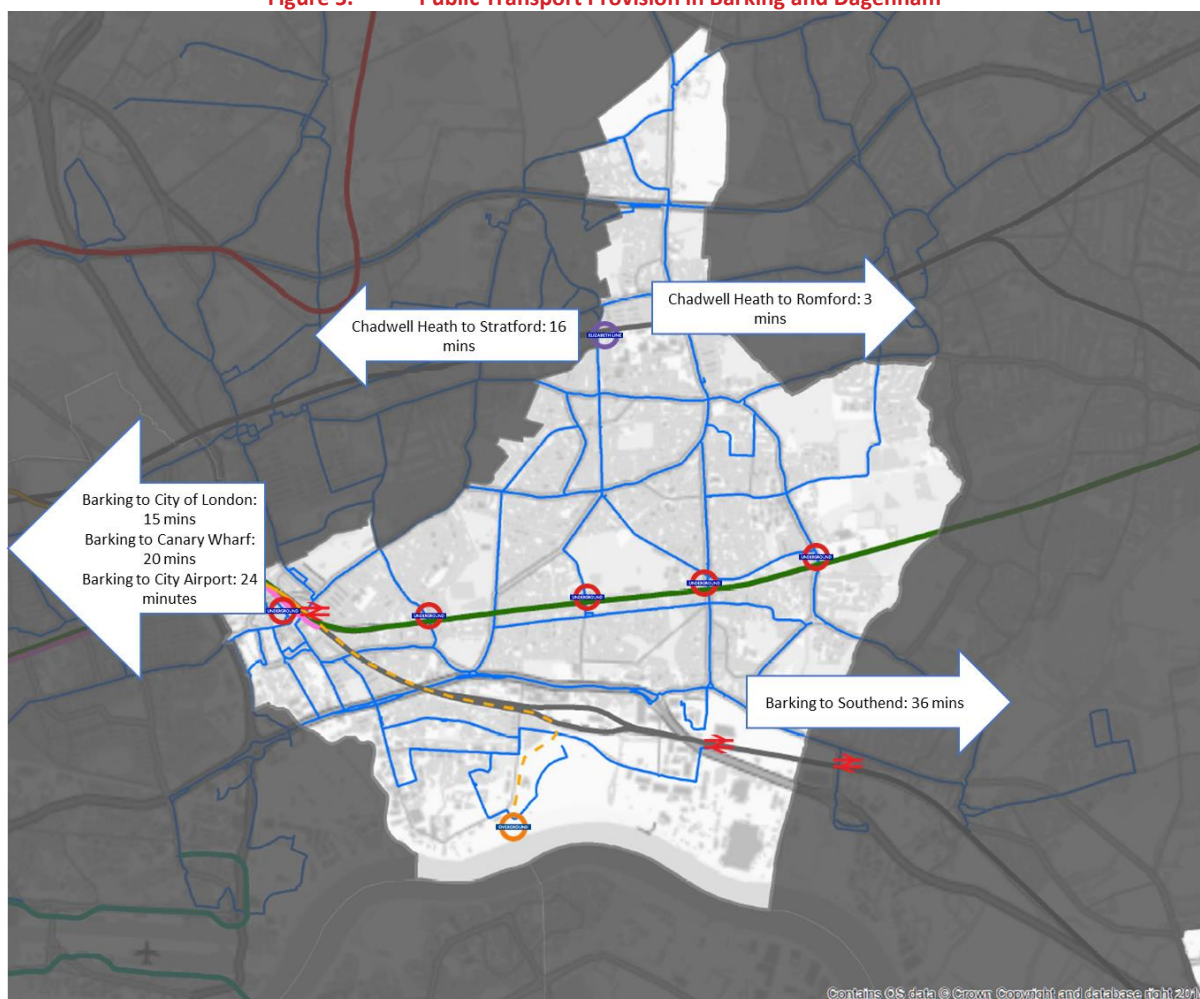
- The River Thames remains largely underutilised as a transport network in East London, with no passengers services in operation east of the Thames Flood Barrier at Woolwich
- Significant freight activity occurs on the Thames around Barking Reach. Over half of London's safeguarded wharf sites are located here – handling significant volumes of freight

Walking/Cycling

- Barking and Dagenham is served by a number of on and off-road cycle routes and supporting infrastructure, including:
 - 7km of 'Greenways' routes, providing safe, continuous cycle links through a number of borough parks
 - Local 'Quiteways', linking the main urban centres and other key destinations in the borough
 - Cycle Superhighway 3, providing a direct route from Barking to Tower Hill
 - An extensive network of cycle parking facilities at key locations and destinations across the borough
 - Cycle Route 10 Barking Riverside – Ilford will open within 2020
- Key Walking routes/facilities in the borough include:
 - A 16km Rights of Way network, predominantly located in the more rural eastern part of the borough
 - The Thames Path 'City to Sea' pedestrian/cycling route
 - Eight 'Just Walk' routes set up in the borough's parks, to encourage people to walk to improve their health
 - A network of designated 'safe routes to schools' – to encourage more children to walk to school

3.2.2 Public Transport provision across the borough is displayed in the figure below (bus network highlighted in blue).

Figure 5. Public Transport Provision in Barking and Dagenham³



3.3 Current Issues

- 3.3.1 Although much of the borough has good east-west radial connections; north-south connections (especially for public transport) are limited and highway congestion results in unreliable journey times. This is highlighted by the following journey time examples⁴ (see Figure 6):

1. Chadwell Heath to Barking Town Centre

- 3.3.2 **Highway:** This journey is expected to take between 18-45 minutes travelling via Valence Avenue and Longbridge Road. The large variation in journey times suggests that highway congestion can be quite severe.
- 3.3.3 **Public Transport:** The direct route would take around 44 minutes by taking route 368 which runs every 9-12 minutes. Alternatively it is around 10 minutes quicker to take the 173 (runs every 7-10 minutes) to Dagenham Heathway and change onto the District Line.

³ Bus Network displayed by blue links

⁴ Source: Google Maps for journeys undertaken at 8am on weekdays

The public transport routes are significantly slower than the Highway option and would also be susceptible to highway delays.

2. Becontree to Chadwell Heath

3.3.4 **Highway:** Estimated to take 9-22 minutes via Valence Avenue.

3.3.5 **Public Transport:** 16 minutes taking route 62 which runs every 7-11 minutes.

3. Chadwell Heath to Barking Riverside

3.3.6 **Highway:** Estimated to take 18-40 minutes via Valence Avenue, Gale Street, A13, Choats Road and Fielders Crescent. The large variation in journey time suggests significant congestion and delays can occur along the route.

3.3.7 **Public Transport:** The direct route takes 60 minutes taking the bus route 172 (runs every 8-12 minutes) to Renwick Road but then this would require a 20 minute walk to complete the journey.

3.3.8 Avoiding such a long walk is possible by taking the 173 (every 7-10 minutes) to Movers Lane / River Road and then taking the EL1 (every 3-6 minutes) to Riverside Campus – this route is expected to take 67 minutes. The fastest possible route by public transport actually involves three interchanges but takes 58 minutes:

- Bus 62 to Becontree Station (8-10 minutes)
- District Line to Barking Station (every 3 minutes)
- EL1 to Riverside Campus (every 3-6 minutes)

3.3.9 The fact that the fastest public transport route involves three interchanges and involves travelling westbound on the District Lines highlights how poorly connected the north and south of the borough are.

4. Barking and Dagenham Civic Centre to London Sustainable Industry Park

3.3.10 **Highway:** Estimated to take 14-30 minutes via Rainham Road, A1306 and Choats Manor Way. The large variation in potential journey times suggest that congestion and delays occur along the route.

3.3.11 **Public Transport:** The fastest route involves taking route 173 (every 7-10 minutes) to Morison Road but then a 20 minute walk to complete the journey (total of around 47 minutes). Alternatively there is the EL2 (every 7-8 minutes) which takes 55 minutes via Barking Town Centre.

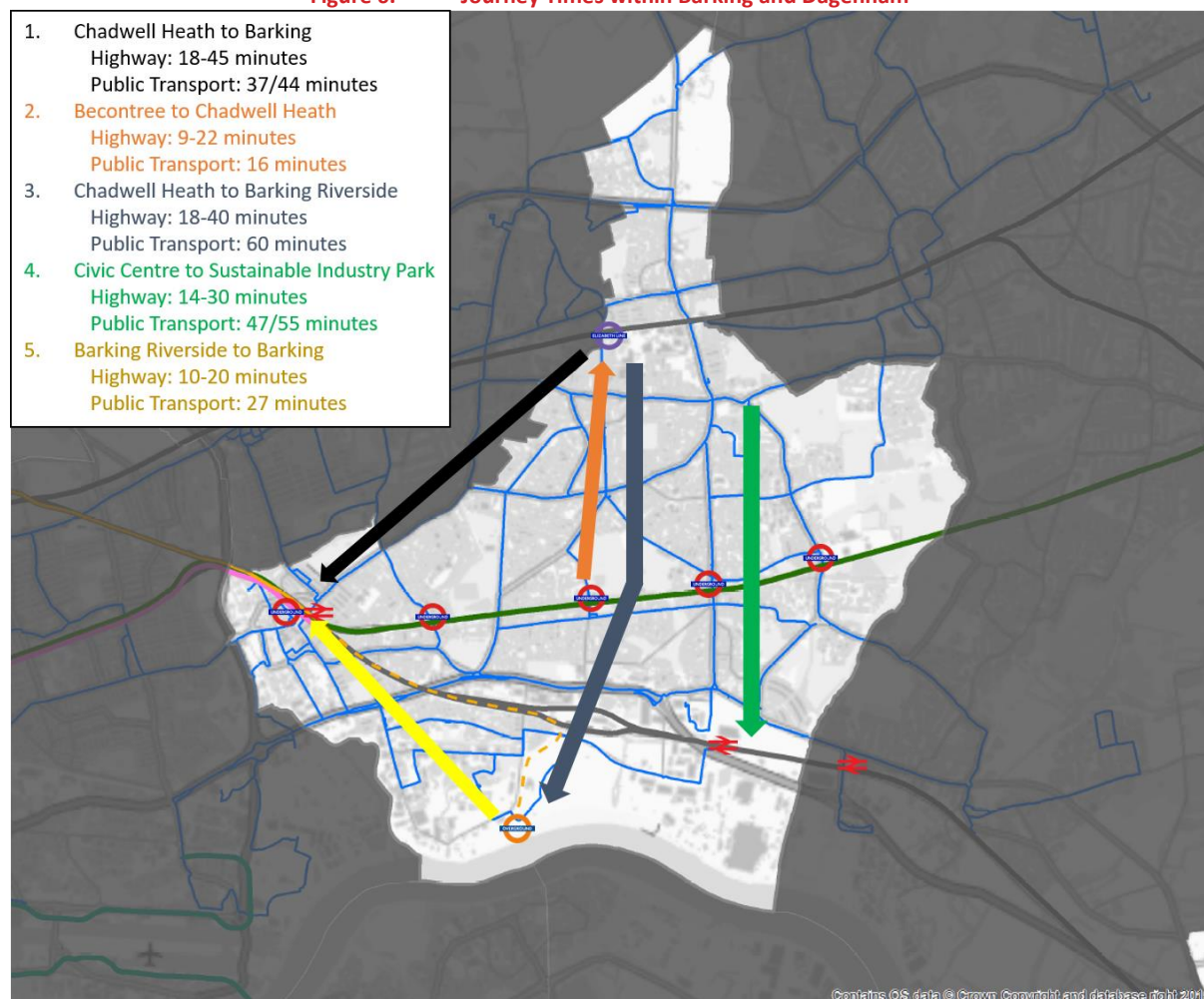
3.3.12 The journey time via Public Transport is significantly greater than the highway time and given the fastest route is via the EL2 which routes via Barking Town Centre it is clear that North-South movements by Public Transport within the borough are not well connected.

5. Barking Riverside to Barking Town Centre

3.3.13 **Highway:** Estimated to take 12-20 minutes via the A13.

3.3.14 **Public Transport:** Estimated to take 27 minutes via the EL1 which runs every 3-6 minutes. Note that the Barking Riverside – Barking Overground journey time will be approximately just 6/7 minutes.

Figure 6. Journey Times within Barking and Dagenham⁵



3.3.15 The majority of the routes discussed above have a significant variation in expected journey time which suggests that, at present, there is considerable congestion across the borough. This is resulting in delays and unreliable journey times.

3.3.16 In addition, it is clear that North-South connections across the borough are limited, especially for public transport. For the majority of the routes reviewed the public transport time is significantly longer than the highway time. In addition, many of the public transport options involves taking an in-direct route via Barking Town Centre.

⁵ Bus Network Displayed by Blue Links

4. WHAT THE BOROUGH WANTS TO ACHIEVE

4.1 Overview

- 4.1.1 This section provides a summary of the Borough's aspiration for improving transport provision within and to/from the borough.

4.2 Healthy Streets and Mode Shift

- 4.2.1 Adopting the Healthy Streets approach is a requirement for Local Implementation Plan funding and The Mayor of London report⁶ outlines some practical steps to achieve this, including:

- Improving local environments by providing more space for walking and cycling, and better public spaces where people can interact;
- Prioritising better public transport and safer and more appealing routes for walking and cycling;
- Planning new developments so people can walk or cycle to local shops, schools and workplaces, and have good public transport links for longer journeys.

- 4.2.2 The measures and schemes (and funding) to achieve this are outlined in the borough's Local Implementation Plan (LIP), which has been agreed between LBBD and TfL. The existing LIP, up to 2022, contains:

- Upney and Dagenham East Station public realm improvements;
- Marks Gate – Chadwell Heath improvements;
- Public realm improvements at Heathway;
- Low Emissions Neighbourhood in Becontree Heath;
- Valence Avenue Corridor Improvements; and
- Eastbury Manor House public realm improvements.

4.3 Cycle and Car Parking

- 4.3.1 The borough's preferred option is that parking is controlled and managed to promote sustainable travel patterns and address congestion. The Council's preference is that the policy will ensure that development proposals comply with the parking standards for vehicles and bicycles set out below:

- Meeting or exceeding the minimum cycle parking standards set out in the Draft New London Plan;
- Not exceeding maximum vehicular parking standards set out in the Draft New London Plan with the aspiration for developments to be predominantly car free;
- Meeting the minimum disabled parking standards; and
- Meeting the infrastructure requirements for electric or other Ultra-Low Emission vehicles set out in the Draft New London Plan.

⁶ <http://content.tfl.gov.uk/healthy-streets-for-london.pdf>

4.4 Good Access to Industrial Sites along the A13

- 4.4.1 The council is working with key landowners to develop opportunities for developing rail freight sites, logistics and distribution centres and improving access to the A13 and the River.

4.5 Improved North – South Access

- 4.5.1 Despite London having one of the most extensive public transport networks in the world, there is poor public transport connectivity between certain parts of Barking and Dagenham. The lack of north-south and orbital connections is a particular problem and often requires journey to be made using more than one mode of transport.
- 4.5.2 The borough has aspirations to improve north-south public transport provision, it is envisaged this would include a north-south transit system connecting Marks Gate/Chadwell Heath to Barking Riverside/Dagenham Dock to address severance and support mode shift.

4.6 Upgrades to Stations and Rail Services

- 4.6.1 In addition to the opening of the Elizabeth Line, the Four Lines Modernisation⁷ programme and C2C rolling stock improvements the borough will continue to seek further improvements or extensions to existing rail services.
- 4.6.2 A key aspiration is to deliver improvements to the key borough transport interchanges of Barking, Dagenham Dock, Dagenham Heathway and Becontree stations to improve access, meet future passenger demand and unlock new homes. It is likely that West Ham station will also require capacity upgrades to accommodate for increased interchanges between C2C – District/Hammersmith & City and Jubilee line services.

4.7 Town Centre Re-design to Reduce Highway Dominance

- 4.7.1 The intention is to re-centre Barking around the Abbey Green and achieve better integration from around Barking train station and down to the River Roding, drawing on the area's rich heritage to create a coherent town centre and underpin a resilient and sustainable economy. This will include improvements to the existing thriving market, including extending and diversifying this into new and enhanced public spaces within the Town Centre.

4.8 Improved River Transport Connections

- 4.8.1 The aim is to improve connections into London for freight, goods and passenger from both Barking Riverside and Dagenham Dock.

⁷ <https://tfl.gov.uk/travel-information/improvements-and-projects/four-lines-modernisation>

4.9 Examine Case for new Long-Term Schemes

4.9.1 The borough wishes to examine the case for a variety of long-term schemes which would significantly improve transport provision within and to/from the borough. Potential schemes include (but not limited to):

- Schemes to improve the A13 and address the Lodge Avenue Flyover issue e.g. a tunnel and/or new road junctions
- New road/bus/cycle crossings at the Upper and Lower Roding Crossing
- New rail station at Castle Green
- A future Barking – Stratford Rail Link
- Crossrail 2 Eastern Extension

4.10 Summary of Vision

4.10.1 The aim is to produce a new coordinated vision for the Borough, pulling together existing schemes, clearly promoting our achievements and setting a programme for future investment. Priorities include:

- Barking Town Centre Improvements;
- Address North-South severance;
- Healthy Streets;
- Expand use of River for freight and passenger movements; and
- Investigate cases for key major interventions to support growth (A13 upgrades, new public transport infrastructure and walk/cycle links)

4.11 London Riverside Strategic Transport Study

4.11.1 A key support document to this TIA is the emerging London Riverside Strategic Transport Study. This has been commissioned by Transport for London (TfL), BeFirst and the City of London Corporation (CoLC) to identify how transport demand from new developments in the London Riverside Opportunity Area (LROA) can be sustainably accommodated in line with the policies set out in the Mayor's Transport Strategy, the Draft New London Plan and LBBD's new Local Plan.

4.11.2 The objectives for this study will be to:

- Inform TfL's future investment plans, including those at key junctions on the A13, as well as potential improvements to public transport and active travel;
- Produce an evidence base for BeFirst to develop strategy and policy and support creation of new jobs and homes in LBBD;
- Provide a 20 year phased programme of transport improvement to accommodate the planned levels of growth in the Opportunity Area; and
- Provide an evidence base on transport solutions to support CoLC's submission of a private bill to Parliament to move their three wholesale markets to Dagenham Dock.
- Address the Lodge Av flyover issue – This was built in the 1970s as a temporary measure to ease congestion. The structure has been in operation since and largely due to a sub-standard alignment has become an accident black-spot.

- 4.11.3 It is envisaged that this Strategic Study will bring a number of work streams, including this Local Plan Transport Evidence Base, together in order to develop a long term plan for how the development proposals along the A13 corridor can be accommodated in a sustainable way. The study is due to be published by the end of 2020.
- 4.11.4 This chapter has set out what the borough wants to achieve in terms of improving transport provision within Barking and Dagenham. The next chapter will review the modelling work undertaken to assess the impact of proposed Local Plan growth on the transport network. This will help ascertain whether this vision can be achieved whilst also accommodating a significant level of planned housing growth.

5. FUTURE YEAR FORECASTS

5.1 Overview

5.1.1 For this study the following suite of Transport for London (TfL) models were used:

- LTS for future year transport demand modelling
- ELHAM for Highway Modelling
- Railplan for Public Transport Modelling

5.1.1 The London Transport Studies (LTS) Model is TfL's go-to tool for assessing the complex interactions of changes in land use and the impact on the transport system. LTS is a 24-hour model which provides responses to changes in cost in terms of mode shift, trip generation and redistribution. In this situation it is therefore the most appropriate tool to test the impact of the proposed development anticipated over the Local Plan period from 2019 to 2034.

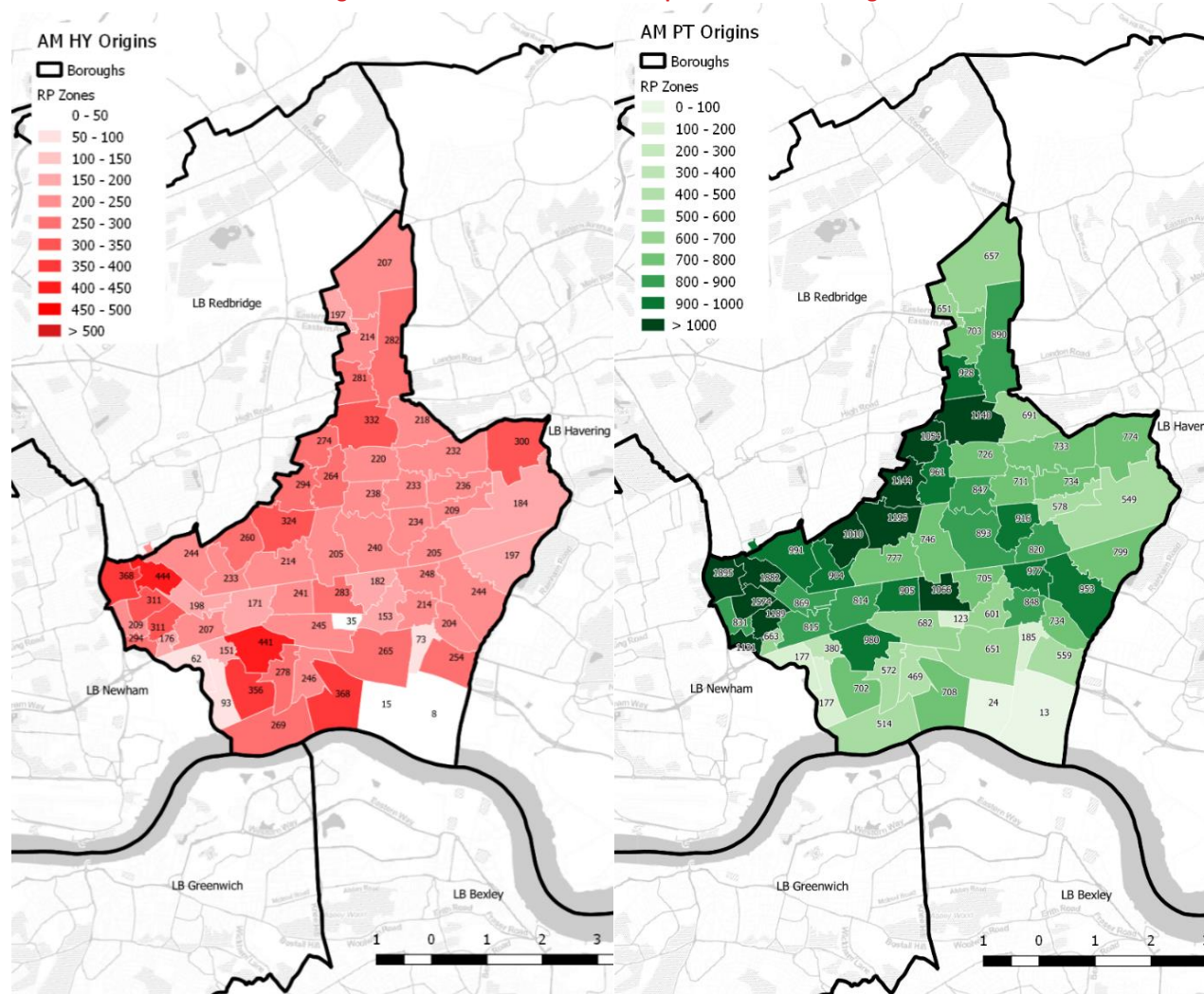
5.1.2 The output demand from the LTS model feeds into both the Railplan and HAM fixed demand assignment models.

5.2 Without Development Scenario

Forecast Background Growth

- 5.2.1 The 2031 Without Development Scenario assumes planned growth across London except Barking and Dagenham. This is in order ascertain the forecast performance of the highway and public transport networks in the future before Local Plan growth is added.
- 5.2.2 By 2031 it is forecast that there will be around 90,000 Highway trips to/from the borough in the AM peak, and 81,000 Public Transport trips.
- 5.2.3 The forecast demand for the AM period by LTS zones is shown in Figure 1 for both Highway and Public Transport trips respectively. The majority of the highway trips originate in Riverside and Barking town centre, where there is good access to the A13 and A406, whilst for public transport these are focussed at the north-west of the boroughs near Barking and Chadwell Heath Rail stations.

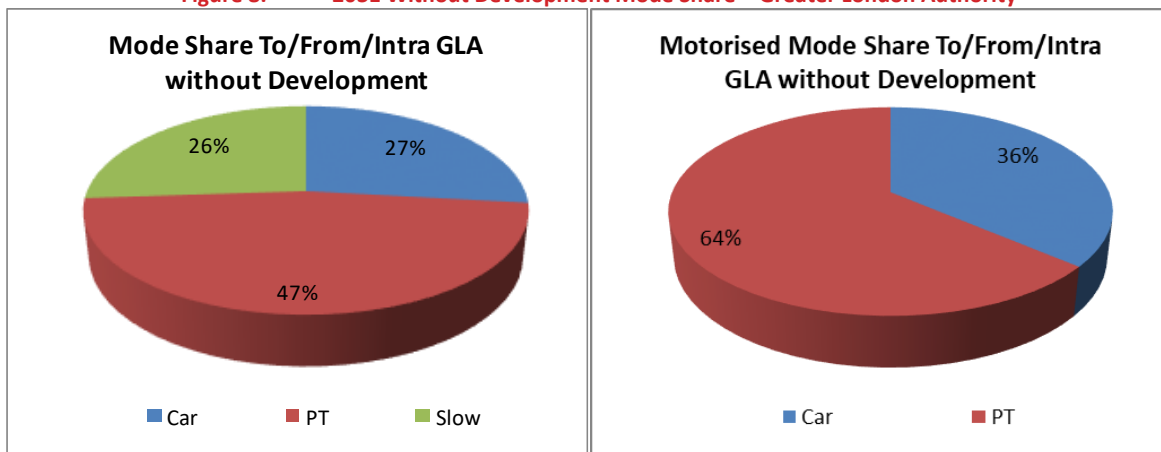
Figure 7. 2031 Without Development AM Period Origins



Forecast Mode Share

- 5.2.4 The figure below displays the forecast mode share for all trips to/from/intra Greater London Authority (GLA). This shows that non-highway trips (Public Transport and Slow) account for 73% of the total trips, which is only slightly below the aspirations set out in the Mayor's Transport Strategy for 80% of all trips in London to be made on foot, by cycle or using public transport by 2041⁸.
- 5.2.5 When excluding Slow (Walk and Cycle) from the mode share calculation Public Transport trips account for 64% of trips.

Figure 8. 2031 Without Development Mode Share – Greater London Authority



⁸ <https://tfl.gov.uk/corporate/about-tfl/the-mayors-transport-strategy#on-this-page-0>

5.2.6 The motorised trip mode share in the local boroughs are shown in Table 1. Trips originating in LBBD in the morning period have a slightly higher proportion of Public Transport trips, but destinations in the borough are arrived at predominantly by car.

5.2.7 This shows that for trips starting in the borough (origins) the Highway / Public Transport split is forecast to be around 50/50 in the 2031 AM morning peak. However for trips ending in the borough (destinations), highway is the more dominant mode with an approximately 60/40 split. Splits for neighbouring boroughs are provided for comparison, note that Public Transport mode share for Newham is forecast to be considerably greater. This would be expected given it's more central location and increased number of Public Transport corridors serving the borough.

Table 1. 2031 Morning Peak Motorised Mode Share

BOROUGH	TOTAL DEMAND	HIGHWAY ORIGINS	HIGHWAY DESTINATIONS	PT ORIGINS	PT DESTINATIONS
Havering	230,949	57%	70%	43%	30%
Newham	336,047	27%	36%	73%	64%
Barking and Dagenham	171,807	47%	62%	53%	38%
Redbridge	244,404	45%	63%	55%	37%

Forecast Trip Distribution

5.2.8 Highway and Public Transport trip distribution between LBBD to/from neighbouring boroughs and beyond is displayed in Figure 9 and Table 3 along with the forecast mode share⁹.

Trips that start within the borough

5.2.9 Table 2 and Figure 9 display forecasts from the LTS model for trips starting within the borough in the morning peak.

5.2.10 In the morning peak the majority of trips starting within LBBD are to destinations also within the borough (internal), at around 30% of all trips. For these trips the mode share is split fairly evenly between Highway and Public Transport. This is followed by trips to the neighbouring boroughs of Havering, Redbridge and Newham which also account for around 30% of all LBBD origins. For trips to Havering and Redbridge the mode share is around 60/40 in favour of Highway. For Newham it is closer to 50%. Around 70% of all Highway trips starting in the borough are forecast to be either within the borough or to destinations in the neighbouring boroughs of Havering, Redbridge and Newham.

⁹ Highway Vehicles/PT passengers

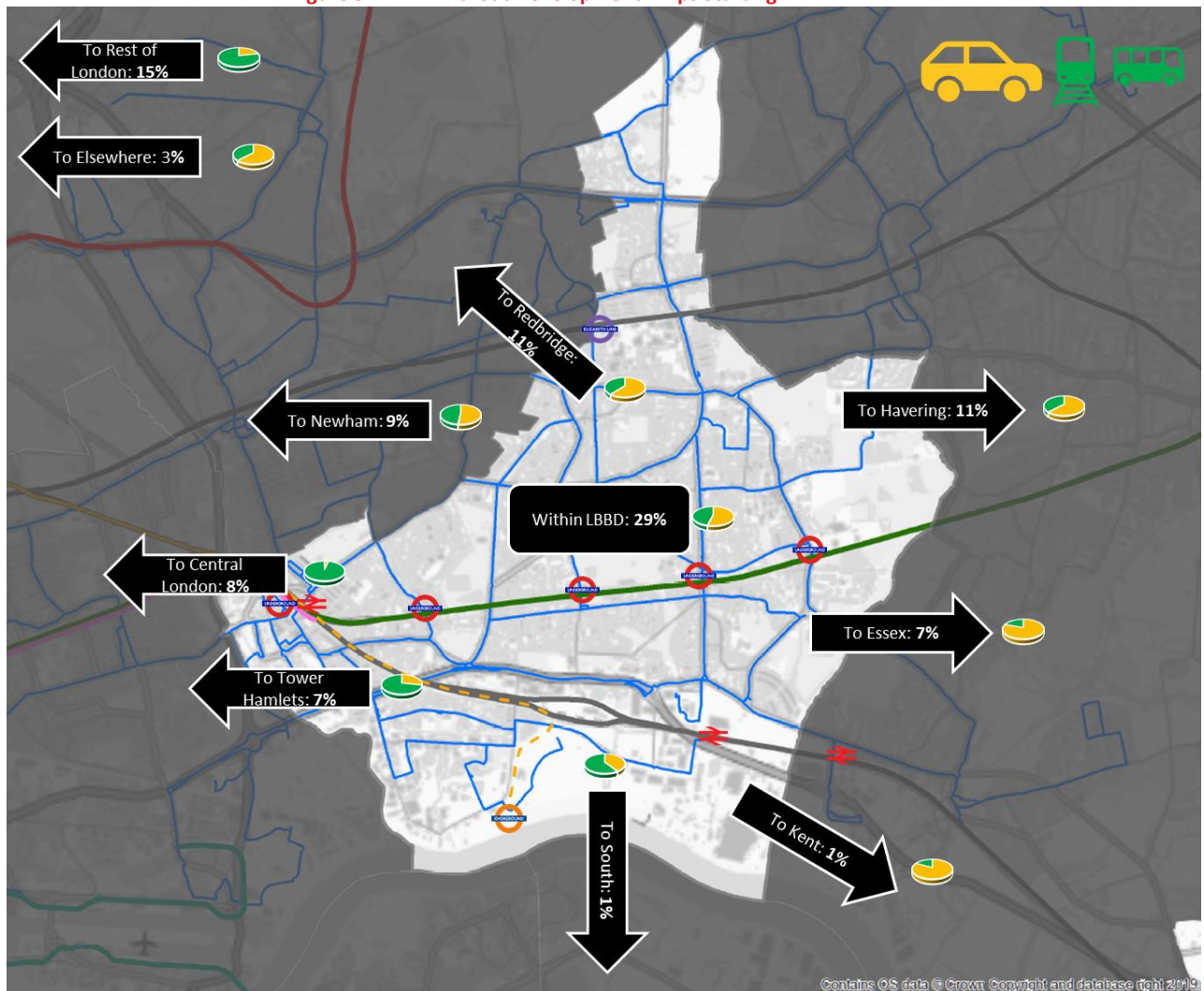
5.2.11 Other major destinations include Central London¹⁰, Tower Hamlets and all other remaining London boroughs – when combined is around 30%. For these trips the mode share for PT is significantly greater at 96% for Central London and 78% for the remaining London Boroughs.

Table 2. Without Development: Trips Starting in LBBD

DESTINATION	TOTAL TRIPS	HWY	PT	% OF TOAL
Within LBBD	26,345	54%	46%	29%
Havering	9,677	62%	38%	11%
Redbridge	9,725	61%	39%	11%
Newham	8,489	52%	48%	9%
Greenwich & Bexley	656	41%	59%	1%
Central London	7,211	4%	96%	8%
Tower Hamlets	6,091	29%	71%	7%
Rest of London	14,215	22%	78%	15%
Essex	6,255	80%	20%	7%
Kent	913	83%	17%	1%
Elsewhere	2,470	62%	38%	3%
TOTAL	92,046			100%

¹⁰ City of London and Westminster

Figure 9. Without Development: Trips Starting in LBBD



Trips that end in the borough

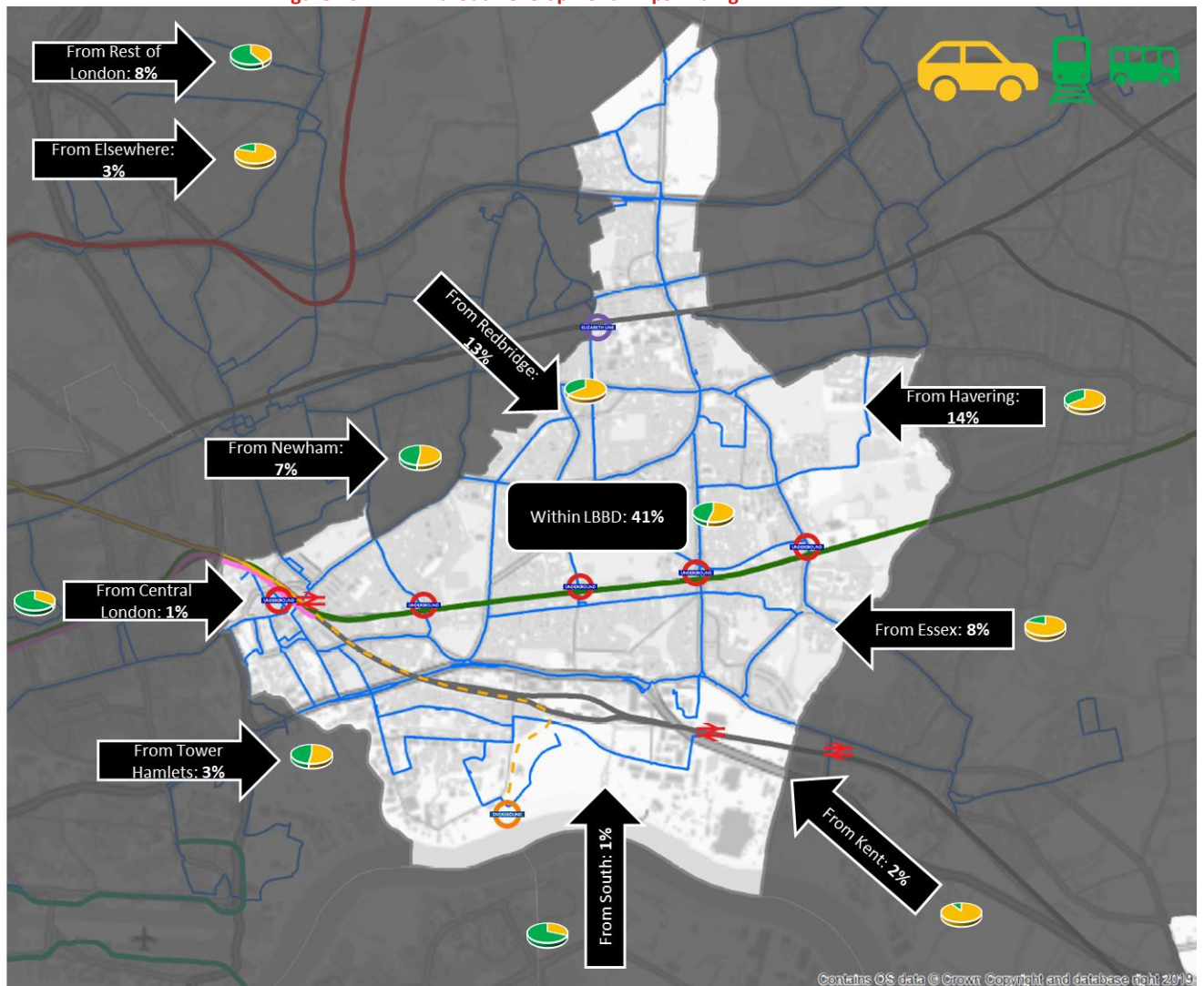
5.2.12 For trips that end in the borough during the morning peak a greater proportion are internal borough movements – 41%. This is because overall there are less trips ending in the Borough (64,000) than trips starting in the borough (92,000) during the morning peak. As expected the other main origins are the neighbouring boroughs of Havering, Redbridge and Newham which account for 34% of trips ending in the borough. For all these trips Highway is the dominant mode with a mode share as high as 73% for trips from Havering.

5.2.13 The next largest origin is Essex (8%) for which the Highway mode share is as high as 80%.

Table 3. Without Development: Trips Ending in LBBD

DESTINATION	TOTAL TRIPS	HWY	PT	% OF TOAL
Within LBBD	26,345	54%	46%	41%
Havering	9,230	73%	27%	14%
Redbridge	8,087	64%	36%	13%
Newham	4,601	52%	48%	7%
Greenwich & Bexley	465	32%	68%	1%
Central London	412	34%	66%	1%
Tower Hamlets	1,814	52%	48%	3%
Rest of London	5,417	41%	59%	8%
Essex	5,420	80%	20%	8%
Kent	975	91%	9%	2%
Elsewhere	1,641	80%	20%	3%
TOTAL	64,409			100%

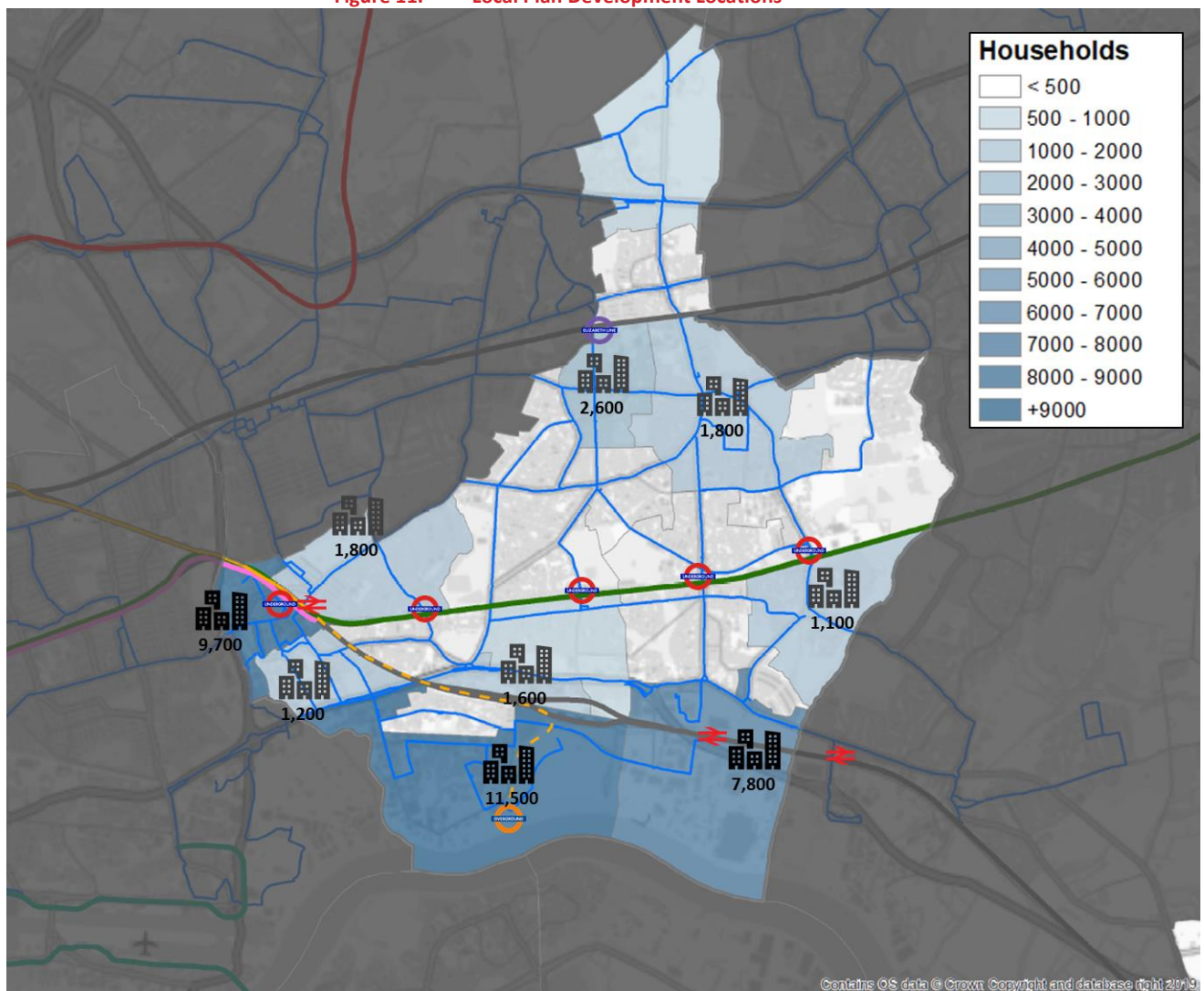
Figure 10. Without Development: Trips Ending in LBBD



5.3 Local Plan Growth

- 5.3.1 Housing Trajectories for the Local Plan period (up to 2034) have been provided by BeFirst. The Housing Trajectories used for this study are from **July 2019** and assume 42,466 proposed households across the borough. The latest trajectory (**November 2019**) assumes a slightly lower total of 39,766.
- 5.3.2 The sites and volumes of development (mapped to LTS zone) are shown in the figure below. Areas with +1,000 planned growth in households are highlighted whilst zones with under 500 planned households are not shown. The majority of proposed development is within the Riverside Opportunity Area and Barking Town Centre.

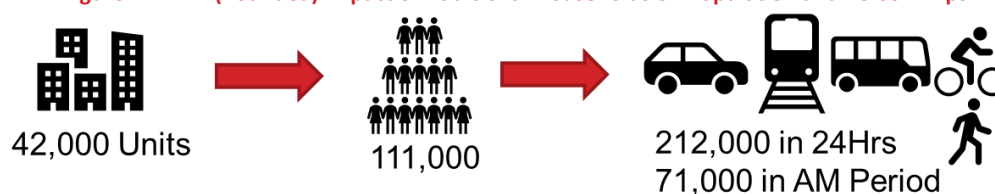
Figure 11. Local Plan Development Locations



- 5.3.3 These assumptions have been run through the LTS model for 2031, with the assumption that any jobs supporting the increase in population were distributed across the Greater London Authority in the same proportions as the Without Development Scenario.
- 5.3.4 The number of trips generated by the new development in the Car Ownership Trip End (COTE) model component of the LTS modelling suite. This considers car ownership, a trip rate per household based on trip rates for the various population demographics and trips generated by employment to/from the area (rates varying by type blue/white collar). Trips ends are split across modes and purposes at a zone level and the distribution of the trips is based on the base year pattern of trips, which are subsequently adjusted by the demand model during a run, based on cost changes in each assignment loop.
- 5.3.5 A summary of the impacts of the additional development is shown in the figure below. The additional 42,000 households is estimated to result in an additional 111,000 living within the borough by 2031. This increase in population is forecast to result in additional trips during the morning peak period:

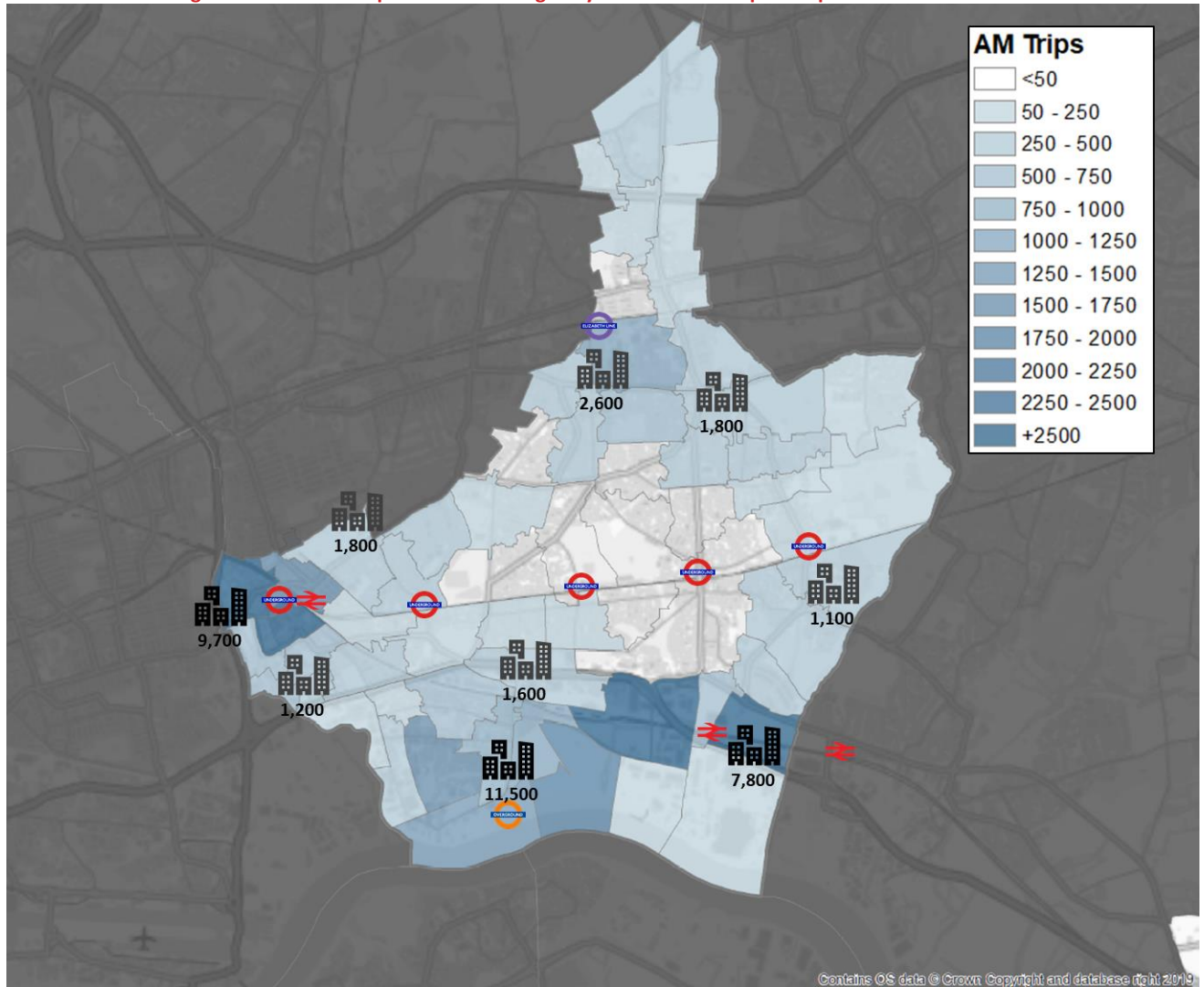
- 22,900 Highway trips
- 20,500 Public Transport trips
- 27,500 Walk/Cycle trips

Figure 12. (Rounded) Impact of Additional Households on Population and Person Trips



5.3.6 The forecast growth in Highway and Public Transport trips by LTS zone is displayed in the figure below. As expected the largest increase in non-walk/cycle trips are originating from around the major development sites of Barking Town Centre, Barking Riverside and Dagenham Dock areas.

Figure 13. Development Related Highway and Public Transport Trips – 2031 AM

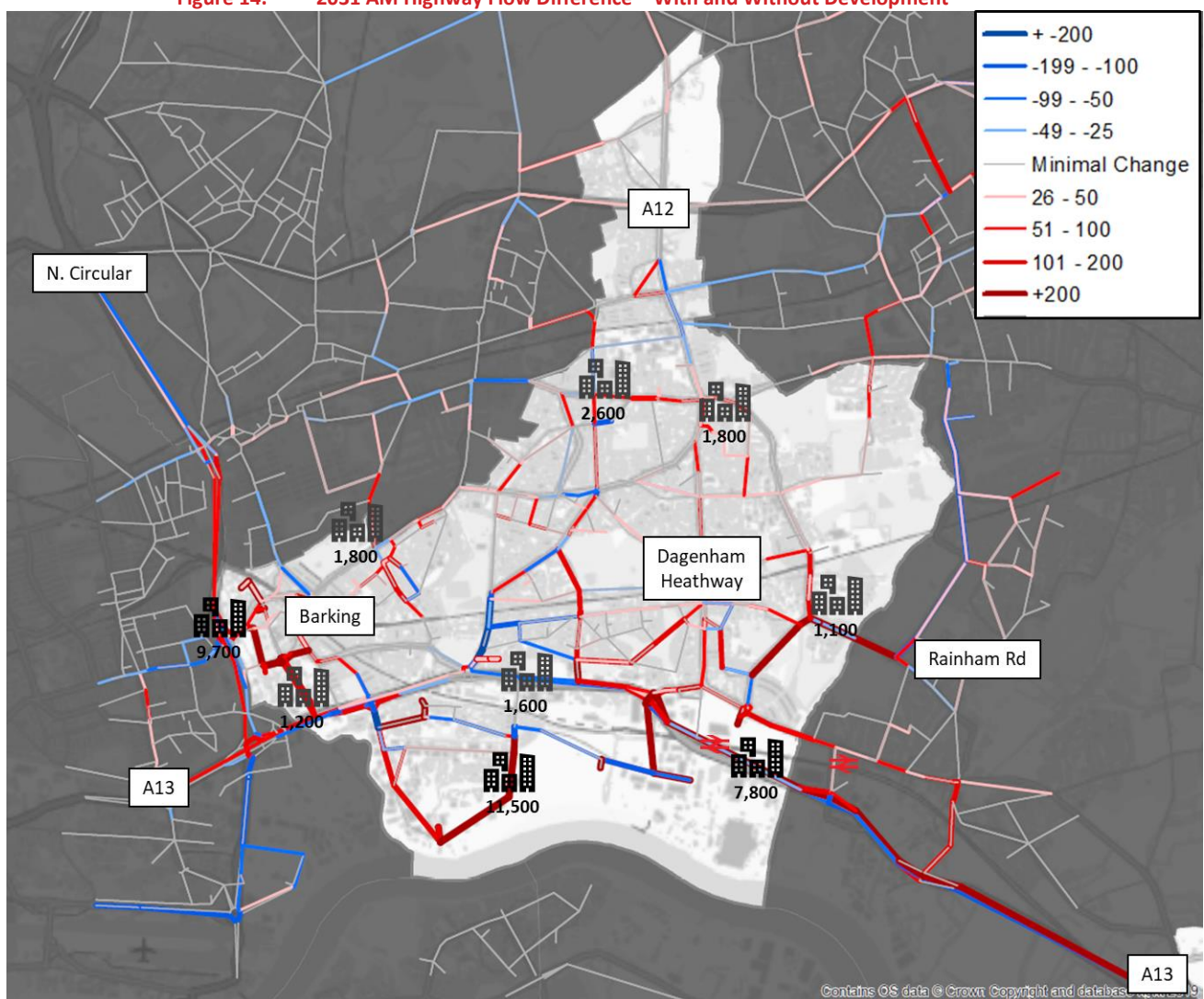


5.4 Growth Impact on Highway

Additional Highway Demand

- 5.4.1 The planned growth set out in section 5.3 is forecast to result in an additional 7,000 pcus¹¹ in the AM peak hour (08:00-09:00). Figure 14 displays the change in forecast Highway flows in the 2031 AM peak hour as a result of the anticipated Local Plan growth. There are significant increases in flows around the main development locations around Barking Town Centre, Barking Riverside and Dagenham Dock. This will increase highway congestion and the impact of this is discussed in the next section.

Figure 14. 2031 AM Highway Flow Difference – With and Without Development

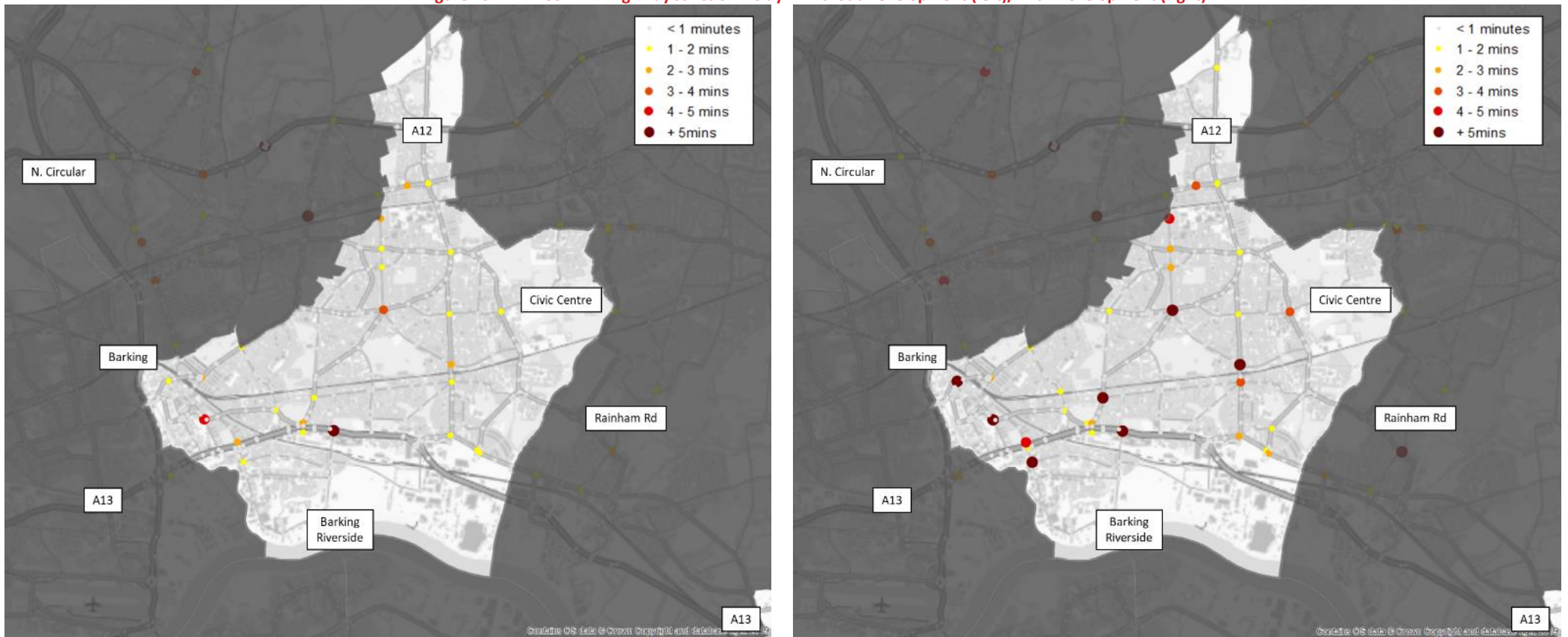


¹¹ Passenger Car Units

Impact on Highway Performance

- 5.4.2 This section reviews the level of delay on the borough's Highway network in both the Without and With Development scenarios to ascertain the impact of the Local Plan Growth. In the Without Development 2031 Forecasts (see Figure 15) there are some quite large delays expected at a number of junctions across the borough. Issues include:
- A13 Renwick Road
 - Martins Corner – Valence Avenue
 - Movers Lane / River Road / A13
 - The A124 northern approach into Barking Town Centre
 - The A123 southern approach into Barking Town Centre
 - Various Junctions along the Heathway between Dagenham Dock – Chadwell Heathway
- 5.4.3 Forecast delays at Renwick Road / A13 are quite severe at an average of plus 5 minutes for all demand passing through the junction. This is likely to have significant impacts once additional development demand from the Barking Riverside development is added to the network.

Figure 15. 2031 AM Highway Junction Delay – Without Development (left)/With Development (right)



5.4.4 Figure 16 displays the change in delays against the Without Development scenario. It is clear that there is a considerable worsening of junction delays across the borough once Local Plan development demand is added to the network. Locations include:

- A13 / Movers Lane / River Road / Bastable Avenue area
- North Street / A124 in Barking Town Centre
- Lodge Avenue / Woodward Road
- Numerous junctions along Dagenham Heathway
- Martins Corner – Valence Avenue
- Heathway / New Road / Ballards Road

5.4.5 The impact is that there are now seven junctions within the borough forecast to experience delays of plus five minutes compared to just one junction in the Without Development Scenario.

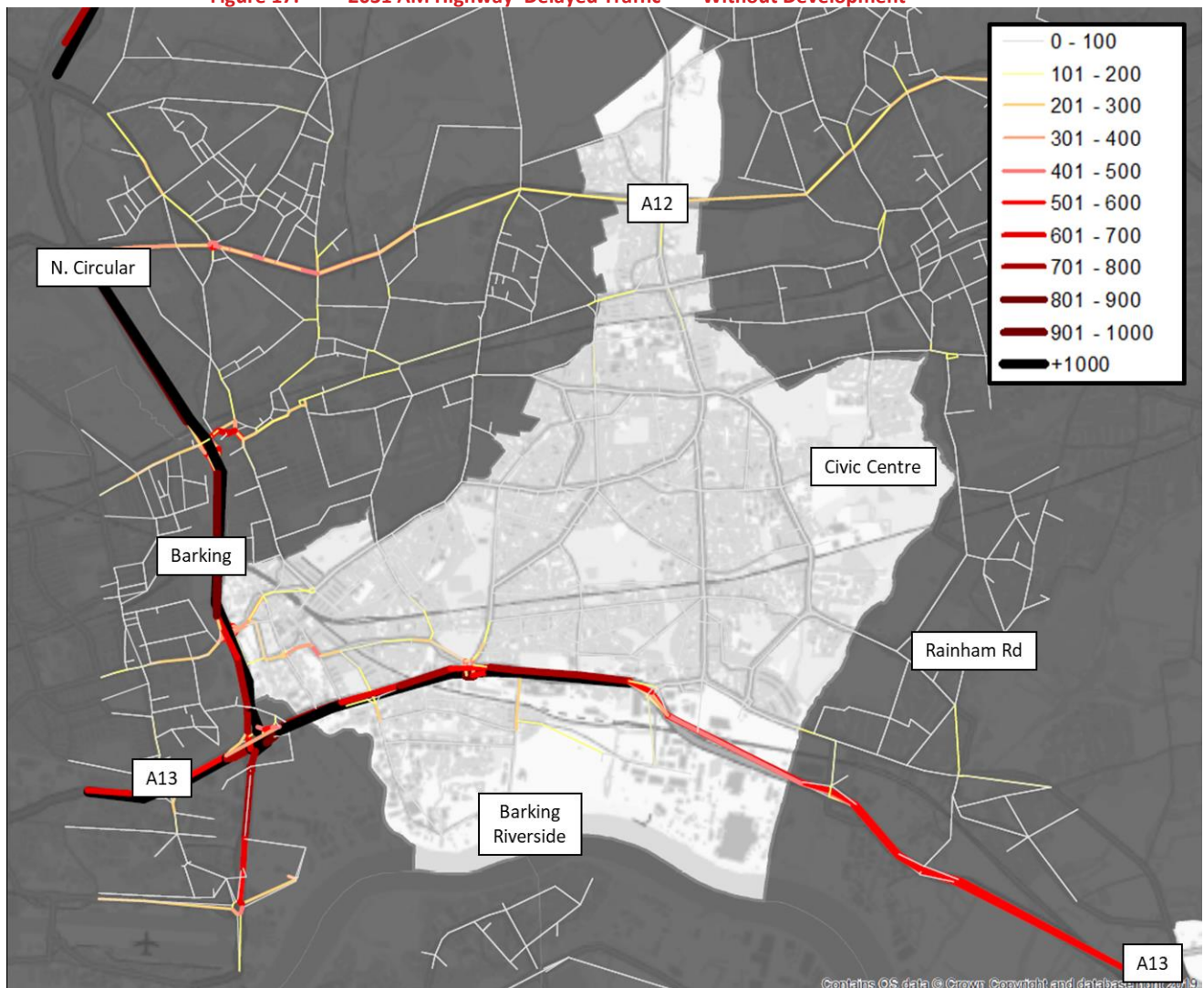
Figure 16. 2031 AM Highway Junction Delay – With Development Change



5.4.6 The following figure displays the forecast level of 'Delayed' traffic in 2031. This is the volume of traffic which is modelled to 'want' to travel on a link but is unable to due to congestion and delays. Figure 17 displays the level of 'Delayed' traffic forecast for the Without Development scenario.

5.4.7 As can be seen by 2031 it is forecast there will be significant congestion on the A13 and North Circular roads – in some areas there are +1,000 vehicles who are unable to travel due to congestion/delays. This suggests that in the Without Development scenario these strategic roads are expected to be at or over capacity **before** the Local Plan development is even added to the network.

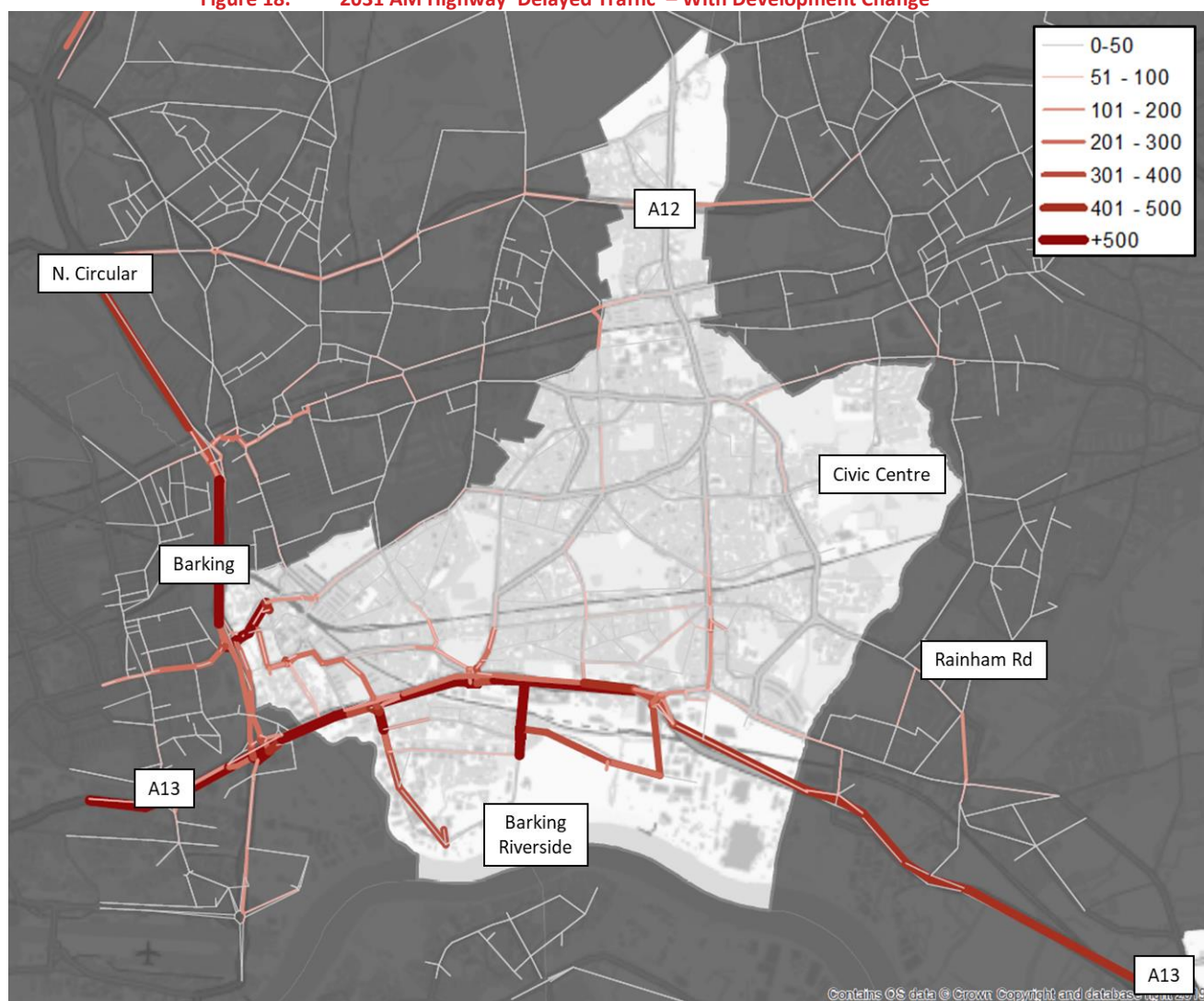
Figure 17. 2031 AM Highway 'Delayed Traffic'¹² – Without Development



¹² Queued Traffic - SATURN

- 5.4.8 Figure 18 displays the increase in 'Delayed' traffic on links between the With and Without Development scenarios. Once the Local Plan Development is added, there is even more demand which is unable to travel on the A13 as it is already forecast to be at capacity in the Without Development scenario.
- 5.4.9 There is also a considerable amount of demand (+500) that is unable to access the A13 from the Renwick Road approach. This demand comes from the Barking Riverside development and delays at Renwick Road / A13 are too high for demand to route in this direction.
- 5.4.10 As highlighted in 0 Renwick Road / A13 is forecast to experience significant delays (plus 5 minutes) before Local Plan development demand is even added to the network. This explains the large increase in delays forecast at A13/Movers Lane/River Road as additional development demand is having to re-route to avoid the high delays at Renwick Road.
- 5.4.11 This all suggests that significant improvements, or mode-share reductions for highway, will be required to accommodate the Local Plan growth on LBBD's highway network.

Figure 18. 2031 AM Highway 'Delayed Traffic' – With Development Change

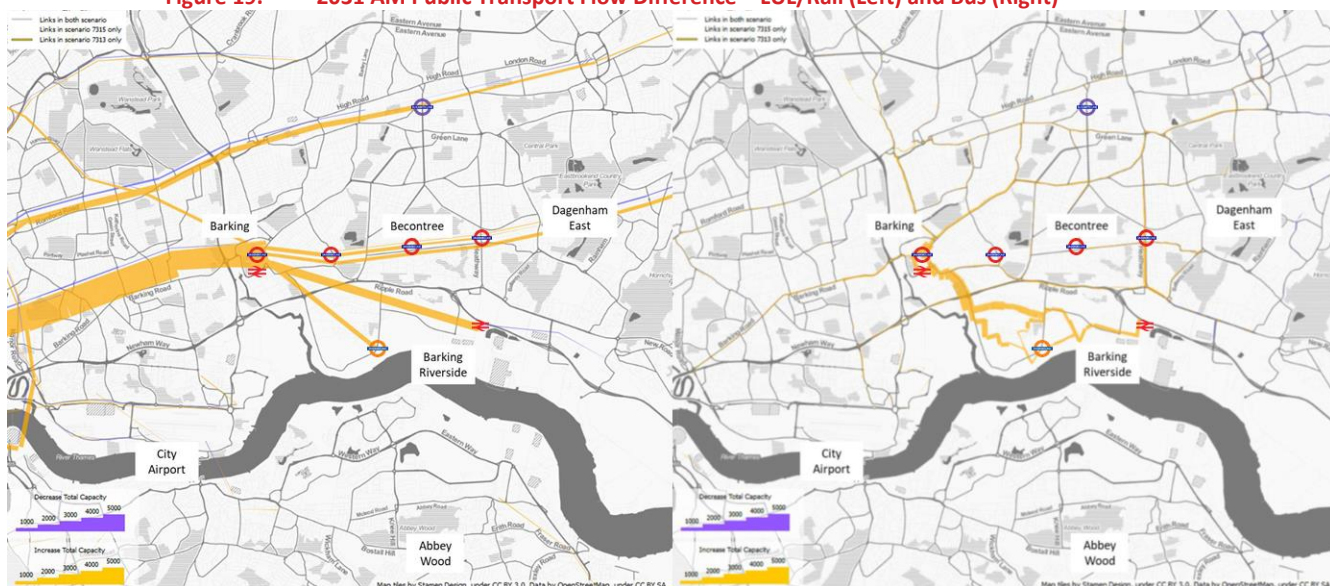


5.5 Growth Impact on Public Transport

Additional Public Transport Demand

- 5.5.1 The planned growth set out in section 5.3 is forecast to result in an additional 25,000 public transport trips across the AM peak period (07:00-10:00).
- 5.5.2 On rail links, the largest increase in flows is from Barking travelling into Central London. A significant proportion of public transport demand within the borough travels to Central London in the morning peak which would be expected as this is a major employment area. The largest increase is an additional 4,600 passengers on Westbound District / Hammersmith & City Line services from Barking during the morning peak.
- 5.5.3 There are flow increases on all rail links located near the additional Local Plan growth areas. Although the majority of development and resultant demand is located in the south of the Borough there is also growth in trips from development around the Chadwell Heath area resulting in additional trips on the Crossrail Shenfield corridor.
- 5.5.4 For Bus link flows, the main increases are between the main Local Plan growth areas: Barking Riverside and Barking Town centre. The East London Transit bus network provides good connections between the two areas and allows demand to access direct Underground and National Rail services to/from London.

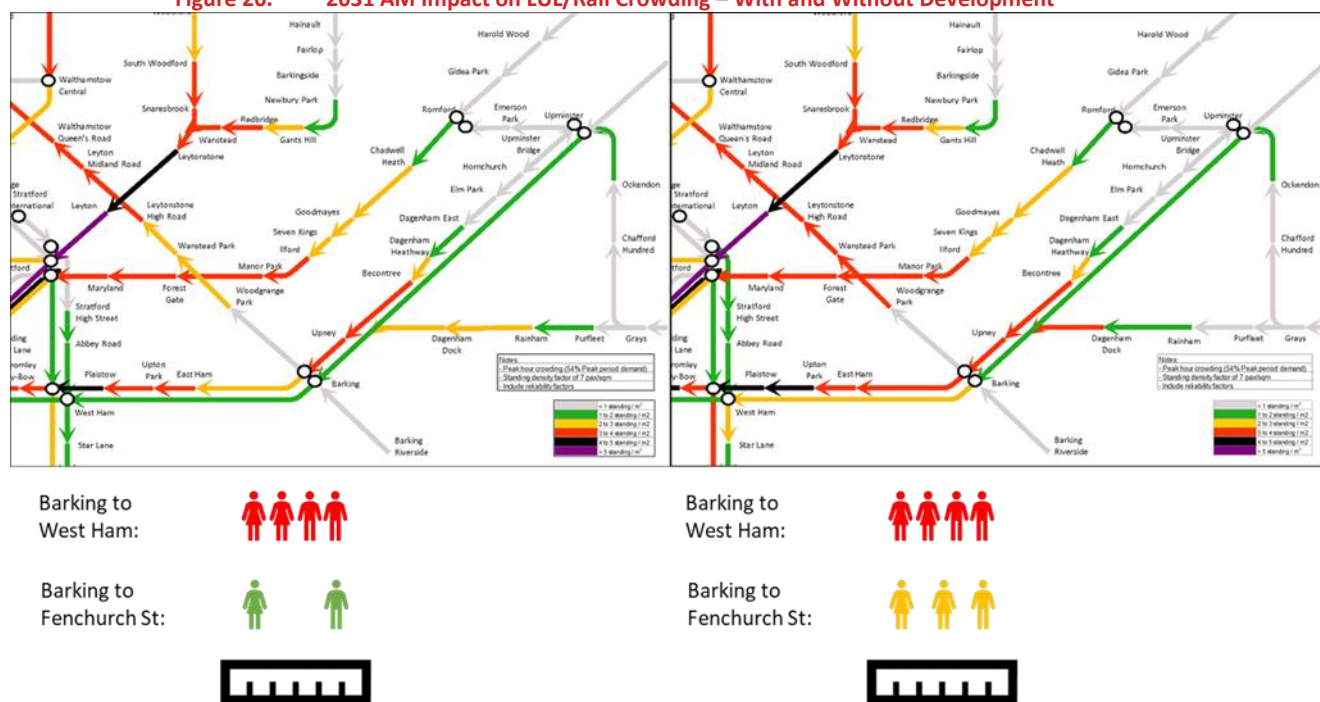
Figure 19. 2031 AM Public Transport Flow Difference – LUL/Rail (Left) and Bus (Right)



Impact on Crowding

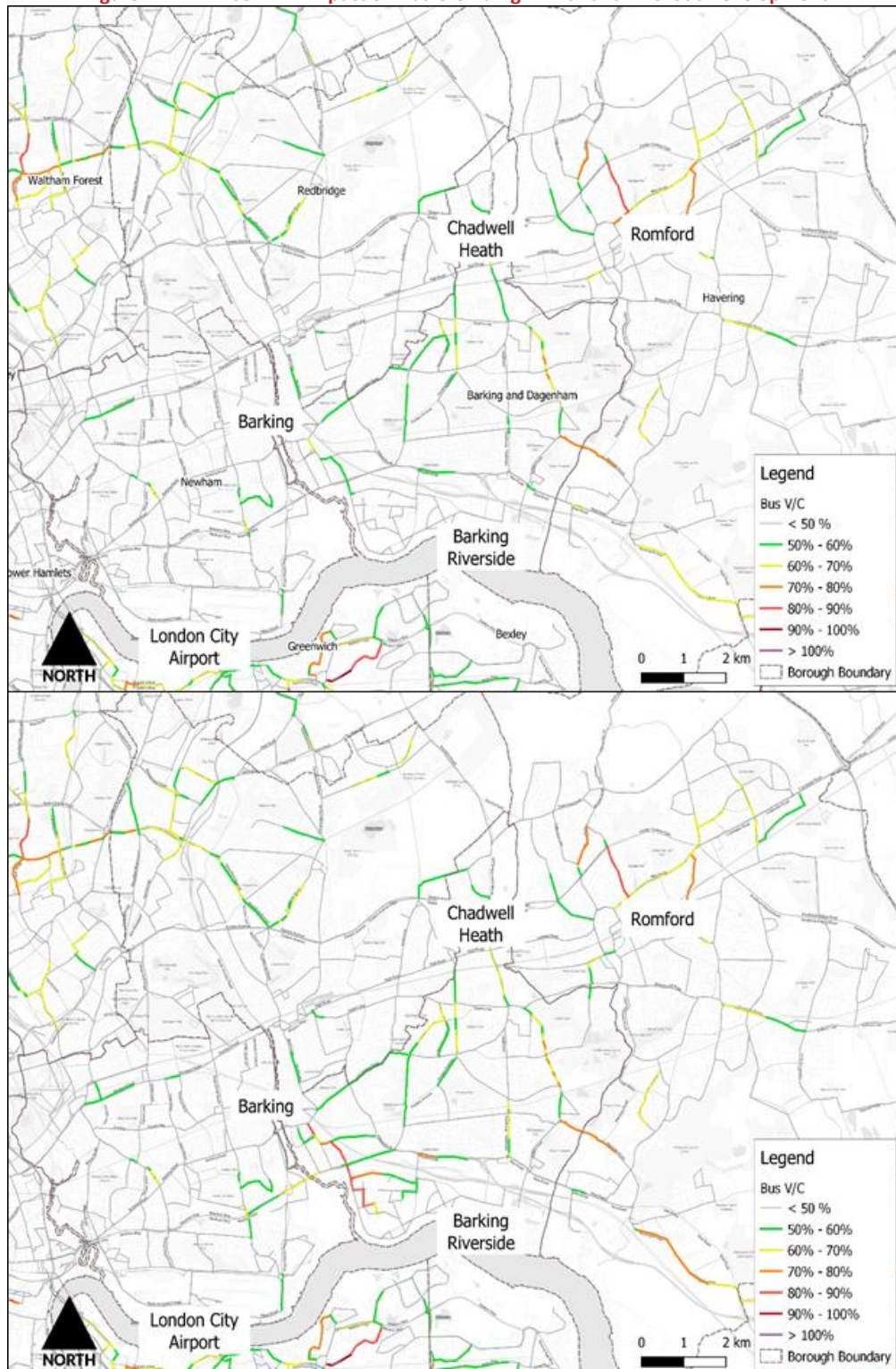
- 5.5.5 Without the Development there are reasonable levels of crowding forecast on Crossrail services travelling into London from Ilford onwards and on Hammersmith & City / District line services from Barking onwards into Central London. C2C services are not forecast to have significant crowding levels with 1 to 2 passengers standing per square metre estimated on services travelling from Barking into Fenchurch Street during the morning peak hour.
- 5.5.6 Once Local Plan Growth is added crowding levels are forecast to increase along both the London Underground (LUL) and C2C corridors. On LUL services, the increased demand is results in high levels of crowding (4 to 5 people per square metre) on services between Upton Park – West Ham. Standing passengers increases from 1-2 to 2-3 people per square metre from Barking to West Ham.

Figure 20. 2031 AM Impact on LUL/Rail Crowding – With and Without Development



- 5.5.7 The Volume to Capacity Ratio (VCR) has been used to display crowding levels on bus services during the morning peak (Figure 21). In the Without Development scenario there are no bus links with significant crowding forecast within the Local Plan area. The highest VCR value being between 70-80%.
- 5.5.8 In the With Development scenario the main change in Bus VCR forecasts is that bus services around the London Riverside Opportunity Area are forecast to be operating closer to full capacity. East London Transit services between Barking Riverside – Barking Town Centre increase to be operating at close to 90% load factors.

Figure 21. 2031 AM Impact on Bus Crowding – With and Without Development



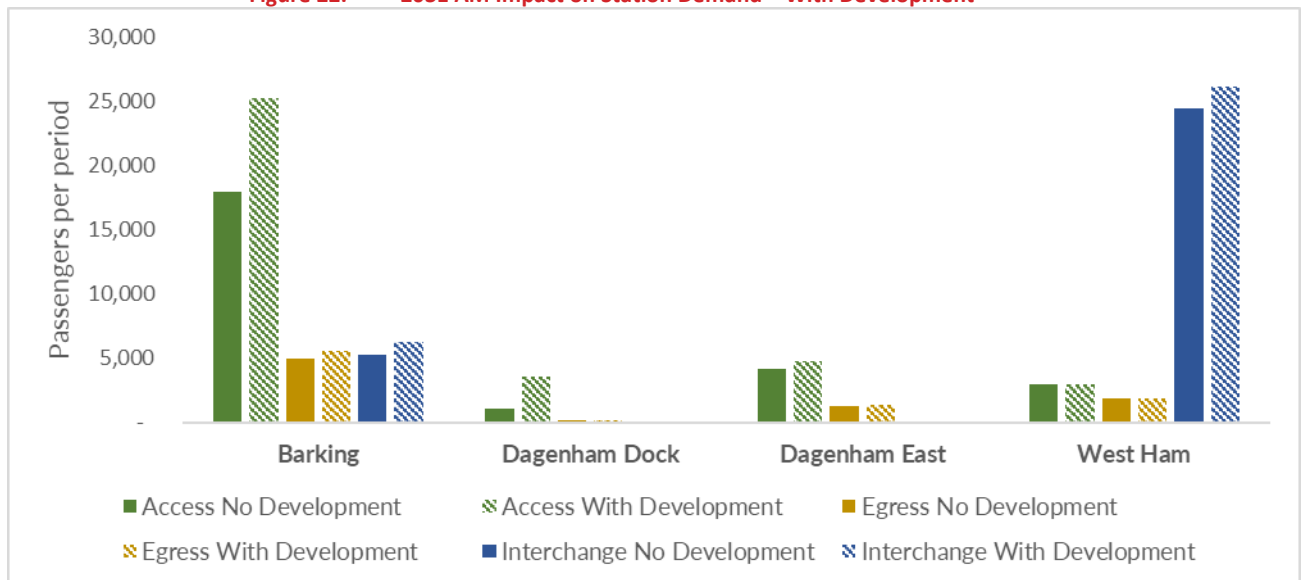
Station Usage

5.5.9 Changes in station usage for all key stations within the study area have been reviewed. The main changes are displayed in the following figure and summarised below:

- Passenger Interchanges within Barking forecast to increase by 1,000 (+19%)
- Passenger Interchanges within West Ham forecast to increase by 1,700 (+7%)
- Passenger entries at Dagenham Dock forecast to increase by 2,500 (+240%)

5.5.10 It is likely that both Barking and West Ham stations will require upgrades in order to handle the increased number of passengers interchanging within the station – to be discussed in chapter 6.

Figure 22. 2031 AM Impact on Station Demand – With Development

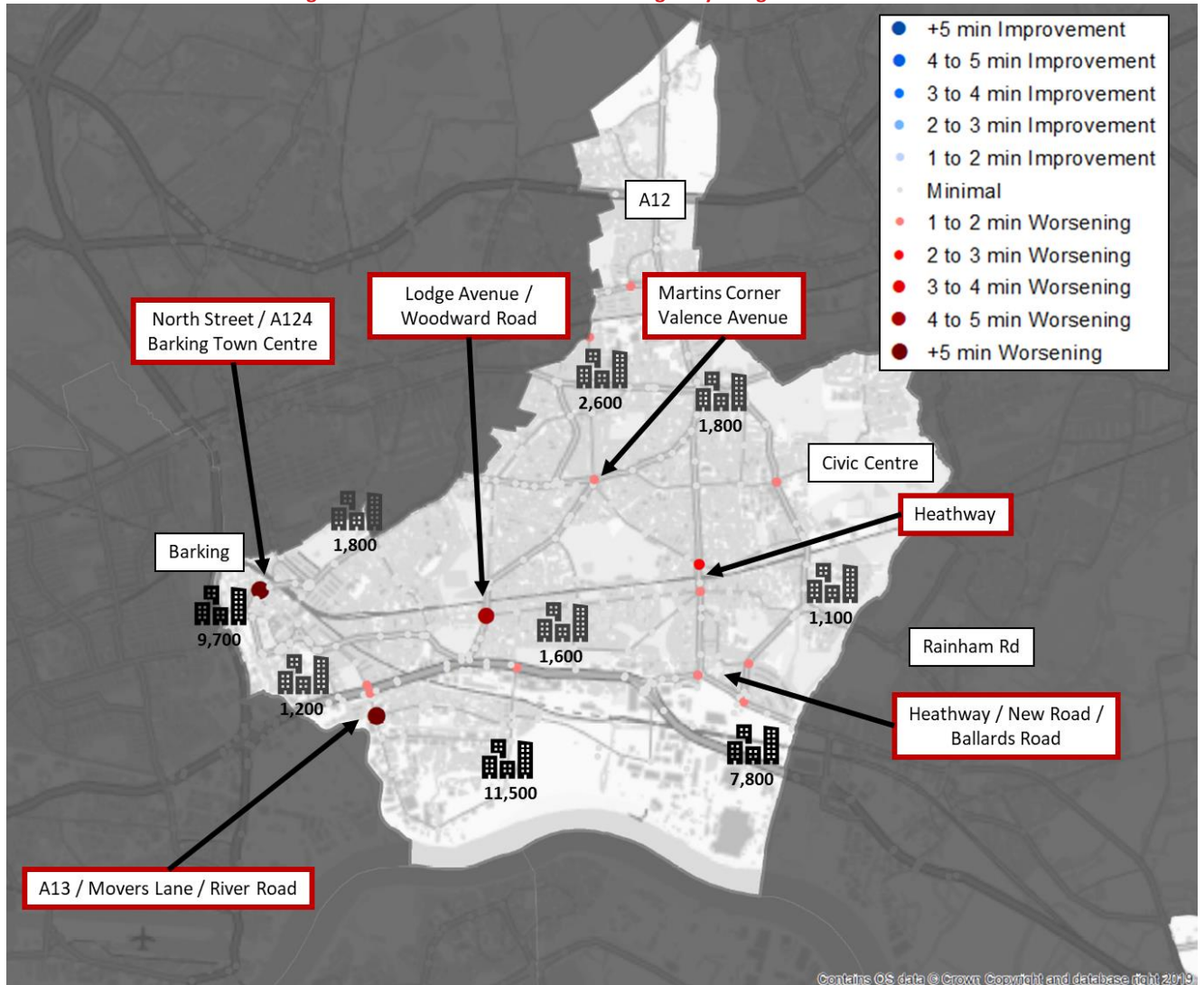


5.6 Summary of Impact

Highway Impact

- 5.6.1 Section 5.4 clearly shows highway congestion and delays increase significantly once Local Plan demand is added to the network. The Without Development scenario is forecast to be highly congested with a significant amount of demand unable to route via the A13 due to delays.
- 5.6.2 Figure 23 displays the locations of junctions which are forecast to suffer from a significant increase in delays once Local Plan growth is added to the network – locations of major growth locations are also provided. In summary (and already highlighted in 5.4.5) the locations are:
- A13 / Movers Lane / River Road / Bastable Avenue area
 - North Street / A124 in Barking Town Centre
 - Lodge Avenue / Woodward Road
 - Numerous junctions along Dagenham Heathway
 - Martins Corner – Valence Avenue
 - Heathway / New Road / Ballards Road
- 5.6.3 For the majority of these junctions the forecast delays are quite severe (plus five minutes) and therefore significant capacity enhancements would be required. Most of these locations are physically constrained which would limit the scale of capacity enhancements possible. It is also noted that significant highway capacity enhancement is unlikely to be a borough priority given the commitment. Potential mitigation measures are discussed in chapter 6.

Figure 23. Locations for Potential Highway Mitigation



Public Transport Impact

- 5.6.4 Section 5.5 reviewed the impact of Local Plan growth on the Public Transport network. The main impact to note is that there is expected to be an increase in crowding levels on the Hammersmith & City / District lines. Therefore it is likely that additional east-west radial capacity will be required between the borough and Central London.
- 5.6.5 Station usage levels at both Barking and West Ham stations are forecast to increase and it is expected that pedestrian flow capacity enhancements will be required to cater for this additional demand. Volume capacity ratios for bus services (Figure 21) suggests that load factors on the East London Transit between Barking Town Centre – Barking Riverside will be close to 90% which suggests service enhancements could be required/supported.
- 5.6.6 Finally the significant highway congestion noted above is likely to require a significant shift in mode share away from Highway towards Public Transport, Walk and Cycle. It is likely that Public Transport provision for the significant growth sites of Barking Riverside and Dagenham Dock will need to be enhanced to limit the level of additional Local Plan highway trips. In addition, north-south non-highway connections will need to improve to further reduce highway's mode-share for trips within the borough. Discussion on what these mitigation options could be is given in the next chapter.

6. MITIGATION PROPOSALS

6.1 Overview

6.1.1 The previous chapter has clearly demonstrated that the additional Local Plan demand will have an impact on both the Highway and Public Transport networks. From the analysis it is clear that the A13 is a significant pinch point and the level of highway traffic will require a wholesale modal shift away from highway to ensure Local Plan growth can be delivered. Therefore, certain mitigation measures will need to be considered.

6.1.2 This chapter reviews a long-list of potential mitigation measures and provides a summary of the impact of the measures which were tested in TfL's Highway and Public Transport fixed assignment models.

6.2 Mitigation Options

6.2.1 A list (but not exhaustive) of potential mitigation options which could be implemented to ensure the Highway and Public Transport networks can adequately accommodate the additional Local Plan demand is provided in the **Appendix A**.

6.2.2 For each option this sets out:

- Whether it is Beneficial, Important, Necessary or Critical to delivering Local Plan growth;
- The location;
- Scheme description;
- Estimated costs;
- Justification;
- Current status;
- Timeframe; and
- Discussion whether the option was included in the modelled mitigation scenario or not.

6.2.3 From the Local Plan modelling (chapter 5) it is clear that the key issue that needs addressing is the significant highway congestion/delays around the A13 especially at Renwick Road and Movers Lane. In addition, Local Plan growth is expected to increase crowding levels on the London Underground corridor (Hammersmith & City and District Lines) into Central London, and also passenger numbers at Barking, Dagenham Dock and West Ham stations.

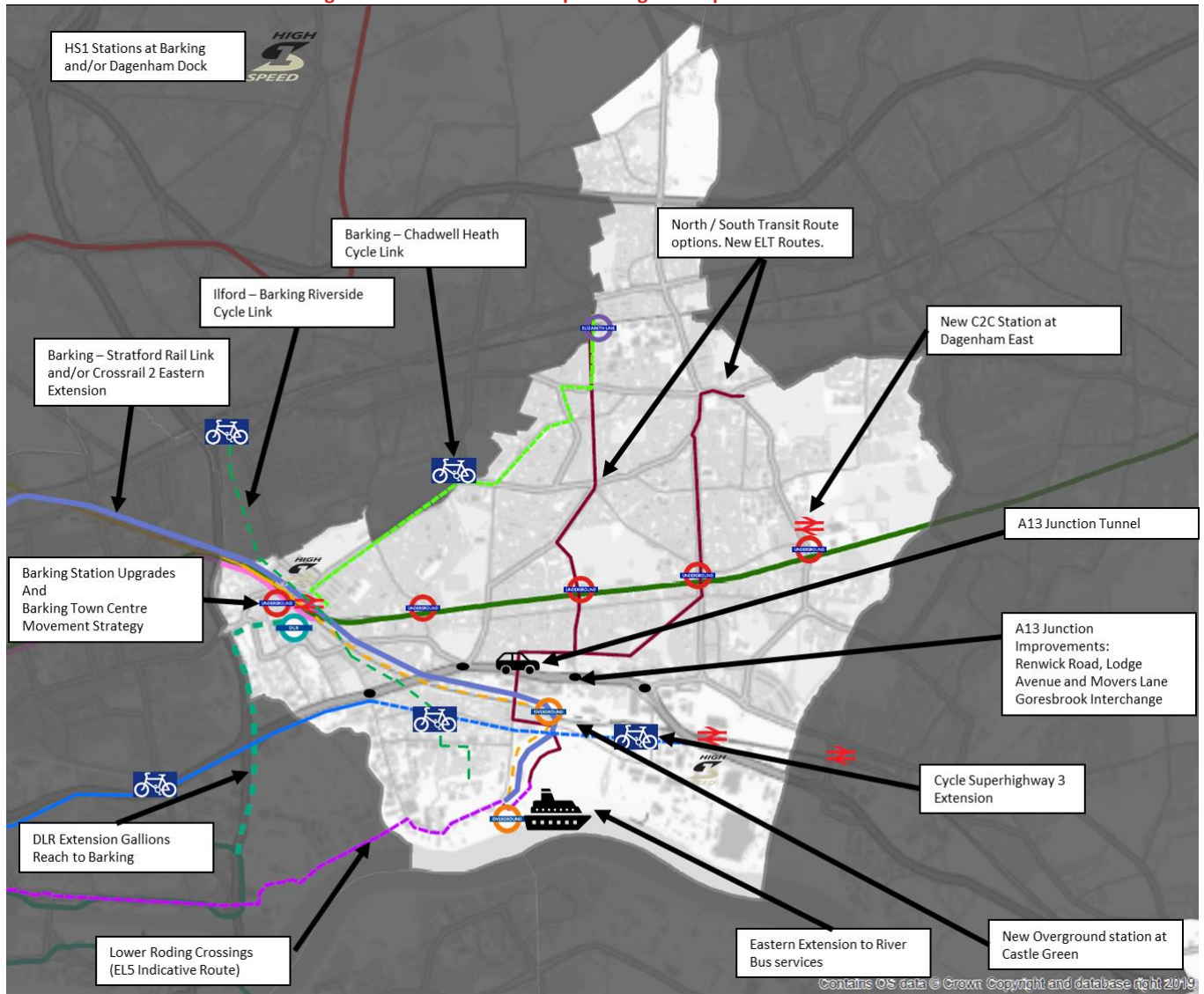
6.2.4 Therefore, the key aim for the mitigation package to deliver a significant mode-shift away from the private car to reduce highway congestion across the borough (highlighted in section 5.4). In addition to this a number of Public Transport options are proposed to also alleviate existing crowding on services, especially the Hammersmith & City / District lines (highlighted in section 5.5). These are then displayed in Figure 24.

6.2.5 The rest of this chapter reviews the impact of the proposed mitigation options tested and their ability to accommodate Local Plan growth. This is split into three sections:

- Impact on the Highway Network (Modelled in ELHAM)

- Impact on the Public Transport Network (Modelled in Railplan)
- Parking Strategy Impact on Highway Demand (Modelled in LTS and ELHAM)

Figure 24. Indicative Map of Mitigation Options



6.3 Mitigation Test – Highway

6.3.1 The following Local Plan Highway mitigation measures have been tested in the AM Peak (as different scenarios):

- A13 Tunnel
- Improvements at Renwick Road Junction with A13
- Improvements on Thames Road

6.3.2 All scenarios have assumed a high-level reduction (of 10%) in Local Plan development Highway trips to reflect the potential of mode shift from the various mitigation options discussed previously. It is recommended that a more accurate/precise mode-share shift is estimated by running a package of mitigation measures through LTS.

6.3.3 Table 4 shows the modelled highway borough statistics for all scenarios. It is clear that there is a worsening of performance between the Base (2012) and 2031 Without Development scenario as demand increases outweighs capacity increases.

6.3.4 In the With Development Scenario the situation worsens with the average speed within the borough reducing from 11.7kph to just 8.1kph. None of the proposed mitigation options reduce vehicle hours, kilometres or average speeds back to Without Development levels.

Table 4. Borough Statistics – All Scenarios

LINKS WITHIN LBBD	BASE	2031 WITHOUT DEV.	2031 WITH DEV.	2031 WITH DEV. A13 TUNNEL	2031 WITH DEV. RENWICK RD	2031 WITH DEV. THAMES RD
PCU Hrs	11,671	18,468	28,046	30,182	26,831	26,797
PCU KMs	94,066	216,776	27,758	221,619	227,153	226,940
Ave. KPH	16.6	11.7	8.1	7.3	8.5	8.5
CHANGE FROM 2031 WITHOUT DEVELOPMENT						
PCU Hrs			+52%	+63%	+45%	+45%
PCU KMs			+5%	+2%	+5%	+5%
Ave. KPH			-31%	-38%	-27%	-27%

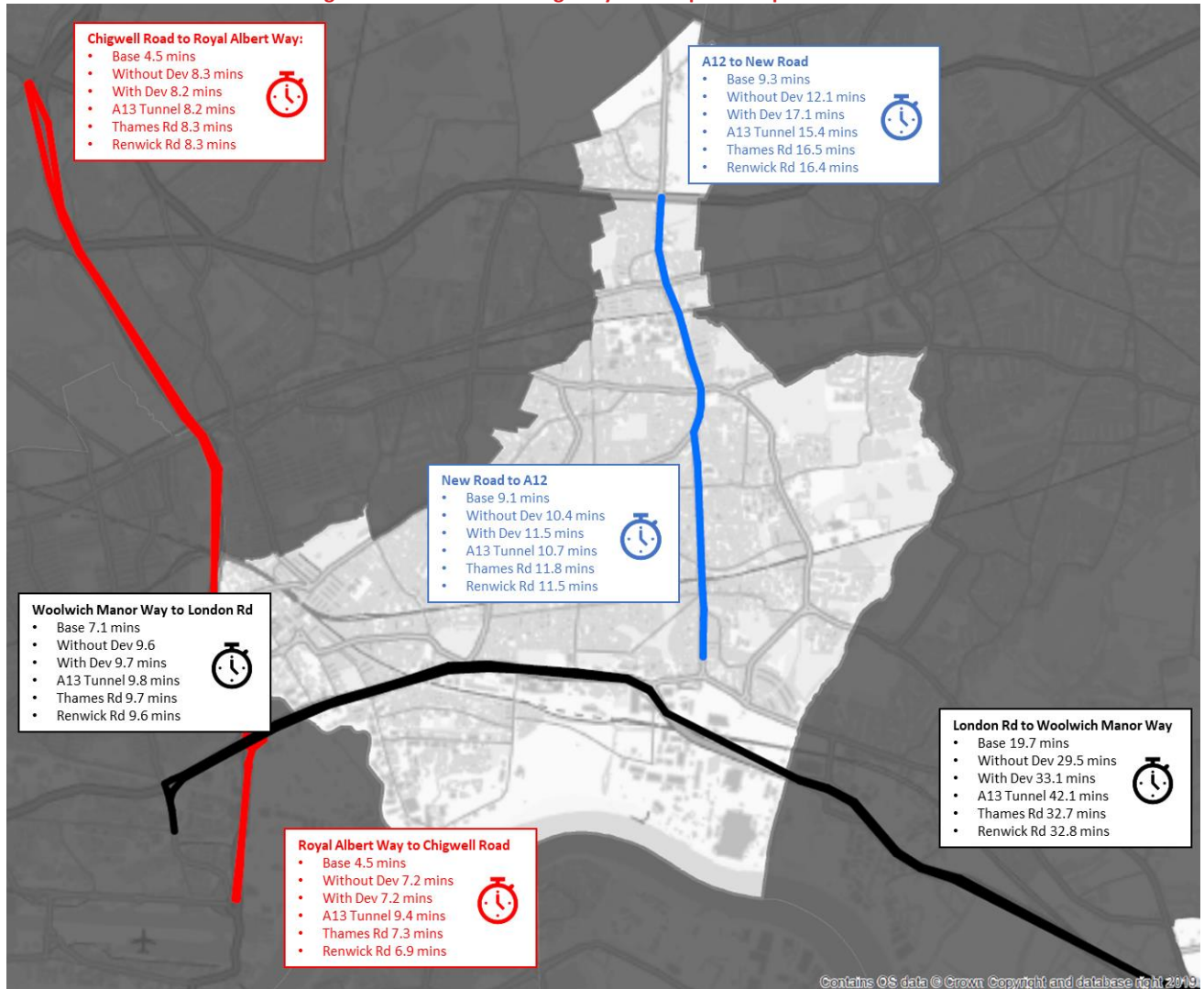
6.3.5 Figure 25 displays journey times for three key ELHAM model routes within or close to LBBD. As expected journey times increase considerably between the Base Year and 2031.

6.3.6 For London Road to Woolwich Manor Way along the A13 there is a clear peak hour congestion issue with the Westbound (into City) journey forecast to take significantly longer than the reverse route. The Westbound journey is forecast to increase by around 4 minutes once Local Plan growth is added as congestion and delays increase. None of the

mitigation measures are able to reduce journey times back to Without Development levels. The A13 Tunnel actually increases journey times as there is significant congestion at the Goresbrook Interchange.

6.3.7 The A12 – New Road covers Chadwell Heath to Dagenham Dock via the Heathway. In both directions the journey times is forecast to increase once Local Plan development is added and none of the mitigation measures has a significant impact.

Figure 25. 2031 AM Highway Route Speeds Impact



6.4 Mitigation Test – Public Transport

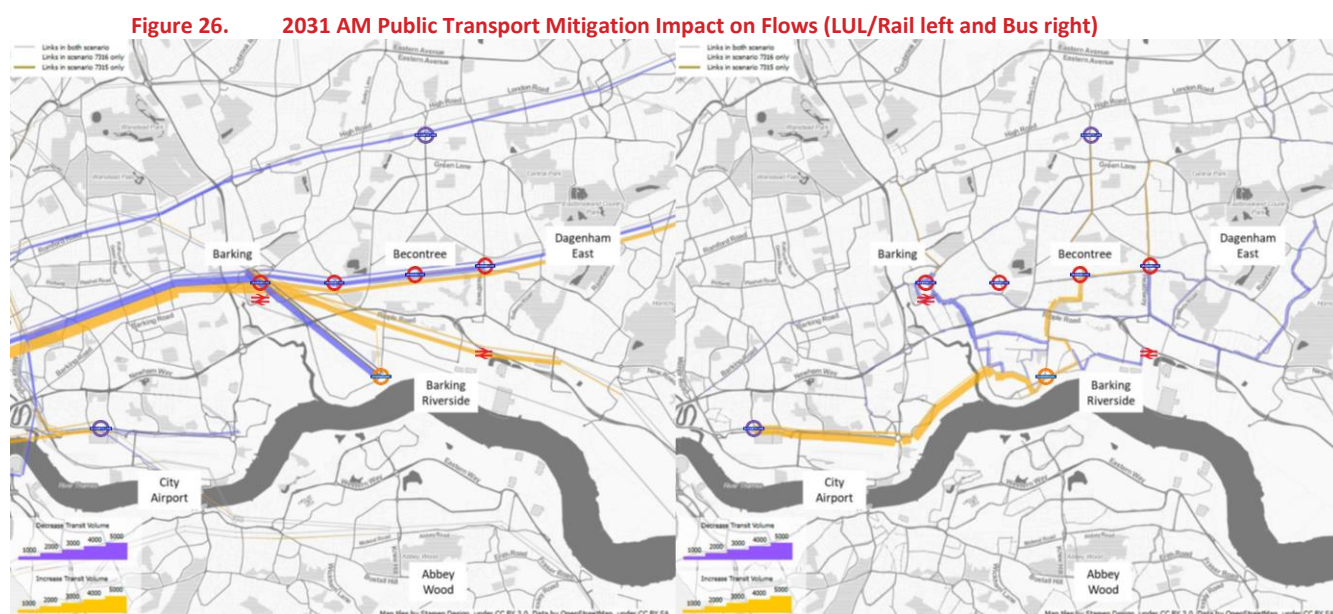
6.4.1 The Local Plan mitigation measures that have been included in the AM Period Railplan mitigation scenario are as follows:

- Renwick Road Overground Station
- Beam Park C2C Station
- C2C Rolling Stock upgrades
- C2C Digital Railway frequency improvements
- East London Transit extensions (EL1-EL2-EL3)
- New EL4a and EL4b services connecting Barking Riverside with the Northern end of the borough
- New EL5 service connecting Barking Riverside with Gallions Reach and Custom House
- Increased Public Transport mode share for Development trips versus highway (10% switch)

6.4.2 The figure below displays the change in Public Transport flows as a result of the Mitigation proposals. The C2C frequency and capacity upgrades are resulting in flow changes along both C2C corridors, LUL lines and, to a lesser extent, Crossrail.

6.4.3 The flow reduction on Overground services from Barking Riverside is due to the link being split into two to include the Castle Green station. Overall there is minimal change in passengers flows on the Overground extension as the increased demand from Castle Green station is being countered by passengers switching to the new EL5 service (see below).

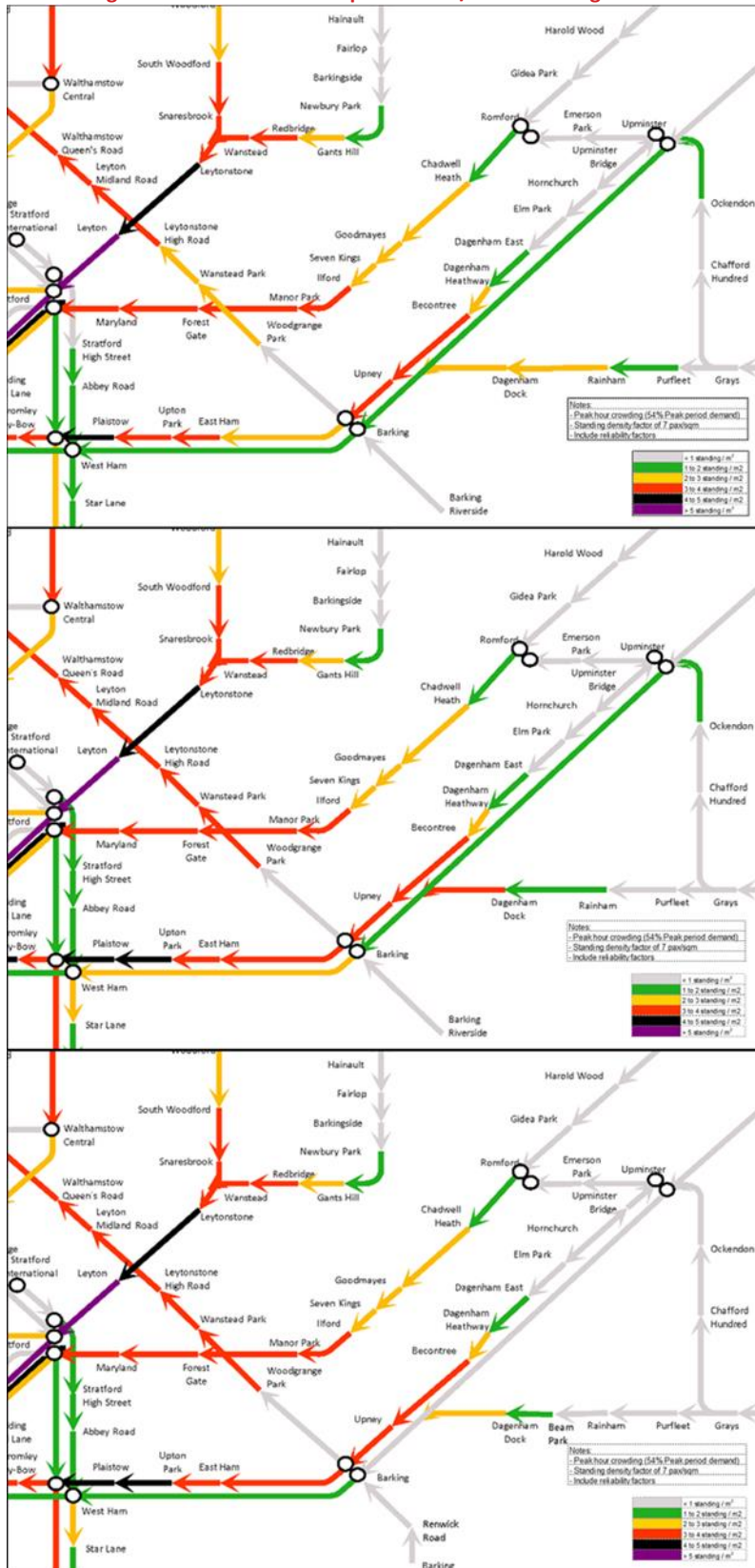
6.4.4 Bus flows increase along both the new EL4 and EL5 corridors as these provide significant connectivity improvements. EL5 is attracting considerable levels of demand as it provides good access to both DLR (Gallions Reach) and Crossrail (Custom House) services.



Impact on Crowding

- 6.4.5 Figure 27 displays the forecast crowding levels for all scenarios: Without Development, With Development and Mitigation. Although the mitigation scenario reduces crowding levels, they are not reduced to below Without Development levels.
- 6.4.6 The increased C2C frequencies and capacities is encouraging demand to switch from District/Hammersmith & City line services but this is not sufficient enough to reduce the crowding category for the LUL services. Despite the capacity and frequency improvements the mode switch from LUL to C2C is probably limited by the fact C2C only provides connections to/from Fenchurch Street whilst LUL connects into the majority of locations within Central London (via Hammersmith & City and District Lines). Crowding levels on C2C services are reduced to below Without Development levels.
- 6.4.7 Further East London Transit opportunities could be explored to alleviate crowding levels on the London Underground between Barking and Central London. This could include improving connectivity between Barking and Custom House with Crossrail / DLR connections. In addition, extending the London Overground to Abbey Wood would potentially encourage demand to access Crossrail services south of the River Thames. Although this would be a costly scheme involving tunnelling and may negatively increase crowding on Crossrail services.
- 6.4.8 Figure 28 displays the bus VCR forecasts for all three scenarios. The plus +90% VCR estimated on bus links to/from Barking Riverside – Barking reduces to between 60-80% as Bus demand is switching to Overground via Renwick Road but also onto the EL5 service. This new service has significant flows and is estimated to have a VCR of 90% along the majority of the route between Barking Riverside – Custom House. This suggests that patronage could potentially support a more frequent service.

Figure 27. 2031 AM Impact on LUL/Rail Crowding – With and Without Development and Mitigation



Barking to
West Ham:



Barking to
Fenchurch St:



Barking to
West Ham:



Barking to
Fenchurch St:



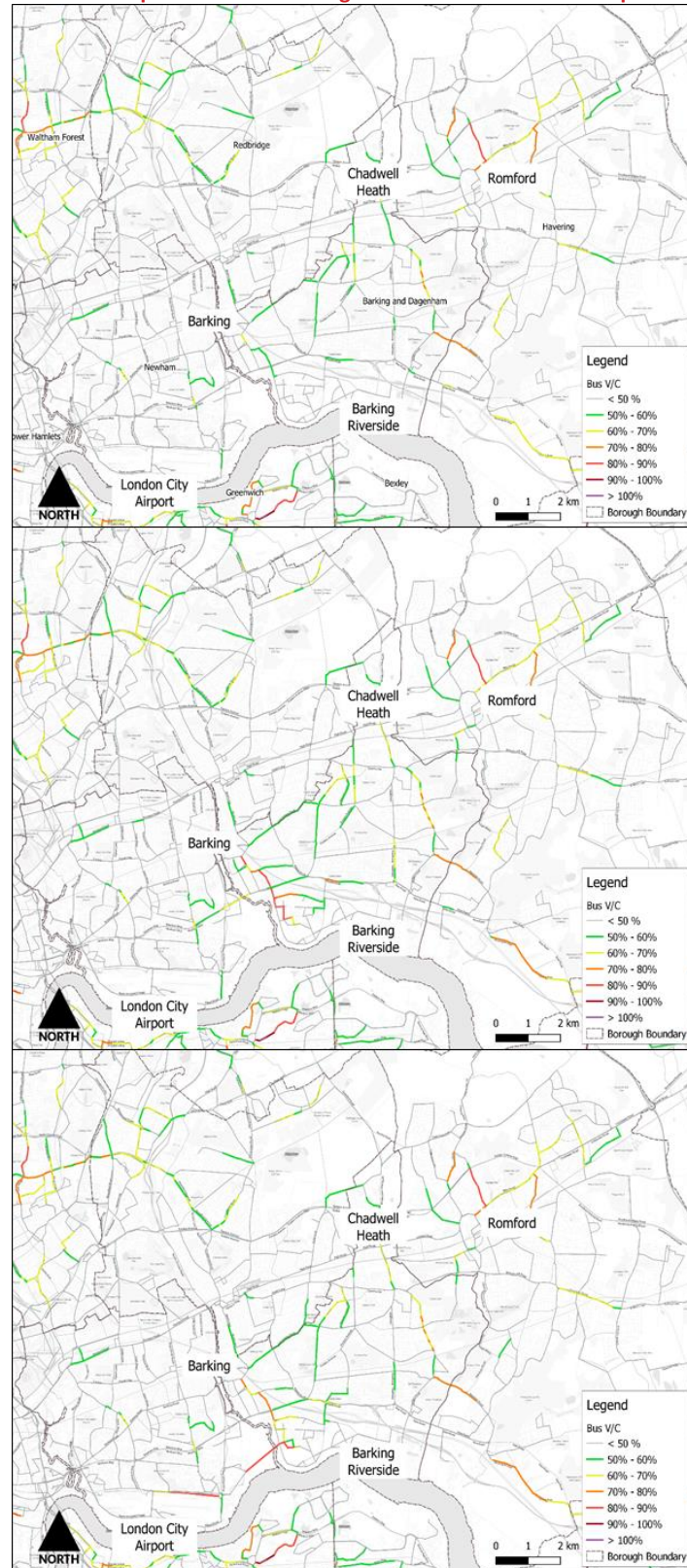
Barking to
West Ham:



Barking to
Fenchurch St:



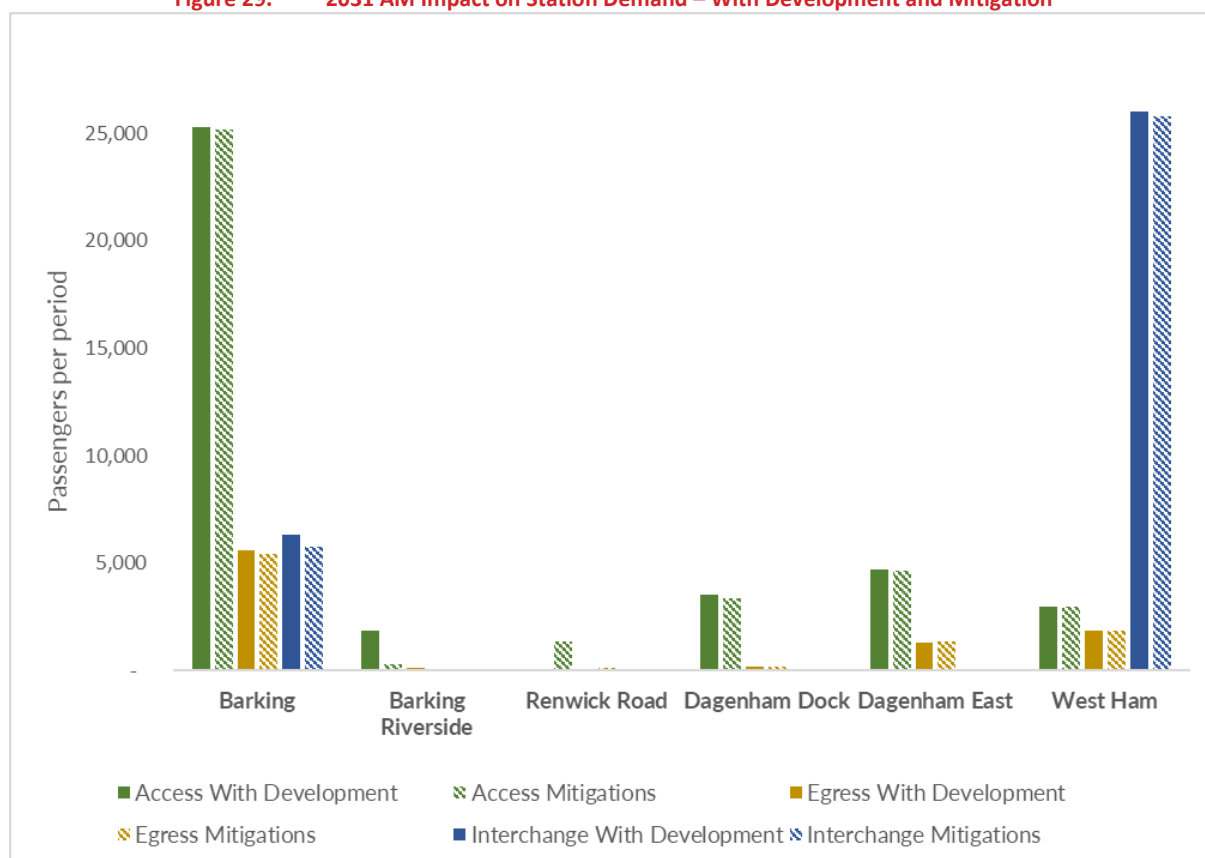
Figure 28. 2031 AM Impact on Bus Crowding – With and Without Development and Mitigation



Station Usage

- 6.4.9 The following figure displays the forecast change in station usage as a result of the mitigation measures implemented. The impact of the mitigations on the station usage within the study area is mainly related to the improved capacity on National Rail services and the new Renwick Road Overground station.
- 6.4.10 At Barking, the number of interchanges has decreased by 9% which can be attributed to the decrease in passengers changing between National Rail and the Hammersmith & City and District Lines as more passengers are staying on the National Rail services to Central London.
- 6.4.11 There are over 1,500 fewer passengers entering Barking Riverside station for London Overground services (in the morning peak) in the 'With Mitigations' scenario as the new Castle Green station is located closer to the northern end of the Riverside development site.

Figure 29. 2031 AM Impact on Station Demand – With Development and Mitigation



6.5 Mitigation Test - Parking Strategy

- 6.5.1 To align with the London Plan target for mode shift of 80% of journeys in London to be made on foot, cycle or public transport a test reducing available parking within the borough has been undertaken within the LTS model.

6.5.2 Parking in LTS is categorised in the following way:

- On-Street
- Off-Street Residential
- Off-Street Non-Residential (workplace parking only)
- Off Street Public

6.5.3 The current assumptions in the LTS model for Off-Street residential parking fall within the London Plan maximum parking standards guidelines therefore there seems no precedent for further reducing the spaces available.

6.5.4 Similarly the borough has limited desire to reduce public off-street parking spaces and non-residential spaces, the latter could become a source of workplace parking levy in the future. Therefore the focus of this parking test was to reduce the level of On-Street parking in an effort to reduce the number of highway trips arriving in the borough in the morning peak.

6.5.5 To provide an indication of the impact of the reduction in On-Street parking we reduced the volume of On-Street spaces by 30% in the LTS model. As the parking model in LTS lacks recent zone-specific base year data it is more suited to wider area policy tests than specific changes in one zone. Therefore the overall borough parking supply was reduced by 30% rather than individual zones/development sites.

6.5.6 The impact of reducing the supply is two-fold, firstly the reduction in spaces means that demand in LTS changes destination, moving to locations outside the borough and secondly demand shifts mode. The results in the table below show the impact of the change in the LTS model in the Greater London Authority area. There is a reduction in car trips with the reduced car parking availability and trips overall.

Table 5. Change in LTS Passenger Trips (To/From/Intra GLA) – AM Period

MODE	WITH DEV	WITH DEV AND PARKING REDUCTION	DIFFERENCE	% DIFFERENCE
Car	1,887,606	1,885,229	-2,377	-0.1%
PT	3,292,314	3,293,845	1,531	0.0%
Slow	1,841,990	1,842,427	438	0.0%
All	7,021,910	7,021,501	-409	0.0%

6.5.7 Looking at the differences at a borough level (in Table 6), shows that some of the car trips are also redistributed around the GLA. There is an overall drop in highway trips. Half of the difference in trips are redistributed to the boroughs local to Barking and Dagenham and the remaining travel to the other boroughs/outside London.

Table 6. Change in AM Peak Car Only Trips by Borough

BOROUGH	ORIGIN	DESTINATION
Havering	-51	106
Newham	-38	71
Barking and Dagenham	-361	-1204
Redbridge	-43	86
Other London Boroughs	-97	120
Outside London	-98	134
Total	-688	-688

6.5.8 The result is that there are fewer highway trips travelling to/from the borough in the AM peak. These changes were reflected in the highway model, by reducing the highway trips in the matrix which includes the development and the 10% highway reduction by the same LTS zonal factors as in the LTS model.

6.5.9 This results in the change in overall highway trip matrix as shown in Table 7.

Table 7. Change in AM Peak Car Only Trips by Borough

MATRIX	DEMAND	CHANGE
Development + 10% Highway Reduction	6,103,201	
Development + 10% Highway Reduction + Parking Reduction	6,102,287	-914 (0.01%)

6.5.10 Figure 30 displays junction delay forecasts for the Without Development, With Development and With Development + Parking Reduction scenarios. Figure 31 then displays the change in junction delay between With Development + Parking Reduction against the Without Development forecast. As expected the Parking strategy provides an improvement against the With Development scenario but junction delays are still not reduced to Without Development levels.

6.5.11 Significant junction delay increases against the Without Development scenario are still forecast at:

- North Street / A124 Barking Town Centre
- Lodge Avenue / Woodward Road
- A13 / Movers Lane / River Road

Figure 30. 2031 AM Junction Delays – Without/With Development and Parking Strategy

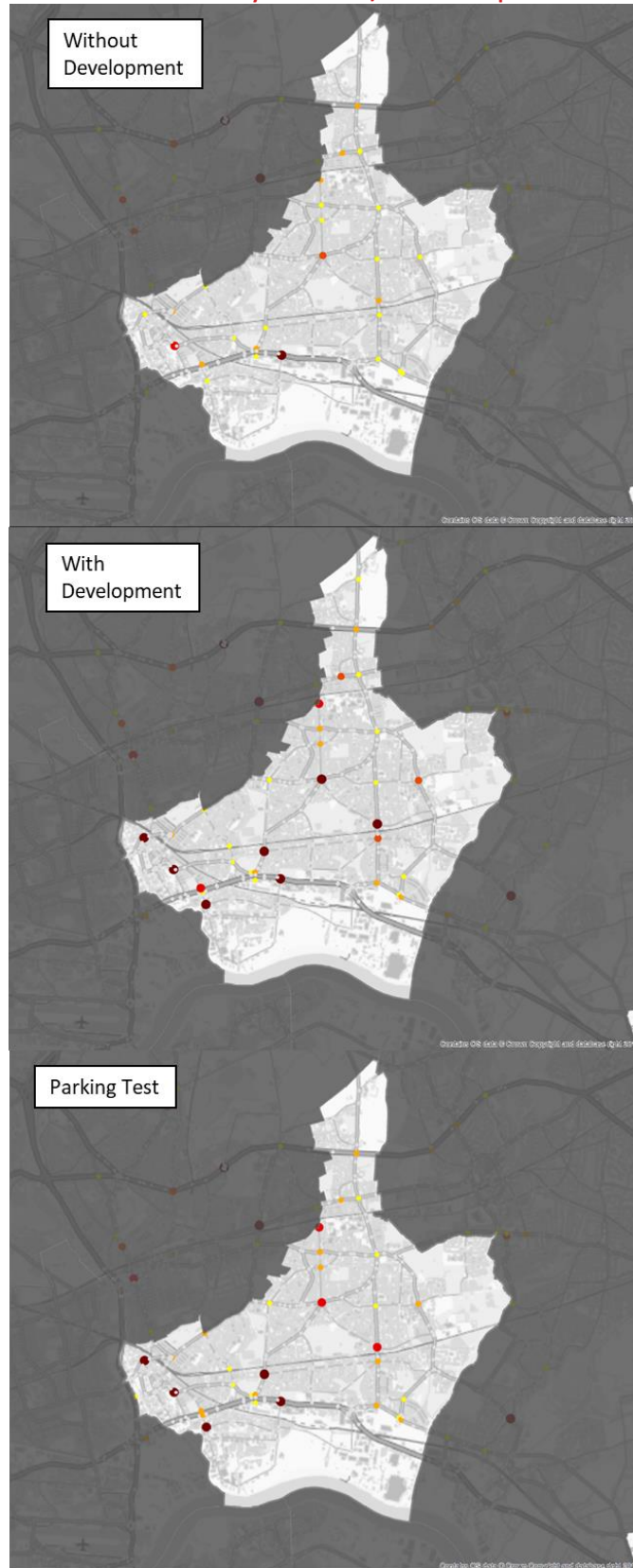
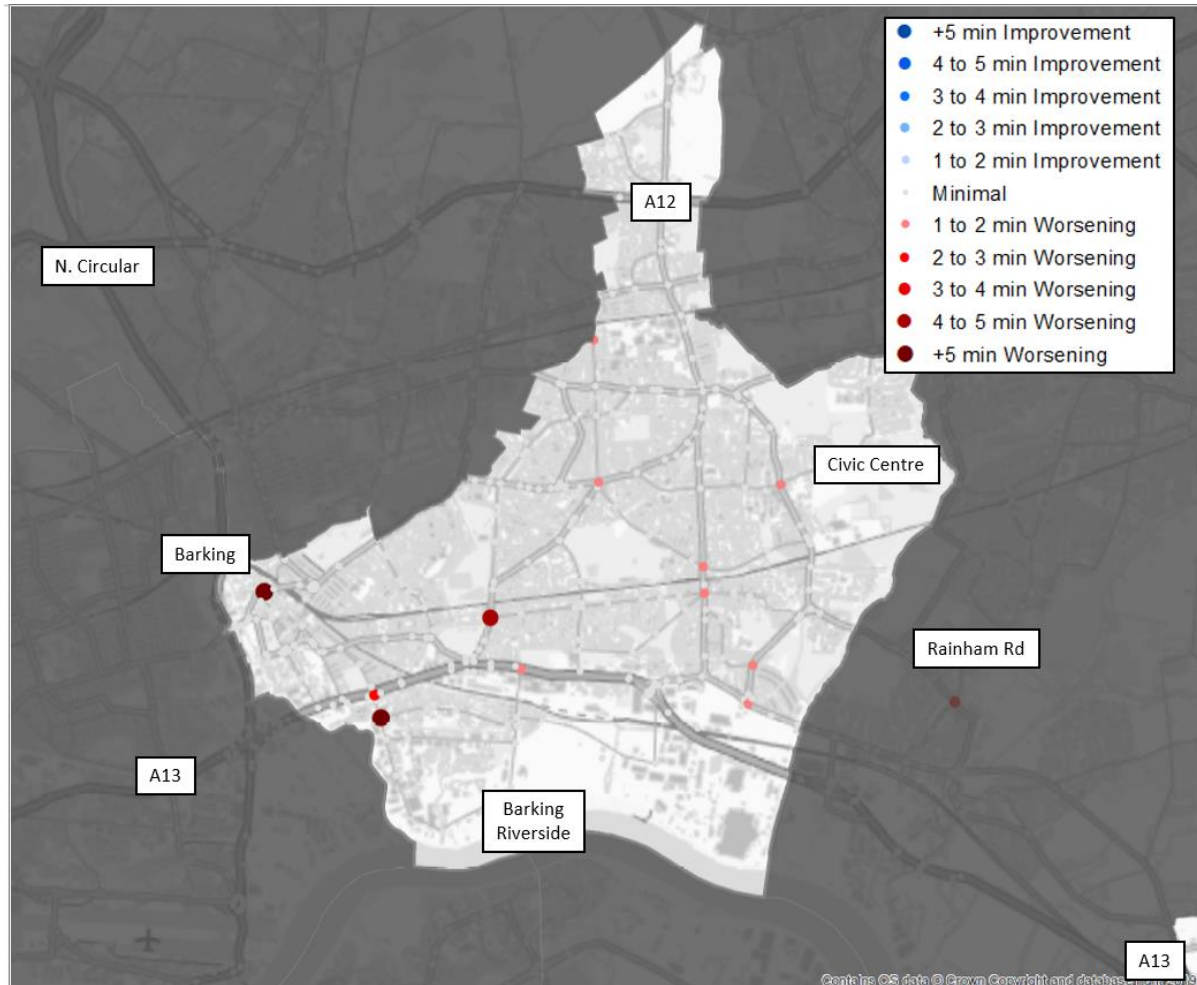


Figure 31. 2031 AM Impact on Highway Junction Delays – With Development and Parking Measures vs Reference Case



6.5.12 The change in journey times through the borough are similarly small and are shown compared to the With and Without Development scenarios in below.

Table 8. Parking Mitigation AM Peak Journey Times

JOURNEY TIME ROUTES	WITHOUT DEV	WITH DEV	WITH DEV + PARKING
Chigwell Road to Royal Albert Way	8.3	8.2	7.3
Royal Albert Way to Chigwell Road	7.2	7.2	7.9
A12 to New Road	12.1	17.1	16.0
New Road to A12	10.4	11.5	11.9
Woolwich Manor Way to London Road (A13)	9.6	9.7	9.3
London Road to Woolwich Manor Way (A13)	29.5	33.1	33.0

6.5.13 The 30% reduction of on-street car parking across the borough does go some way to improving the impact of the development on the highway network suggesting that, alongside other mitigation measures, the practicalities of implementing parking restrictions could be a measure to investigate further.

6.6 Mitigation Summary

6.6.1 This, and chapter 5, has demonstrated that the current transport network cannot adequately accommodate additional Local Plan growth without significant capacity increases and mode-shift away from the private car.

Highway Impact

6.6.2 For the Highway network there is considerable congestion and delays forecast to occur in the Without Development scenario. There are numerous junctions expected to experience delays of between 1 to 4 minutes across the borough and along the A13. The Renwick Road / A13 junction has the highest forecast delay at +5 minutes and there is a significant amount of demand which is unable to access the A13 suggesting it is at or above capacity. Adding Local Plan highway demand onto the network exacerbates the already congested network and additional delays are forecast.

6.6.3 None of the Highway mitigation options are able to reduce delays back to Without Development levels and it is expected that a significant amount of mode-shift away from Highway will be required to feasible accommodate the additional Local Plan Growth. The alternative is significant Highway Infrastructure upgrades and additional links which is a not a borough or TfL aspiration. Regardless, junction improvements should be sought at the following locations to ensure Local Plan growth is deliverable:

- North Street / A124 – Barking Town Centre;
- Lodge Avenue / Woodward Road;
- A13 / Movers Lane / River Road;
- Martins Corner / Valence Avenue;
- Dagenham Heathway; and
- Heathway / New Road / Ballards Avenue

6.6.4 It should be noted that any such improvements should not come at the expense of Public Transport or Walk/Cycle at these junctions as the overall aim must be to reduce car use overall.

Public Transport Impact

6.6.5 The Mitigation options tested are forecast to ensure Public Transport crowding levels are similar to those forecast for the Without Development scenario. The main exception being the high crowding forecast of 4 to 5 passengers standing per square metre between Plaistow – West Ham which extends one stop eastwards to Upton Park. The mitigation options that have been tested and have eased crowding issues are:

- C2C rolling stock capacity increases;
- C2C frequency improvements through Digital Railway signal upgrades;
- North-South transit enhancements through additional East London Transit services (Barking Riverside to/from Chadwell Heath via Valence Avenue and Civic Centre via Dagenham Heathway; and
- Roding River Crossing used for new East London Transit route 5 service between Barking Riverside – Gallions Reach – Custom House.

6.6.6 To successfully reduce crowding levels to Without Development levels and encourage significant mode shift away from highway then more longer term high cost schemes will need to be considered including (but not limited to):

- Abbey Wood London Overground extension;
- Barking – Stratford Rail link;
- Crossrail 2 Eastern extension;
- Additional North-South transit enhancements ensuring frequent, reliable and fast public transport options across the borough; and
- Station footfall capacity enhancements at Barking, Dagenham Dock and West Ham.

Parking Strategy Impact

6.6.7 The impact of a general borough-wide parking restriction is to improve the impact of the development on the highway network. It does not reduce junction delays or journey times to the Without Development scenario level, but it does go some way to improving congestion, junction delays and journey times at a number of locations. This, or some form of parking restrictions should be considered as part of a package of mitigations to improve the impact of the development on the highway.

Next Steps for Developing Finalised Mitigation Package

- 6.6.8 It is recommended that further studies are undertaken to identify a preferred mitigation scenario which can deliver the Local Plan growth aspirations sustainably and within reasonable costs. Some of the potential mitigation options considered in this chapter are significant schemes with high costs. It is likely that such schemes will be required in order to ensure sufficient mode shift to ensure highway delays do not worsen.
- 6.6.9 A sifting exercise is required to identify the best available package of mitigation schemes with an emphasis on achieving mode-shift from highway towards Public Transport and Walk/Cycle. This would be done by testing packages through LTS. It is envisaged that some of this work will be covered within the London Riverside Strategic Transport Study.

7. SUMMARY

7.1 This Study

7.1.1 This study has undertaken a high-level strategic transport assessment to help inform the development of the borough's new Local Plan. This study has made use of existing strategic transport models that were provided by Transport for London (TfL) to prepare an evidence base of the potential transport impact of the Local Plan growth.

7.1.2 It has set out:

- Current transport provision and issues within the borough;
- The borough's aspirations for transport provision;
- Level of Local Plan growth that the borough wishes to deliver;
- The impact this has on the highway network and whether this growth can be accommodated;
- The impact this has on the public transport network and whether this growth can be accommodated; and
- The next steps

7.2 Local Plan Growth

7.2.1 The council has stated its ambition to develop 50,000 new homes and 20,000 new jobs in the borough over the next 20 years. For this study the **July 2019** Housing Trajectory has been used which assumes 42,466 proposed households across the borough.

7.2.2 These growth assumptions have been run through TfL's LTS demand forecasting model to estimate the additional Highway and Public Transport trips resulting from the Local Plan growth. This estimated an additional 7,000 vehicle trips during the morning peak hour (08:00 – 09:00) which was tested in TfL's ELHAM model and 25,000 additional Public Transport trips during the morning peak period (07:00-10:00) which was tested in TfL's Railplan model. As agreed with TfL and LBBD, the starting point for all these models were those that supported the recent GLA/TfL 'Transforming London Riverside' Housing Infrastructure Fund (HIF) bid.

7.3 Transport Impact

7.3.1 From modelling the With Development scenario (Chapter 5) they key issues for delivering Local Plan growth are as follows:

- There is significant highway congestion and resultant delays across the borough before Local Plan growth is even added to the network (Without Development scenario). These then worsen at a number of locations once development is added.
- Significant crowding is forecast on the District and Hammersmith City lines in the Without Development scenario which worsens once Local Plan growth is added. This occurs even with the Four Lines Modernisation Programme assumed to be complete by 2023.

7.3.2 The Mitigation scenarios tested to date (Chapter 6) do relieve some of the Highway congestion and Public Transport crowding. However, it is felt that significantly greater improvements are required to have a neutral/manageable impact (especially for the Highway) within the borough. In order to successfully deliver the planned level of Local Plan Growth the borough will need to:

- Achieve significant mode/distribution shift away from highway;
- A13 and associated junctions improvements will be a priority as this will allow trips to leave the new development sites (although significant highway upgrades is not expected to be a borough or TfL priority)
- Significant improvements to Public Transport and Walk/Cycle infrastructure throughout the borough in order to meet the Mayor of London's mode share of 80% for non-car trips by 2040

7.3.3 This Transport Evidence Base document has identified that the following will be required in order for the impacts of the proposed Local Plan growth on the borough's transport network are kept to a minimum:

- Junction improvements will need to be considered at the following locations:
 - A13 / Movers Lane / River Road (to be addressed in London Riverside Study)
 - A13 / Renwick Road (to be addressed in London Riverside Study)
 - Lodge Avenue / Woodward Road
 - Dagenham Heathway
 - Martins Corner – Valence Avenue
 - North Street / A124 – Barking Town Centre (Barking Town Centre Strategy)
- Capacity enhancements on public transport corridors to/from Central London above the Four Lines modernisation programme will need to be further investigated to assess their ability to alleviate high levels of crowding forecast on the District and Hammersmith & City lines:
 - C2C capacity enhancement with increased use of new 10c 720 high capacity rolling stock (currently 6 sets will enter service in 2021)
 - Frequency improvements on C2C services potentially delivered through Digital Railway signal upgrades
 - Crossrail 2 Eastern Extension
 - Gallions Reach – Barking DLR extension
- Public Transport and Walk/Cycle schemes to encourage a mode-shift away from the private car:
 - East London Transit extensions/enhancements with increased emphasis on North-South routes
 - Upper and Lower Roding crossings for bus, walk and cycle modes
 - Barking – Chadwell Heath Cycle link
 - Ilford – Barking Riverside Cycle link
 - Cycle Superhighway 13 extension
 - Liveable Neighbourhoods urban realm improvements

- Stricter Parking standards to encourage a reduction in overall car use within and to/from the borough
 - Encourage lower parking standards than the draft London Plan for new developments and where feasible consider car-free developments
 - Limit number of on-street car parking spaces

7.4 Next Steps

- 7.4.1 The findings from this study clearly indicate that Highway congestion presents a clear obstacle to ensuring the Local Plan growth can be adequately accommodated by the transport network. In addition, there is also a worsening of crowding levels on the District/Hammersmith & City Line between Barking – West Ham even after mitigation has been included.
- 7.4.2 It is recommended that a preferred mitigation package is developed (possible through a sifting exercise) and is run through LTS in order to forecast the modal shift that can be achieved before then assessing the impact of the Local Plan growth on the Highway and Public Transport networks.
- 7.4.3 The London Riverside Strategic Transport Study is due to commence in February 2020 with the aim to provide a 20 year phased programme of transport improvements to accommodate the planned levels of growth in the London Riverside Opportunity Area. It is recommended/envisaged that this will include a shifting exercise to test the mode-share impact of the various mitigation options highlighted in this report.

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