TECHNICAL NOTE

DATE:	06 March 2024	**CONFIDENTIALITY:**	Public
SUBJECT:	Infrastructure Development Plan - Transport		
PROJECT:	Enfield Local Plan	**AUTHOR:**	Anna Richardson
CHECKED:	Rea Turohan/ Christine Elphicke	**APPROVED:**	Rea Turohan

1 POLICY CONTEXT AND OVERVIEW

This chapter reports on the Enfield Transport Infrastructure provision, illustrating the current provision and identifying future gaps required to enable sustainable growth, support local transport policies and infrastructure provision in alignment with the current planning and policy framework.

The National Planning Policy Framework 2012 (NPPF, last updated 2023) recognises that at the heart of the NPPF is a presumption in favour of sustainable development, pursuing economic, social and environmental objectives. For plan-making this means promoting patterns of sustainable development, by aligning growth and infrastructure with NPPF and National Policy Papers.

First published by the Government in 2020 and last updated in 2023, the Future of Transport Programme aims to shape transport innovation and make the UK a leader in transport movement. Part of this programme, the '*Future of Mobility: urban strategy'* paper outlines the principles that guide UK's approach to emerging technologies and services in cities and is intended to help government and innovators harness the emerging opportunities.

Decarbonising Transport: a better, greener Britain, published in July 2021 and last updated in 2023, follows on from Decarbonising Transport: Setting the Challenge (2020) and recognises transport's role as the largest contributor to UK domestic greenhouse emissions (27% in 2019[1]) and the need to reduce emissions to meet net zero targets. The paper sets the path to net zero, the benefits it delivers, and the principles underpin the approach. Commitments and actions needed to achieve transport decarbonisation are declared.

Taking charge: the electric vehicle infrastructure strategy (DfT, March 2022) sets out vision and action plan for the roll out of electric vehicle charging infrastructure and sets deadlines for the end of petrol and diesel vehicles to 2030, and goal to have all new cars and van zero emission by 2035.

The Plan for Drivers (DfT, 2023) includes a list of actions that government and local authorities will pursue to ensure drivers get a fair deal alongside other road users.

The London Plan 2021 advocates for '*good growth - growth that is socially and economically inclusive and environmentally sustainable'.* Through its transport specific policy objectives, the London Plan promotes sustainable travel and aims to achieve 80 per cent of London travel by public and active travel modes by 2041. The policy objectives aim to promote public transport schemes, with a promise to work with

[1] : https://www.gov.uk/government/statistics/ final-uk-greenhouse-gas-emissions-national-statistics1990-to-2019 (accessed March 2024)

stakeholders to deliver schemes and safeguard land for future public transport improvements, as well promote active travel by securing walking and cycling infrastructure and by making the network safer reducing car travel and fossil fuel vehicle emissions.

The London Plan references transport specific schemes (Table 10.1 London Plan 2021) which are reported later in this document in detail, that will contribute to achieve the objectives set targeting Healthy Streets and active travel projects.

The London Plan is backed by the Mayor's Transport Strategy (TfL, 2018) which relies on the Healthy Streets approach[2], thus focusing on three principles:

- *'Healthy Streets and healthy people – streets make up 80 per cent of London's public spaces making them Healthy Streets will improve the quality of life for everyone in London.*
- *A good public transport experience - public transport is the most efficient way for people to travel distances that are too long to walk or cycle. A seamless, 'whole-journey' experience will provide an attractive alternative to using the car.*
- *New homes and jobs - London needs 65,000 new homes every year to meet demand, plus around 1.3 million more jobs by 2041. We have an opportunity to reshape London and make sure it grows in a way that improves the quality of life for everyone.'*

The Healthy Streets approach aims to prioritise walking, cycling and public transport delivering benefits to Londoner's health by improving the street environment following ten principles:

- People choose to walk, cycle and use public transport,
- People feel safe,
- Things to see and do,
- People feel relaxed,
- Clean air,
- Pedestrians from all walks of life,
- Easy to cross,
- Shade and shelter,
- Places to stop and rest,
- Not too noisy.

[2] Healthy Streets for London (TfL, 2017) https://content.tfl.gov.uk/healthy-streets-for-london.pdf

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The Mayor's Transport Strategy is supported by Action Plans: the Bus Action Plan, the Cycling Action Plan, the Walking and Leisure Walking Action Plan, the Freight and Servicing Action Plan and the Vision Zero Action Plan.

The Mayor's Transport Strategy establishes the link between health benefits, active travel and the Healthy Streets approach, in doing so it captures the potential for active travel in particular in Outer London boroughs where short car trips can be replaced by active travel and local high streets are often car dominated with a direct effect on the environment noise and air quality. Policy 2 and 10 in particular state that the Mayor through TfL and the boroughs will:

' [..] seek to make London a city where people choose to walk and cycle more often by improving street environments, making it easier for everyone to get around on foot and by cycle, and promoting the benefits of active travel. The Mayor's aim is that, by 2041, all Londoners do at least the 20 minutes of active travel they need to stay healthy each day.'

' [..] use the Healthy Streets Approach to deliver coordinated improvements to public transport and streets to provide an attractive whole journey experience that will facilitate mode shift away from the car.'

The Mayor's Transport Strategy formulates Proposals to realise the policy objectives, in relation to Enfield it is worth noting Proposal 3 for a London wide cycle network reaching 70 per cent of Londoners by 2041 and encouraging measures for local and neighbourhood improvements, and Proposal 4 to *'protect, improve and promote the Walk London network'.*

Proposals 53 through 56 focus on improving accessibility to the public transport network for all, and it is notable that the anticipated benefits in journey time savings from the provision of step free access across the network are most significant in the Outer London boroughs and in particular Enfield (Figure 21 MTS, 2018).

Policy 3 aims to eliminate fatalities and serious injuries from London's streets network by 2041 by: introducing lower speed limits, reviewing junctions to reduce danger to vulnerable road users, improving the standard of HGV and bus vehicles, improving the standards of professional driving and improving the emergency response to collisions.

Policies 4 and 5 focus on ensuring the transport network is safe and that space efficient modes of transport are prioritised for the movement of people and goods. A number of proposals are made in support of these policies, notably Proposal 22 references the Local Implementation Plans (LIP), developed with local authorities to support and fund traffic reduction strategies. The most recent Enfield LIP (2019) is referenced in more detail in this document.

Enfield's Local Plan aligns to National and London objectives, promoting sustainable travel and making active travel the natural choice.

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PUBLIC TRANSPORT

Enfield's accessibility across different modes of travel varies widely. Enfield is bounded by the M25 motorway to the north and is dissected by two trunk roads – the A10 (London to Cambridge) and A406 (London's North Circular Road). These are supplemented by several key A-roads including the A1055 Bullsmoor Lane/Mollison Avenue/Meridian Way (north south link), the A1010 Hertford Road (north south link) and the A110 (east west link).

In terms of rail access, Enfield has five train lines, including the Piccadilly (Underground) line in the west of the borough connecting to Kings Cross St Pancras and Heathrow Airport and Uxbridge and Cockfosters, National Rail and London Overground connections are available to London King's Cross, Moorgate and Liverpool Street stations, and outside of London towards Welwyn Garden City, Letchworth, Stevenage (via Hadley Wood); Hertford North (via stations including Palmers Green, Enfield Chase and Gordon Hill); and Hertford East, Cheshunt, Stansted Airport and Cambridge (via the West Anglia Main Line route through stations including Meridian Water and Brimsdown, or the London Overground Southbury Loop and Enfield Town branch line via stations including Edmonton Green).

Bus coverage varies widely across the borough. Edmonton Green and Enfield town centre have very good coverage with 12 routes serving the latter including services connecting to neighbouring London boroughs (the SuperLoop, 34, 102, 144, 149, 307, 377, 217, 231, 259, 279, 299, 121, 192, 313, 318, 349, 444, W3 and 329) and a few services extending into Hertfordshire (including the 491, 217, 279, 313, 231 and 317).

Enfield's public transport accessibility varies greatly, with Enfield Town, Edmonton and the areas served by the Piccadilly Line (Southgate, Oakwood and Cockforsters) being highly accessible, and remaining areas of the borough relaying on lower frequency rail/overground and buses. This is the case with the Upper Lee Valley in particular which has experienced a large amount of development in recent years which has resulted in increased demand on public transport. However public transport quality is poor in terms of public transport accessibility along the Lee Valley corridor despite the presence of the West Anglia Main Line, as this suffers from low service frequencies and relatively poor station multimodal access. Similarly, the Great Northern Line serving the Central-Western neighbourhoods of the borough (Crews Hill, Gordon Hill, Enfield Chase, Grange Park, Winchmore Hill and Palmers Green) along the Moorgate-Stevenage line could support further growth but currently offers four trains per hour in the peak only towards Central London.

The existing capacity constraints on the public transport network will be compounded by the planned growth which will present a greater challenge. The London Plan (2021)[3] sets out proposals for large-scale development at key areas through Opportunity Areas in the Lee Valley (Meridian Water) and New Southgate which are due to support thousands of new homes, jobs and supporting facilities.. It is recognised that in

[3] The London Plan (2021)
https://www.london.gov.uk/programmes-strategies/planning/london-plan/new-london-plan/london-plan-2021

order to achieve the additional growth the transport infrastructure of these areas must be transformed, with a focus on improved public transport accessibility and connectivity.

The Edmonton Leeside Area Action Plan sets out that further growth in both housing and employment is planned for the Upper Lee Valley, Picketts Lock, Angel Road Retail Park, Edmonton EcoPark and Deephams Sewage Treatment Works. Growth will put pressure on the existing public transport network in the more peripheral areas of the borough, which are capacity constrained or are not particularly well served in terms of coverage by public transport at present.

Public transport improvements across the borough will be required to support the planned growth as set out in the London Plan and aspire to fill the gaps in accessibility and capacity constraints. Current aspirational improvements set out in the Enfield Transport Plan (last issued 2019 – currently under review)[4] include, more frequent rail services, the four tracking of the London-Stansted line, and a more frequent and comprehensive bus service. Improving accessibility to public transport for areas of new growth is therefore critical to delivering sustainable growth and supporting the borough's economy.

HIGHWAY

Enfield is linked to major road corridors including the A10, A110 and A406. At present there is a lack of connectivity between strategic east-west and north-south highway links across the borough, which limit movement and access to jobs and services. Nearly half of individuals living in the borough travel to work by car, compared to 34% across all London boroughs[5]. The volume of traffic using the network is placing increasing pressure on the available capacity. Planned growth in the new Local Plan will need to consider and mitigate highway capacity constraints with more emphasis on making space available within the highway for attractive routes for active travel and efficient public transport services.

The following routes have historically had capacity issues: M25 (junction 25), A10 Great Cambridge Road, A406 North Circular Road, A110 Southbury Road, A1010 (Hertford Road) and A1055 (Mollison Avenue/Meridian Way)[6]. With few east west links due to physical severance from reservoirs in the east of the borough, motorists wanting to cross the borough from Brimsdown and Ponders end to Loughton (Epping Forest District) or Chingford (Waltham Forest) are directed towards the pinch point between the King George's and William Girling reservoirs where the A110 (Lea Valley Road) passes through. The upgrade of east west links in the borough are required for all modes and as such there is an opportunity to develop multimodal east-west links across the borough.

[4] London Borough of Enfield Transport Plan 2019
https://new.enfield.gov.uk/services/roads-and-transport/enfield-transport-plan-2019-2041-roads.pdf
[5] Travel in London Report 13
https://tfl.gov.uk/corporate/publications-and-reports/travel-in-london-reports
[6] Enfield London Borough Council (November 2010), The Enfield Plan Core Strategy: 2010-2025
https://new.enfield.gov.uk/services/planning/area-action-plans/planning-policy-information-the-enfield-plan-core-strategy-november-2010.pdf

Businesses reliant on bulk freight movement tend to be located in the east of the borough, particularly on key routes such as Mollison Road, Meridian Way and Great Cambridge Road. Current policies[7] in the borough seek to manage the location of freight generating development and to improve key highway corridors that carry freight traffic in order to reduce the existing capacity issues. Accommodating future growth (both housing and employment) in the borough will require strategic and local network capacity issues to be resolved in order to unlock growth.

WALKING AND CYCLING

Enfield has approximately 64 kms of public footpaths ranging from heritage trails to long distance routes. These include the following:

- London Loop - circular walking route across the capital and covering 15 kms in the north of the borough from Cockfosters to Enfield Lock.
- Lee Valley Walk – which runs through the east of the borough alongside the river 12 kms.
- New River Path - runs through the borough from Bullsmoor through to Bowes.

Levels of active travel account for 37% of mode share and are on a positive trend albeit still tracking below London average. Circa 2%[8] of total trips are made by bicycle, compared to 3% average in London as a whole, walking however represent nearly 35% of mode share against London wide average of 40%. Enfield has been identified as one of five outer London boroughs as having the greatest potential for cycle trips as 30% of all car trips in Enfield are less than 2 kms. There are significant barriers to walking and cycling in Enfield and areas where walking and cycling provision is poor:

- The A406 North Circular forms a barrier to north south movement on foot and by bicycle through Meridian Water and the rest of Edmonton Leeside.
- The A1055 along with the industrial estates and the Lee Valley reservoirs form a significant barrier to east west active travel movement.
- The railway lines (running north south to Brimsdown and Ponders End) form a barrier for east west movement for pedestrians and cyclists, increasing travel distances away from desire lines.

[7] Enfield London Borough Council (November 2010), The Enfield Plan Core Strategy: 2010-2025 https://new.enfield.gov.uk/services/planning/area-action-plans/planning-policy-information-the-enfield-plan-core-strategy-november-2010.pdf

[8] Travel in London Report, TfL, 2023 (https://tfl.gov.uk/corporate/publications-and-reports/travel-in-london-reports#on-this-page-1 accessed March 2024)

- Various cycling and walking routes highlighted in the North East Area Action Plan and Edmonton Leeside Area Action Plan are narrow, unlit, unsegregated and of poor quality.

Where these barriers do not exist, for example around the railway stations and along the Lee Valley Regional Park corridor, there are higher levels of walking and there is greater potential to increase these levels.

The council has embarked on a medium-to-long term programme of large-scale cycle routes and complementary improvements such as cycle parking, priority junctions and speed restrictions, including improved links to other parts of London and parts of Hertfordshire. A series of improvements are set out in the borough's Journey and Places Programme[9] that aims to improve the current walking and cycling provision on a neighbourhood level, building on the Mini-Holland[10] programme which delivered, for example, the A1010 and A105 cycle routes.

Building on the Enfield programme the proposed West Anglia Main Line improvements[11] will develop provision for east west pedestrian and cycle connectivity over the railway through the Upper Lee Valley. The proposed improvements alongside the promotion of active travel modes will help to increase the uptake of these modes and in turn reduce the pressure on both public transport and the road network.

[9] https://tfl.gov.uk/corporate/publications-and-reports/travel-in-london-reports#on-this-page-1 (accessed March 2024)

[10] Mini-Holland is a 2014 TfL Programme, Enfield was one of three boroughs awarded £30 million.

[11] London and South East Route Utilisation Strategy published by Network Rail in July 2011.

2 BASELINE NETWORK REVIEW

METHODOLOGY AND DATA SOURCES

A benchmarking of the current (baseline) transport network is necessary to establish opportunities and constraints and set the proposed Local Plan growth in context. An overview and assessment of the transport network has been undertaken both quantitatively, to ascertain public transport and highway capacity implications, and qualitatively to look at broader network coverage, accessibility, active travel offering and potential for mode shift.

The quantitative review of the potential impacts and testing of associated mitigation effectiveness on the highways and public transport networks was undertaken through the use of the TfL strategic modelling suite including:

- MoTioN, a Multi-modal strategic transport 'mode of travel' in London model.
- LoHAM, a strategic London-wide highway assignment model.
- Railplan, a public transport strategic model.

The transport model analysis included the established industry standard approach steps as follows:

- Establish the 'fitness for purpose' of the models through review of the baseline scenario and discussion with TfL and the local highway authority.
- Build the 'future year' baseline capturing development and infrastructure completions and secured growth only.
- Build the 'future year' new Local Plan growth scenario.
- Assess impact of 'future year' new Local Plan growth scenario by ways of comparison with the Future Baseline.

The impacts and mitigations required, documented at the end of this note, have been determined through the comparison of the future baseline and growth scenarios and the outcome of the qualitative review.

In order to establish the baseline transport network coverage and operation benchmarking a review of data was carried out, drawing from available sources including:

- TfL strategic modelling suite (MoTioN, Railplan, LoHAM)
- TfL WebCAT PTAL (https://tfl.gov.uk/info-for/urban-planning-and-construction/planning-with-webcat/webcat accessed July 2023)
- London Datastore – Greater London Authority (London Datastore – Greater London Authority accessed July 2023)

- TfL Bus Action Plan (https://content.tfl.gov.uk/bus-action-plan.pdf accessed August 2023)
- TfL Cycling and Walking Action Plans (https://tfl.gov.uk/corporate/about-tfl/how-we-work/planning-for-the-future/encouraging-cycling-and-walking accessed September 2023)
- Basemap DataCutter, Bus Route Public Transport Lines dataset Wednesday AM period (07:00-09:00) (https://datacutter.basemap.co.uk/DataCutter accessed July 2023)
- DfT Road Safety Data 2022 (https://www.data.gov.uk/dataset/cb7ae6f0-4be6-4935-9277-47e5ce24a11f/road-safety-data accessed July 2023)
- National Highways Delivery Plan 2020-2025 (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/910866/5-year_Delivery_Plan_2020-2025_FINAL.pdf accessed July 2023)

PUBLIC TRANSPORT AND ACCESSIBILITY

Public transport account for 20 per cent of travel in the borough[12]. The coverage and accessibility of public transport across the borough varies significantly.

TfL's Connectivity Assessment Toolkit (WebCAT) shows public transport access levels (PTAL) across London. PTAL assesses a place's level of connectivity to the public transport network based on distance, frequency and type of service available.

Figure 2-1 shows the PTAL assessment for the Borough of Enfield. The map reflects of very good to excellent public transport accessibility in Enfield Town, Edmonton Green, Silver Street and Southgate. Fair to low public transport accessibility in the remainder of the borough.

Notably the good PTAL value is located around the town centres and public transport hubs; Enfield and Edmonton town centres are assessed as '6a' and '6b (Best)' implying that they are very well connected to the public transport network. Both town centres are within close proximity to the London Overground (Enfield Town and Edmonton Green stations) which provide a frequent service to London city centre as well as a high number of bus routes. Correspondingly, the Piccadilly line corridor is better connected than the reminder of the borough.

Figure 2-1 shows that large sections of the borough have a score of '2' or below implying that public transport is not as well accessible for many residents. The lower levels of accessibility are located in the

[12] https://www.enfield.gov.uk/__data/assets/pdf_file/0019/4825/enfield-transport-plan-2019-2041-roads.pdf, page 34

northern part of Cockfosters, Ridgeway and Whitewebbs wards. All of these areas are within Enfield's Green Belt large parts of which have low residential density and lack of connectivity to services. The areas surrounding the two reservoirs, the King George's and William Girling, in the east of the borough are also shown to have very poor public transport accessibility, and these areas are also not as well connected to transport hubs due to rail and waterways severance.

The north-western and eastern extents of the borough that score '0' correspond to Greenbelt and Lee Valley Park areas mostly where there is a lack of highway and public transport infrastructure.

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Figure 2-1 PTAL, London Borough of Enfield (source: WebCAT)

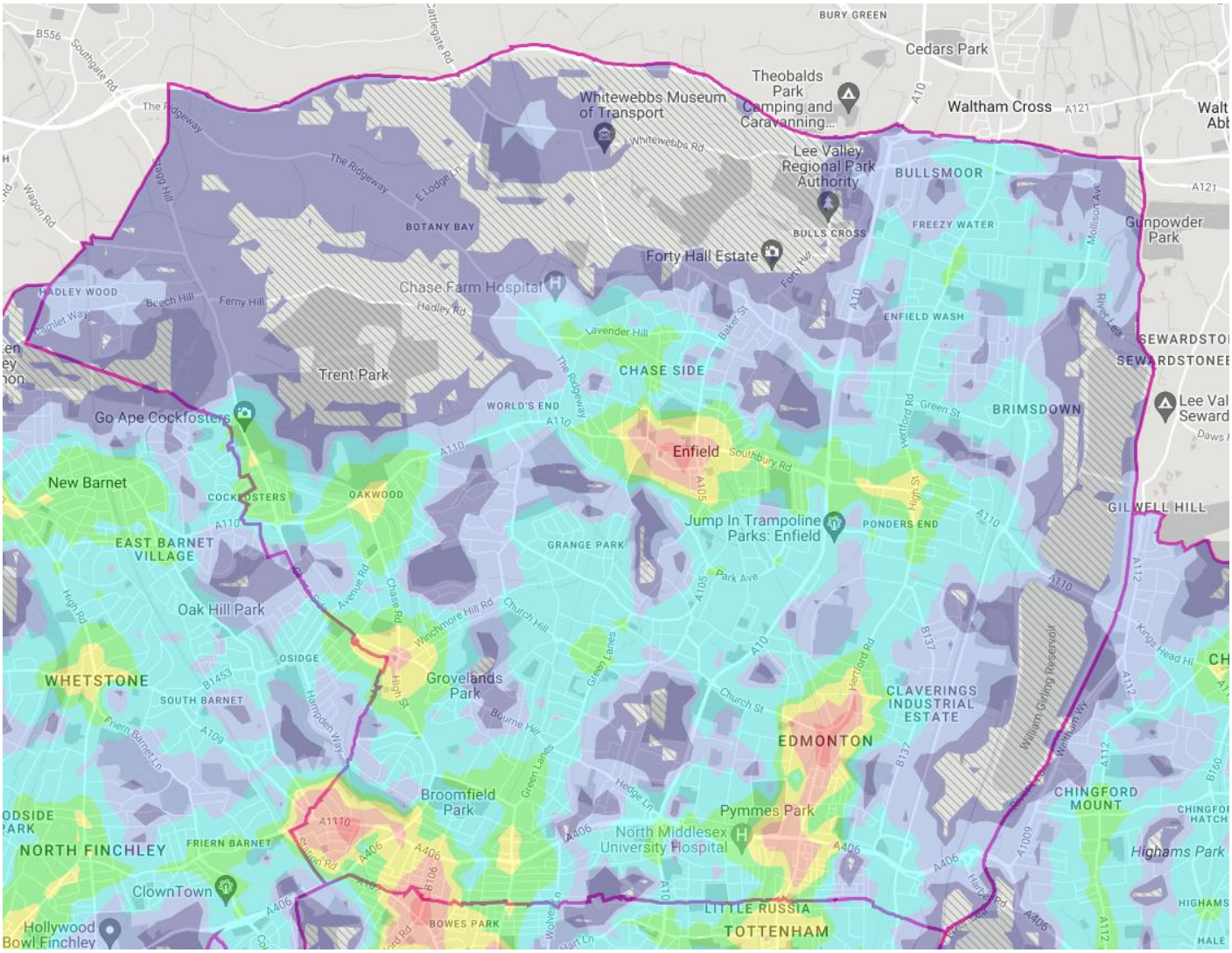

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Figure 2-2 Enfield's Underground, Oveground and Rail Network

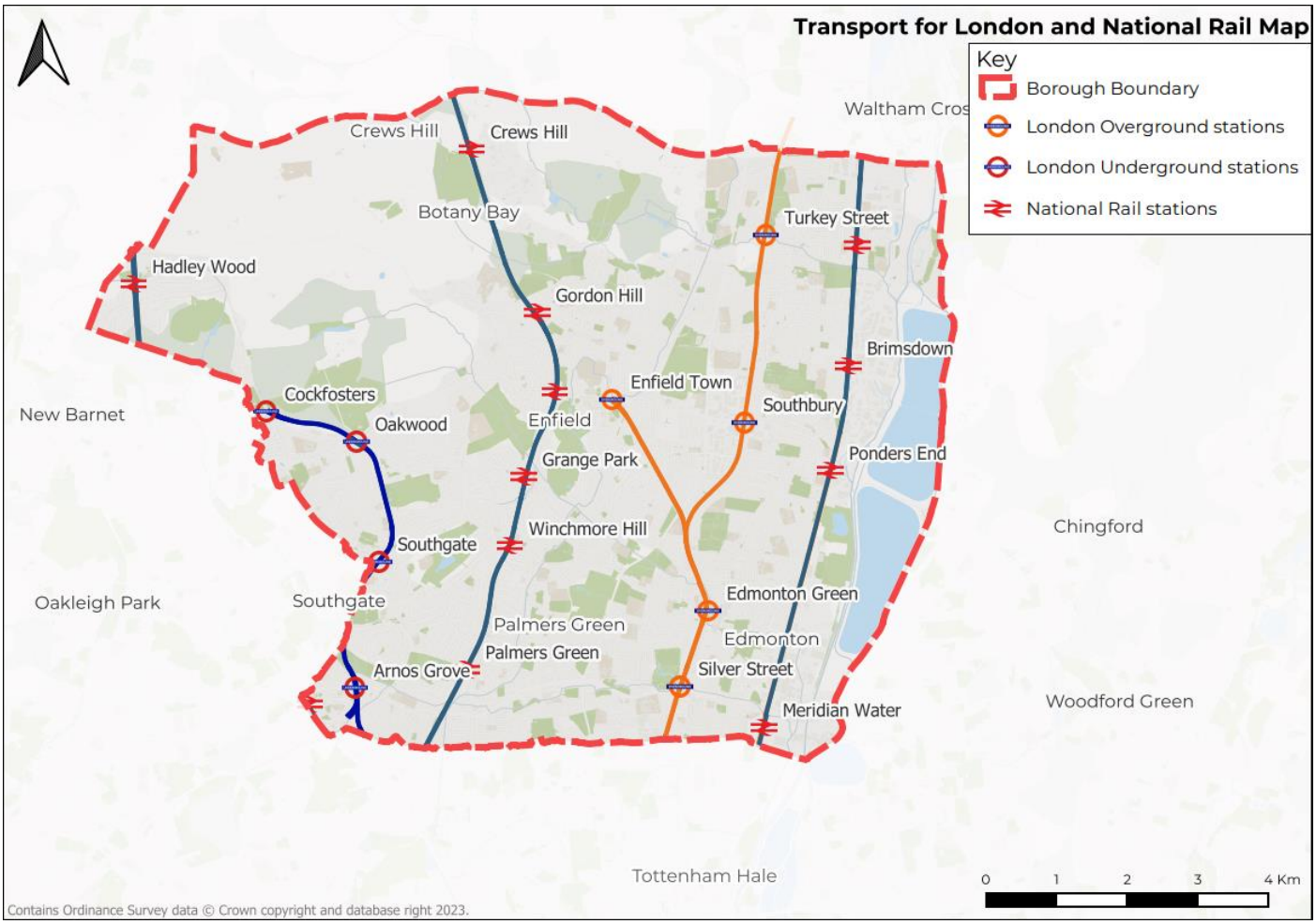

Figure 2-2 shows the London Underground, Overground and rail network in Enfield. Considering 40 per cent of Enfield is green belt land, the borough is reasonably well served by the rail network albeit mostly in a north-south direction. Enfield is served by the London Underground Piccadilly Line, London Overground and two national rail lines, providing connections into central and south London (via Liverpool Street and Moorgate) and outer London connections to Hertford, Stevenage, and toward Stanstead Airport.

London Underground

The western extent of the Borough of Enfield is served by the Piccadilly Line. There are a total of four Piccadilly stations in Enfield, these are Arnos Grove, Southgate, Oakwood and Cockfosters which is where the Piccadilly Line terminates. Oakwood and Cockfosters are step-free accessible stations. The Piccadilly Line provides connections into the centre of London via Kings Cross St Pancras and provides east to west connections terminating at Heathrow and Uxbridge in the outer borough of Hillingdon.

Service frequency is from between six trains an hour, this rises to 24 trains an hour during peak hours. This is expected to rise to 27 trains per hour in mid-2027 with the introduction of a new fleet of trains, which will equate to one train every 135 seconds.

The Piccadilly Line does not intersect with any other tube stations within the borough; the nearest intersection point is at Finsbury Park Underground station, where the line meets the Victoria Line, providing connections to Brixton in the south and Walthamstow in the north-east.

London Overground

The central-eastern extent of Enfield is served by the London Overground, which serves Silver Street and Edmonton Green (step-free access) before splitting into branches: one serving Bush Hill Park and Enfield Town (both step-free access) and the other Southbury, Turkey Street and Cheshunt stations. Southbound, the London Overground provides an important interchange with the Victoria Line at Seven Sisters together with a direct service to Liverpool Street.

Edmonton Green service frequency is two to six trains per hour, both south and northbound, Monday-Friday, reaching a maximum of six trains during morning and evening peak. On weekends service frequency is slightly reduced, with around three to four trains per hour.

After the line branches off, two services per hour continue to Cheshunt and the rest terminate at Enfield Town.

Table 2-1 Overground frequency overview

Branch	First Train	Last Train	Daytime Frequency
Edmonton Green – Liverpool Street	05:28	00:21	15 minutes
Enfield Town – Edmonton Green	05:53	00:16	30 minutes
Cheshunt – Edmonton Green	05:17	23:59	30 minutes

Great Northern Line

National Rail also serves the borough north to south. There are six rail stations in the borough which are served by the Great Northern Line. These stations are Palmers Green, Winchmore Hill, Grange Park, Enfield Chase, Gordon Hill and Crews Hill.

Enfield's stations provide southbound journeys to Moorgate (41 minutes from Crews Hill and 28 minutes from Palmers Green) and northbound services to Stevenage. Monday to Sunday the stations receive two trains an hour in both directions, reflecting a regular service pattern.

The Great Northern Line also stops at New Southgate and Hadley Wood (step-free access), on a separate Moorgate to Welwyn Garden City.

Table 2-2 Great Northern frequency overview

	First Train	Last Train	Daytime Frequency
Palmers Green – London King's Cross	01:19	23:39	30 minutes
Winchmore Hill – London King's Cross	01:11	23:36	30 minutes
Grange Park – London King's Cross	01:05	23:34	30 minutes
Enfield Chase – London King's Cross	01:00	23:32	30 minutes
Gordon Hill – London King's Cross	00:54	23:30	30 minutes
Crews Hill – London King's Cross	00:44	23:26	30 minutes

West Anglia Main Line

Greater Anglia operates services along the West Anglia Main Line which serves the very eastern extent of Enfield. There are four stations in the borough boundary these are Meridian Water, Ponders End, Brimsdown and Enfield Lock. These provide southbound connections to Stratford and London Liverpool Street and northbound connections towards Stanstead Airport.

Table 2-3 WAML frequency overview

	First Train	Last Train	Daytime Frequency
Meridian Water – Stratford	06:13	23:08	30 minutes
Ponders End – Stratford	06:10	23:38	30 minutes
Brimsdown – Stratford	06:08	23:36	30 minutes
Enfield Lock – Stratford	06:05	23:33	30 minutes

London Buses

Figure 2-3 shows that the borough is reasonably well served by daytime bus services. Each of the five local centres are served by multiple bus routes which provide connections between local centres and transport hubs within the borough as well as journeys to the neighbouring boroughs of Barnet, Haringey and Waltham Forest. All of Enfield's train stations, aside from Crews Hill Station, are served by a bus route providing opportunities for onward travel by public transport.

Most of the boroughs bus corridors receive between eight and 24 buses per hour. There is a more regular service through Enfield, Edmonton, Palmers Green and Southgate town centres which receive between 24-120 buses per hour.

Figure 2-5 shows the daytime bus frequency in the borough. Bus routes that provide connections between the local centres receive a high number of buses per hour (24-120 buses). Edmonton Green town centre to the train station and a small area around Enfield Chase receive the highest number of buses within the borough (over 120 per hour). These local centres are likely to be points when multiple bus routes converge, thus have the highest service.

The north-west of the borough appears to have low bus service provision. However, both A roads, Stagg Hill and The Ridgeway, are bus routes which receive 8-24 buses per hour; the 298, 692, 699 (school bus route) and 610 Dragonfly route along Stag Hill and the 355 and the 356 (school bus) route along The Ridgeway. The area between Stagg Hill and The Ridgeway is within Enfield's Green Belt. Current land use (very few residential plots) has little requirement for bus services within the Green Belt.

There are a few areas that are poorly served by the bus network, receiving a maximum of eight buses per hour. Crews Hill and Brimsdown are two areas that are not often frequented by bus services, and this impacts public transport accessibility as shown in Figure 2-1.

There is currently no bus service provision north of Crews Hill to and beyond the M25. This area is also currently part of Enfield's Green Belt so there is little requirement for bus services at present.

Figure 2-4 shows Enfield's night and 24-hour bus services. These services primarily provide north-south connections through the borough. Only one route, the N279, extends north beyond Enfield Town terminating at Waltham Cross. Enfield's Green Belt does not receive any night-time bus service. The town centres all receive 24-hour buses but there is little bus service offering connections between local centres.

Table 2-4 provides an overview of the bus routes serving the Borough and their frequencies.

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Figure 2-3 Enfield Daytime bus service coverage

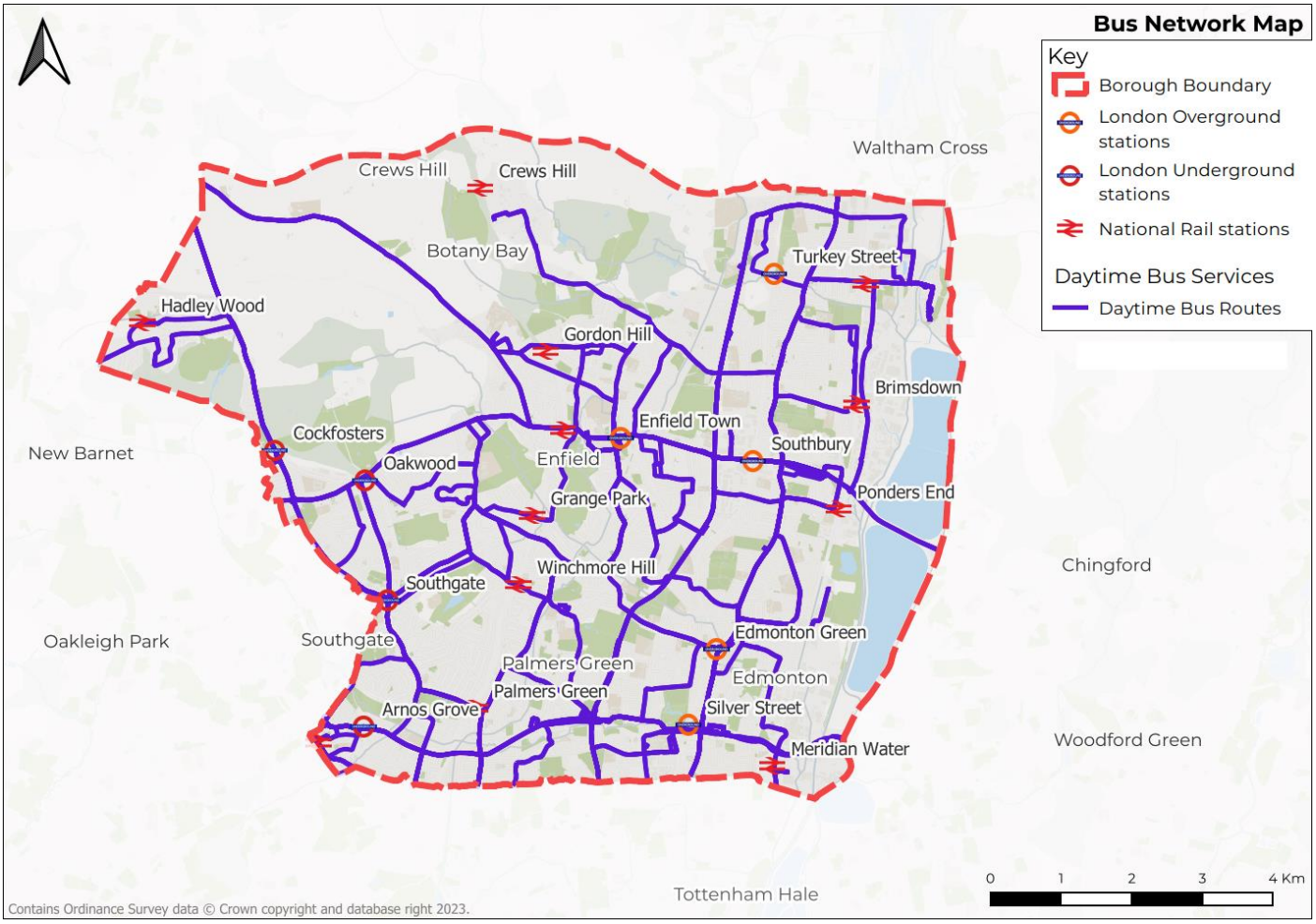

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Figure 2-4 Enfield Night-time bus service coverage

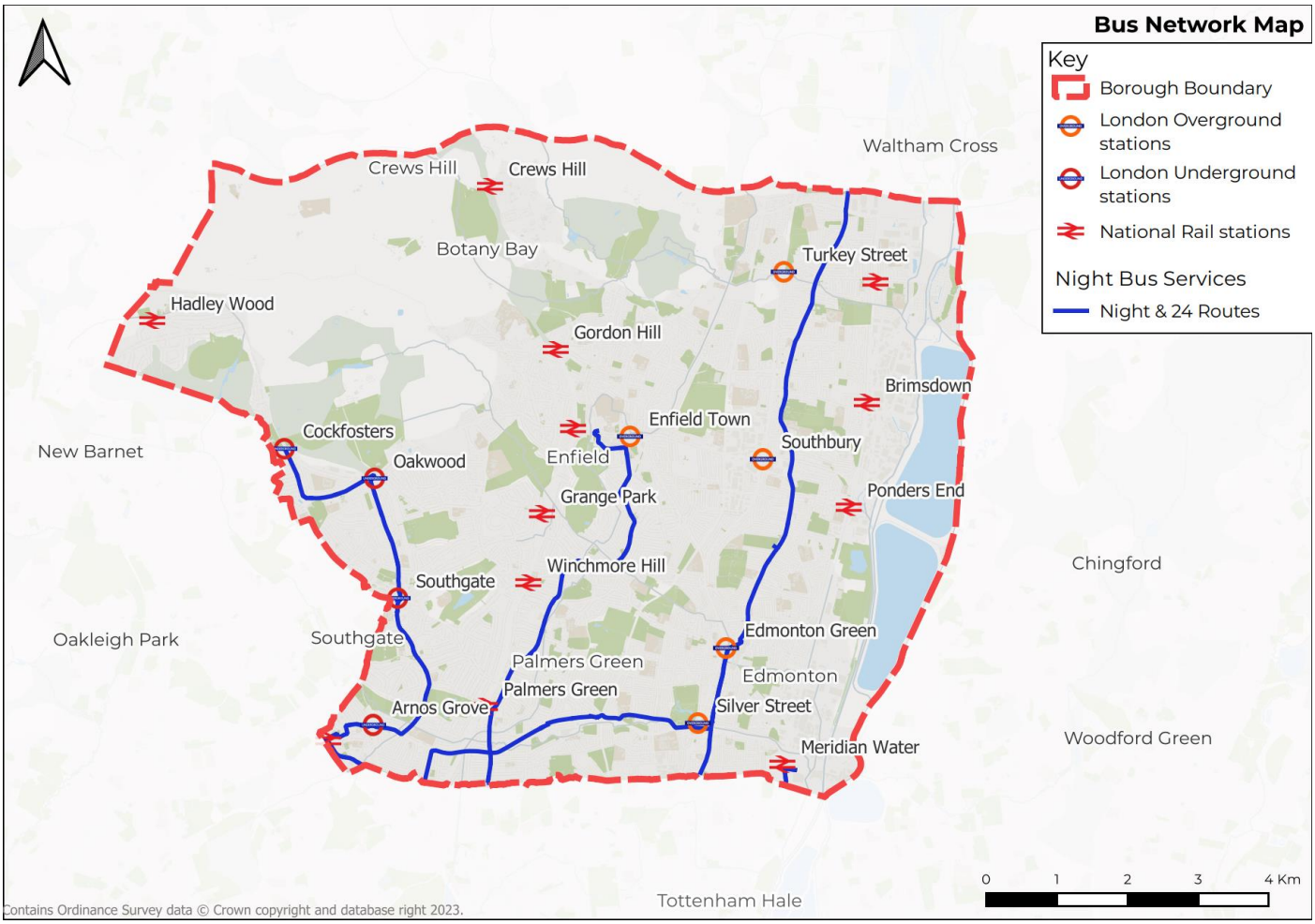

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Figure 2-5 Enfield Daytime bus service frequency

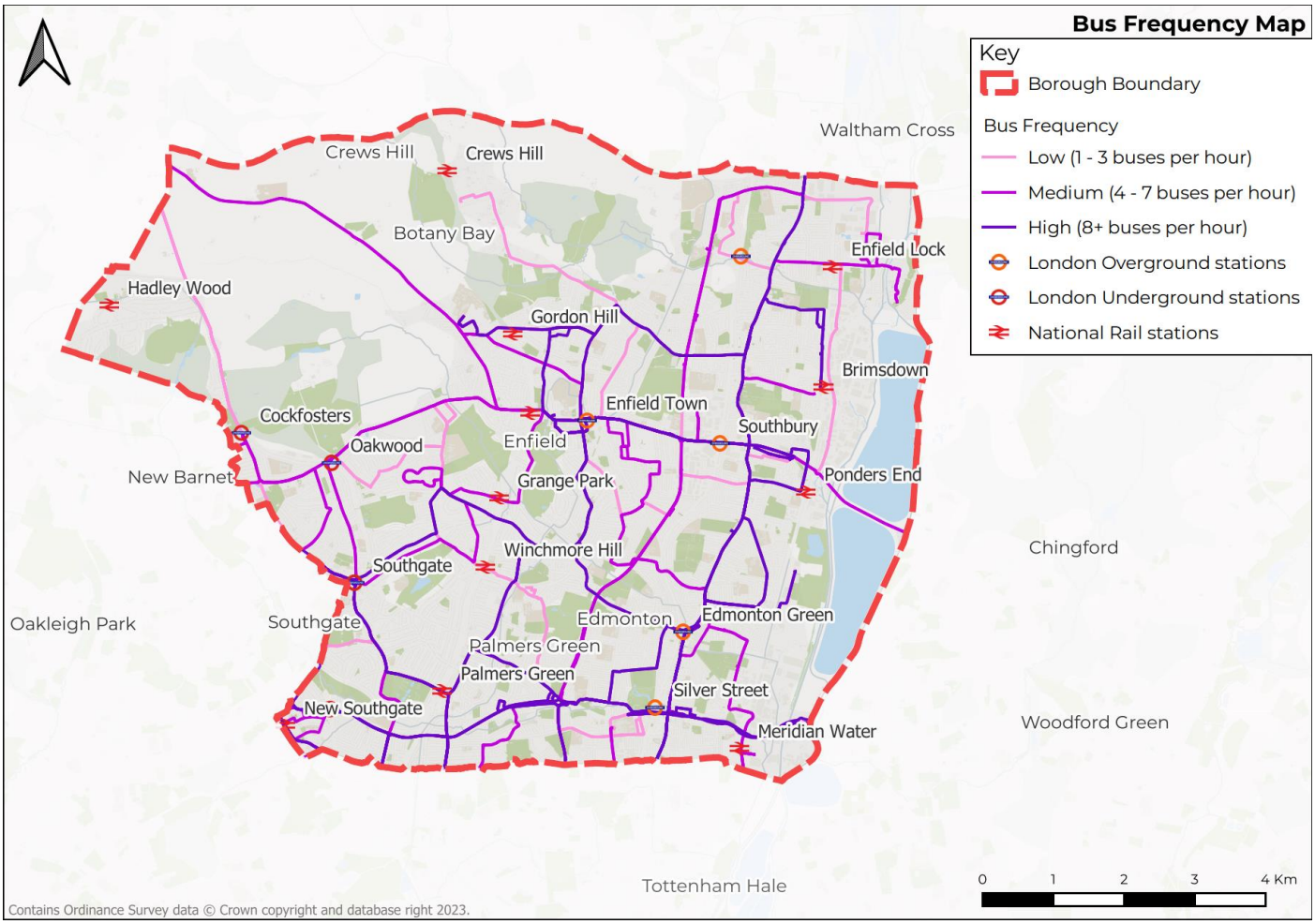

Table 2-4 Bus route frequency overview

Bus Route	Hours of Operation (pick start station)	Start / Destination	Destination / Start	Weekend (peak) frequency
102	00:10 – 00:46	Edmonton Green Bus Station	Brent Cross Shopping Centre	7-11 minutes
121	05:45 – 00:30	Enfield Island Village	Turnpike Lane Station	9-10 minutes
125	05:50 – 00:40	Station Road	Colindale Station	10-12 minutes
141	04:20 – 00:05	Tottenhall Road	London Bridge Station	6-10 minutes
144	04:29 – 01:15	Muswell Hill Broadway	Edmonton Green Bus Station	7-10 minutes
149	00:15 – 00:33	Edmonton Green Bus Station	London Bridge Bus Station	6-10 minutes
184	05:30 – 00:30	Turnpike Lane Bus Station	Chesterfield Road	7-10 minutes
191	05:40 – 23:50	Edmonton Green Bus Station	Brimsdown Station	8-10 minutes
192	04:25 – 00:35	Little Park Gardens	Tottenham Hale Station	9-12 minutes
217	04:50 – 00:25	Waltham Cross Bus Station	Turnpike Lane Bus Station	13 minutes
221	05:25 – 00:22	Edgware Bus Station	Turnpike Lane Station	7-9 minutes
231	05:05 – 00:20	Enfield Chase Station	Turnpike Lane Bus Station	14 minutes
232	05:25 – 00:45	Mitchell Way	Turnpike Lane Station	11-12 minutes
251	05:10 – 00:11	Arnos Grove Station	Edgware Station	12 minutes
259	04:10 – 00:29	Edmonton Green Bus Station	King's Cross Road / Pentonville Road	8-12 minutes
279	05:00 – 00:32	Waltham Cross Bus Station	Manor House Station	7-11 minutes
298	06:20 – 00:14	Arnos Grove Station	Potters Bar Station	20 minutes

251	05:10 – 00:11	Arnos Grove Station	Edgware Station	14 minutes
259	04:10 – 00:29	Edmonton Green Bus Station	King's Cross Road / Pentonville Road	9-13 minutes
279	05:00 – 00:32	Waltham Cross Bus Station	Manor House Station	18 minutes
298	06:20 – 00:14	Arnos Grove Station	Potters Bar Station	15 minutes
299	06:00 – 00:03	Queens Avenue	Cockfosters Station	10-13 minutes
307	05:00 – 00:33	Brimsdown Station	Barnet Hospital	40 minutes
313	05:45 – 00:40	Chingford Station	Dame Alice Owen's School	7-10 minutes
317	05:05 – 23:55	Waltham Cross Bus Station	Little Park Gardens	9-12 minutes
318	05:45 – 00:20	North Middlesex Hospital	Rookwood Road	10-13 minutes
327	07:00 – 19:00	Waltham Cross Bus Station	Cocker Road	9-12 minutes
329	05:25 – 00:40	Little Park Gardens	Turnpike Lane Station	10-14 minutes
34	04:23 – 00:45	Barnet High Street / Barnet Church	Walthamstow Central Station	29 minutes
341	00:15 – 23:45	Meridian Water Station	Waterloo Station / Waterloo Road	13 minutes
349	04:05 – 00:05	Glyn Road	Rookwood Road	15 minutes
355	05:35 – 00:10	Three Kings Pond	Brixton Station	60 minutes
377	06:45 – 23:16	Glyn Road	Oakwood Station	10-13 minutes
382	06:10 – 00:10	Southgate Station	Millbrook Park	29 minutes
384	05:25 – 00:18	Edgware Bus Station	Cockfosters Station	15 minutes
399	10:45 – 14:45	The Spires	Hadley Wood Station	7-11 minutes

444	05:20 – 00:40	Turnpike Lane Bus Station	Chingford Station	9-10 minutes
456	06:10 – 20:05	Crews Hill	North Middlesex Hospital	10-12 minutes
491	06:10 – 00:20	Waltham Cross Bus Station	North Middlesex Hospital	6-10 minutes
616	07:38 – 16:43	Old Park Ridings	Edmonton Green Bus Station	(Weekday only)
617	07:40 – 15:59	Turnpike Lane Bus Station	Turkey Street Station	(Weekday only)
628	15:45	Jewish Free School	Southgate Station	(Weekday only)
629	07:27 – 16:06	Haringey Civic Centre	Turkey Street Station	(Weekday only)
688	06:59 – 17:00	Southgate Station	Jewish Free School	(Weekday only)
699	07:40 – 16:33	Green Dragon Lane	Dame Alice Owen's School	(Weekday only)
N279	00:05 – 04:45	Waltham Cross Bus Station	Trafalgar Square / Charing Cross Stn	20 minutes
N29	00:15 – 05:15	Little Park Gardens	Trafalgar Square / Charing Cross Stn	10 minutes
N91	23:12 – 04:45	Cockfosters Station	Whitehall / Trafalgar Square	30 minutes
W4	05:20 – 00:22	Ulster Gardens	Ferry Lane Primary School	20 minutes
W6	05:55 – 23:30	Southgate Station	Edmonton Green Bus Station	9-11 minutes
W8	05:00 – 00:10	Chase Farm Hospital / Main Entrance	Picketts Lock Centre	7-10 minutes
W9	06:00 – 23:48	Chase Farm Hospital / Main Entrance	Southgate Station	14 minutes
Superloop	05:00 – 00:30	North Finchley Bus Station	Walthamstow Bus Station	10-13 minutes

Adjoining Local Highway Authority public transport services

As well as TfL services, Enfield benefits from University Bus (Uno) operated Dragonfly 610 service which runs between Cockfosters and Luton. The service provides connections to Hertfordshire and Bedfordshire via Potters Bar, Hatfield, Harpenden and Luton, where the bus route terminates. The journey time from Cockfosters to Luton is approximately 1 hour 35 minutes.

Sullivan Buses also provide a school bus connection from Enfield to St Albans. The route starts at Carterhatch Lane, travelling out of Enfield via Botany Bay. From the M25, the bus route goes north via Potters Bay and Welham Green, terminating at Nicholas Breakspear School in the east of St Albans. The total journey time of the route is approximately 55 minutes. There is no service during school holidays or on weekends.

HIGHWAY NETWORK AND ROAD SAFETY

Figure 2-6 shows the borough's road network. As an outer London borough, Enfield has good links to the national motorway system. The north of the borough is bounded by the M25 which is the orbital route around outer London, providing fast east to west links.

Within Enfield, the A10 and A406 are part of the TLRN (Transport for London Road Network). The A10 provides a link from Inner London towards Cambridge and the A406 North Circular, an inner circular route around inner London boroughs, are both high-capacity trunk roads, with dual carriageway and multiple traffic lanes.

There are also several A-roads which are key links through the borough. North to south links include: the A111, the A1005, the A1010 and the A1055. Orbital routes include the A110 lining the adjoining Barnet and Chingford areas.

Collision data for the period 2017-2021 indicates (Figure 3-7) some fatalities of which:

- Seven along the A10,
- Four along the A406 North Circular,
- Two along the A1055 and the A1005, and
- One at Crews Hill.

Limited were available for these collisions. Overall, it appears the serious casualties are located along the A-road corridors, namely the A1010, A406, A110, A111 which appear to have a higher concentration of collisions.

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Figure 2-6 Enfield Highways Network

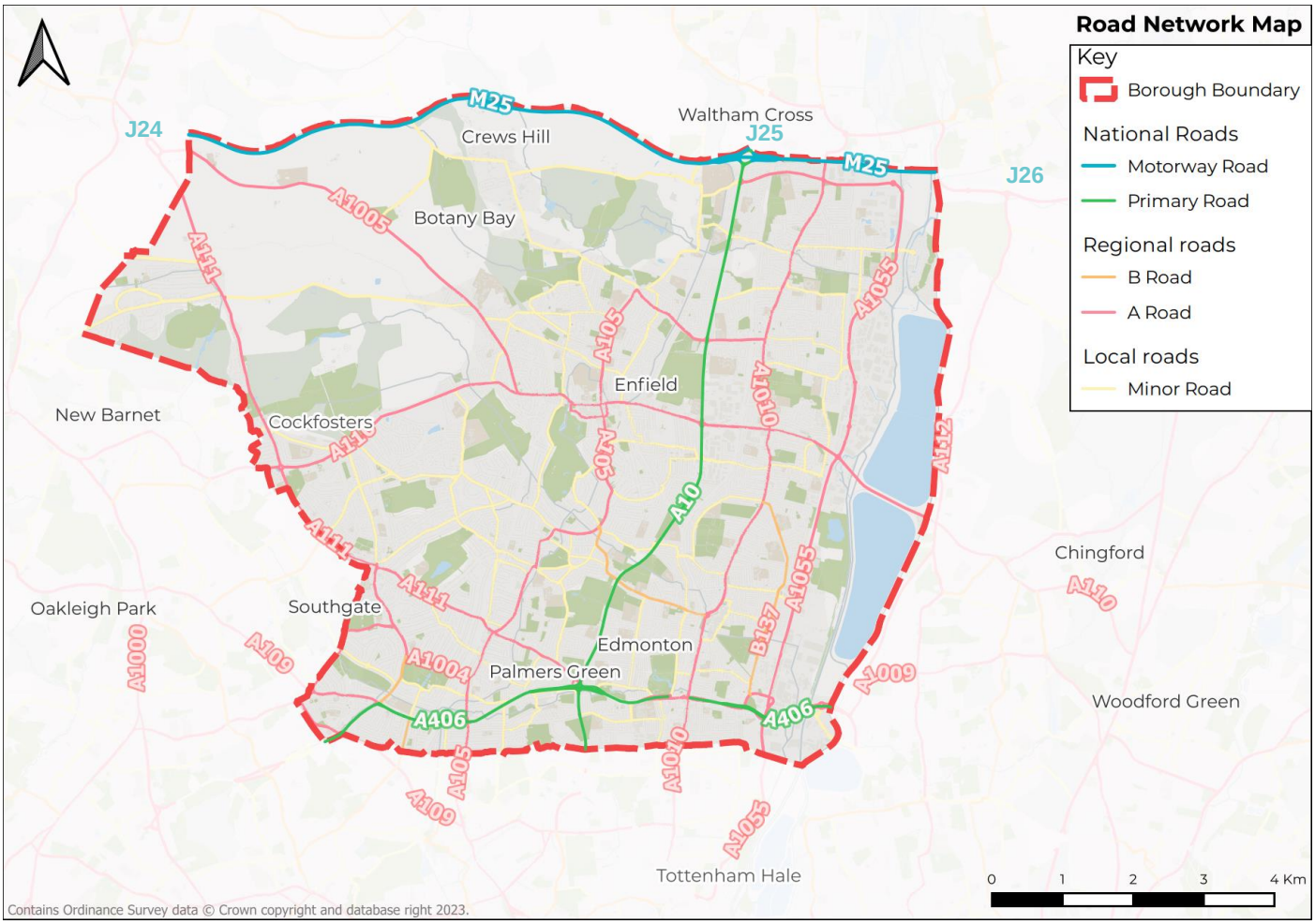

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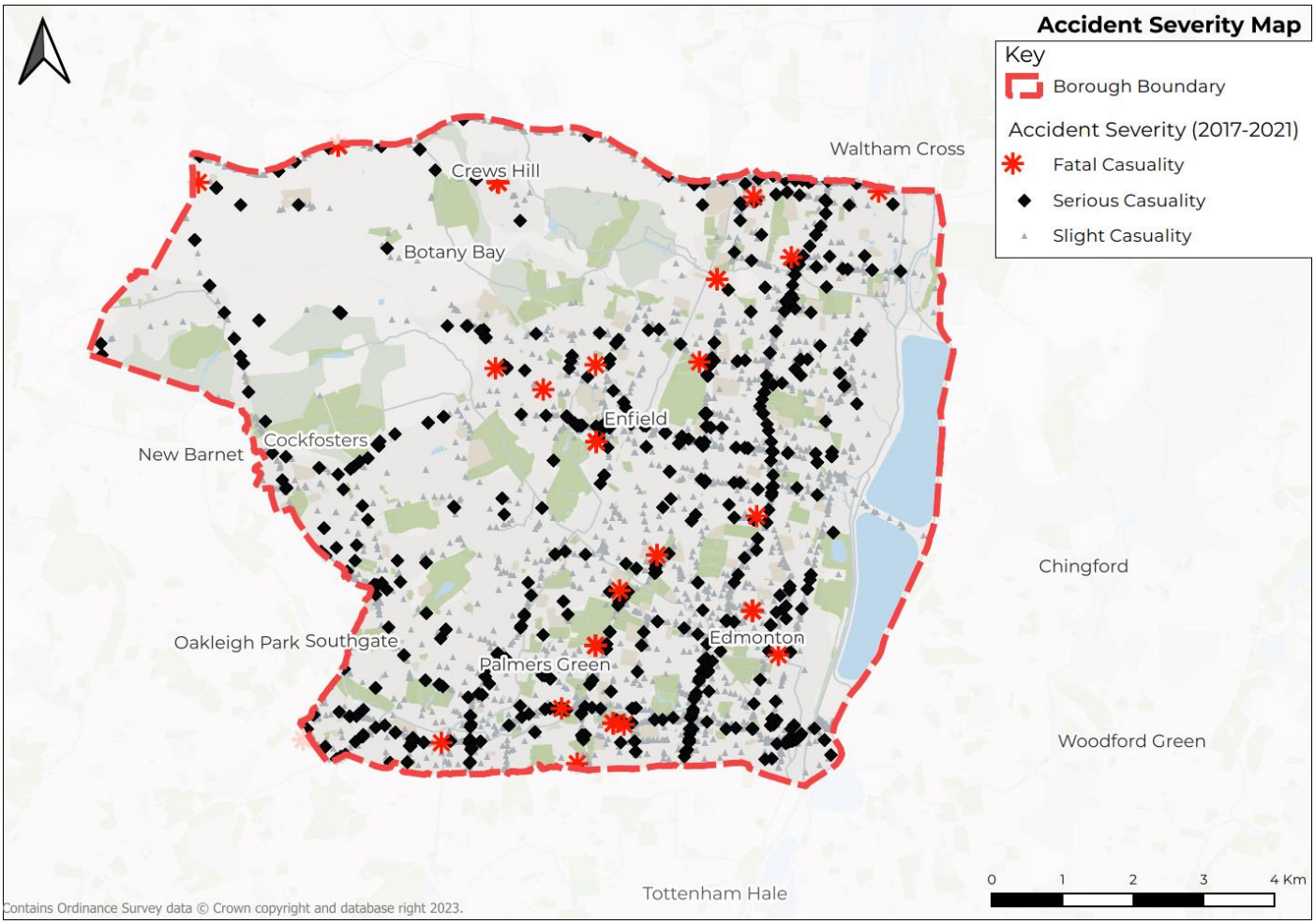
Figure 2-7 Road collision severity (2017-2021 data)



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WALKING AND CYCLING

Spatial Accessibility

Figure 2-8 shows the distances that can be covered up to 20 minutes cycling from Enfield's local centres in Enfield. The local centres are identified in the London Plan Chapter 2 town centre network. Major centres such as Enfield town can have a functional catchment beyond the borough, attracting people to retail, office, civic, cultural, leisure and services offered by a range of sustainable travel. District centres, such as the other ones identified in Enfield, support the local communities providing access to amenities.

The local centres are located around the south/centre of the borough, which also means than most of the northern area of the borough is further away than 20 minutes walking from local centres. Proximity to a local centre is an indicator of the opportunity to foster walking travel for daily needs.

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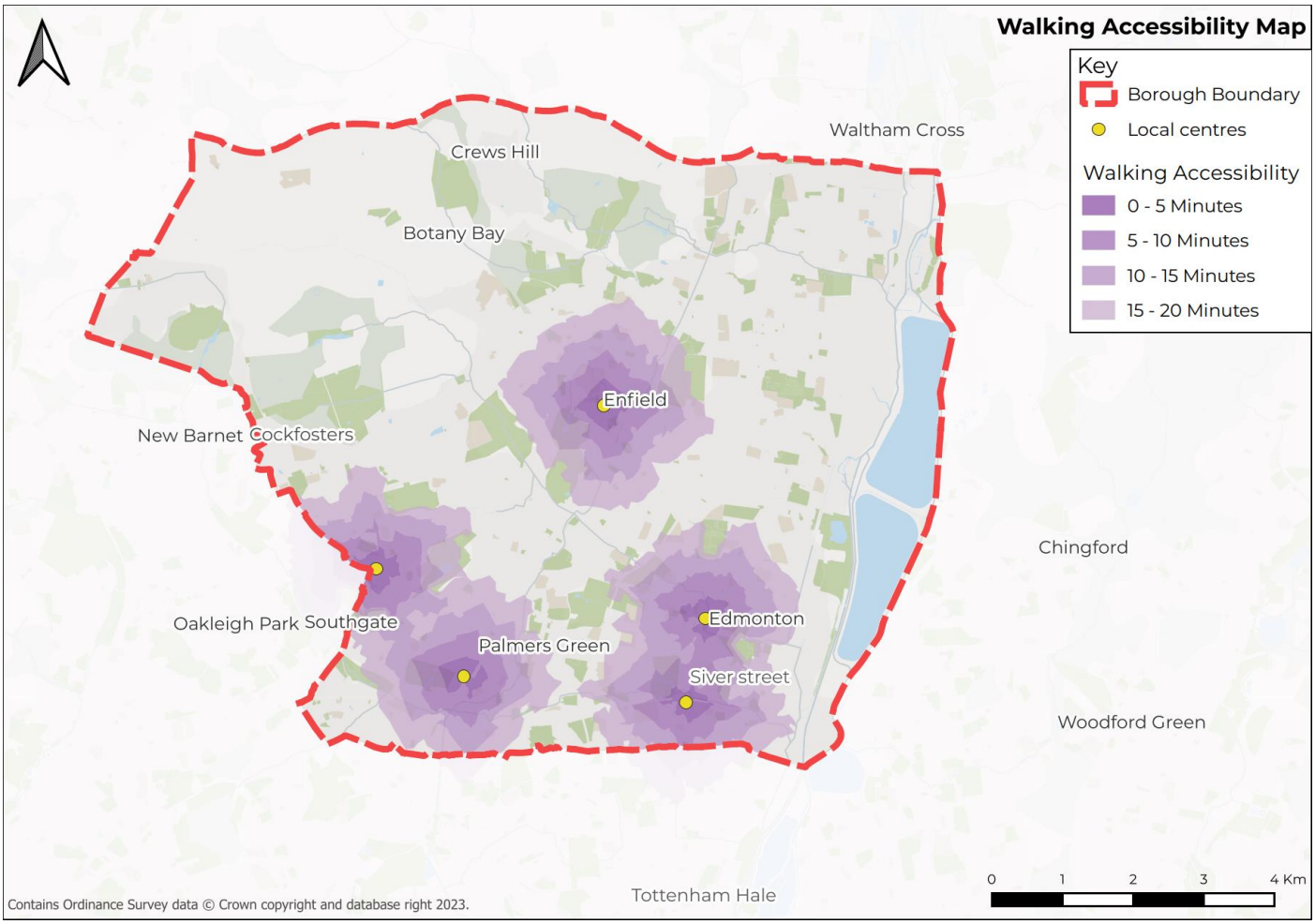
Figure 2-8 Enfield's Local Centres Walking Accessibilty



Cycling

Enfield's cycle accessibility is relatively good compared to other Outer London boroughs.

Figure 2-9 shows the extent of Enfield's cycling provision. In 2014 Enfield was one of three London Boroughs awarded £100M to deliver cycle improvements.

There are two routes that pass through the extent of the borough from North to South and these are both located in the centre-east of borough.

In comparison the western side of Enfield has less cycle infrastructure provision. Aside from a 1.7km route in Hadley Wood, the north-west of the borough including Crews Hill is served by leisure walking and cycling routes off track (London Loop).

There are plans to further extend and connect this network across the whole Borough in the future.

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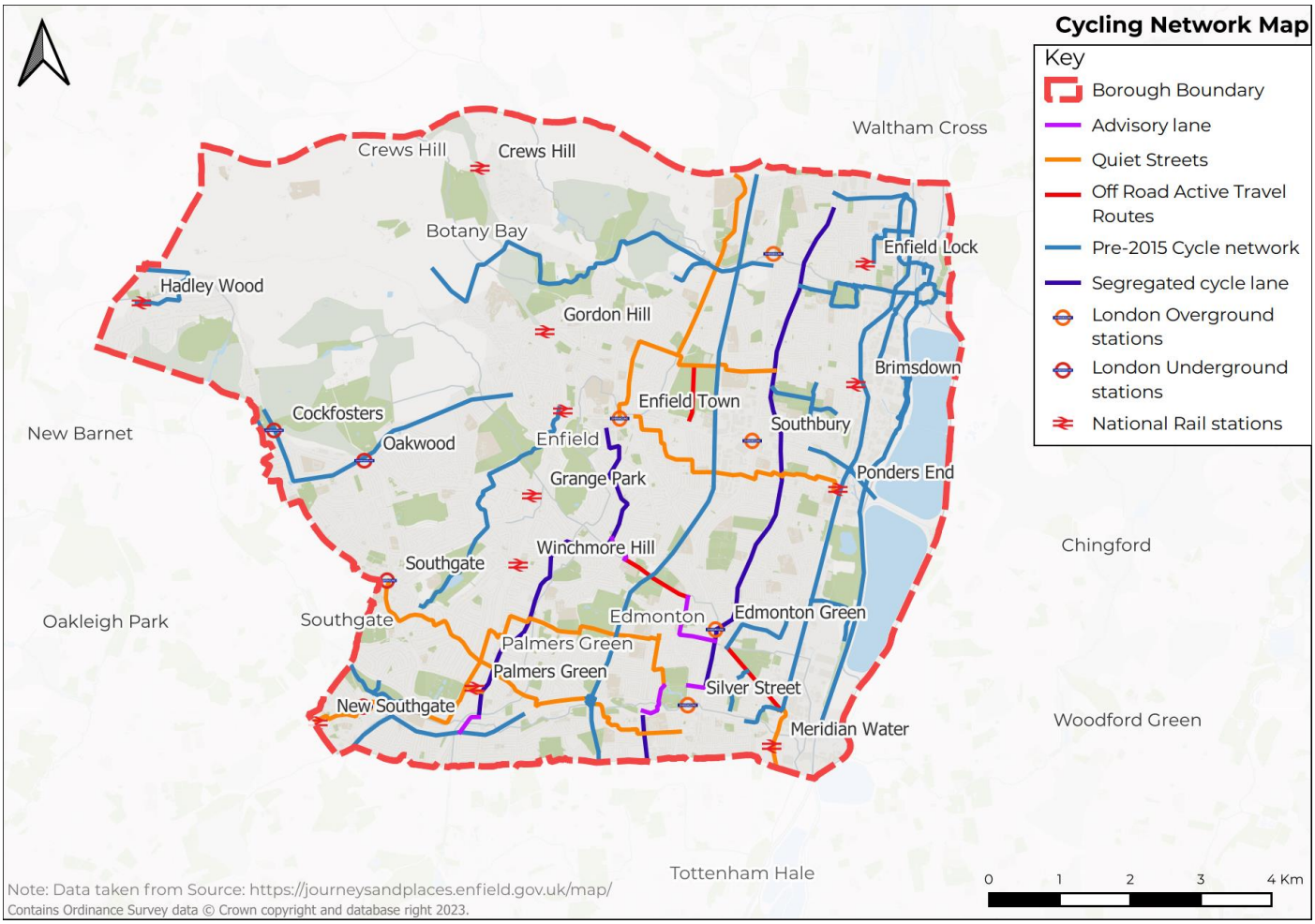
Figure 2-9 - Enfield's Cycle Network



Cycling Accessibility

Figure 2-10 shows the distances that can be covered up to 20 minutes cycling from Enfield's local centres. As is shown in the map, the majority of the south and centre of the borough can be accessed within a 5-10 minute cycle, while much of the eastern side of the borough can be reached within 20 minutes.

Gaps in cycling accessibility are evident in the north-western extent of the borough, where the greenbelt is currently located, and just south of the M25 by Crews Hill station.

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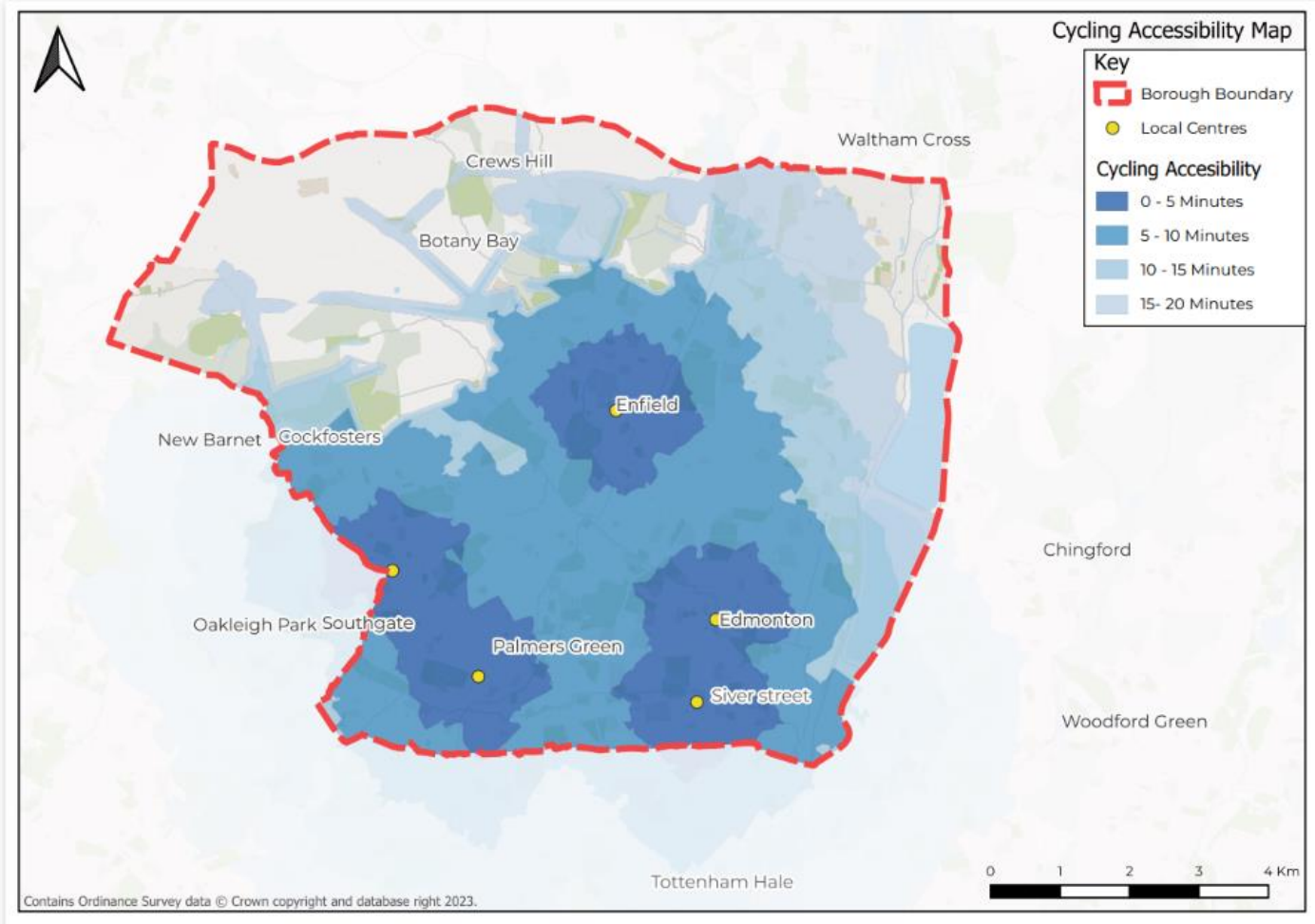
Figure 2-10 - Map of Enfield's Cycling Accessibility



3 FUTURE PLANNED PROVISION

FUTURE PLANNED PROVISION

The transport environment is in constant state of change, even as this document was being prepared planned schemes became operational, these are:

- ULEZ (Ultra Low Emission Zone) expansion to all boroughs implemented as off 29 August 2023 to improve air quality.
- A new bus Superloop programme of express orbital London links, the SL1 route between North Finchley and Walthamstow Central will link New Southgate, Arnos Grove and Silver Street in Enfield, as off July 2023.

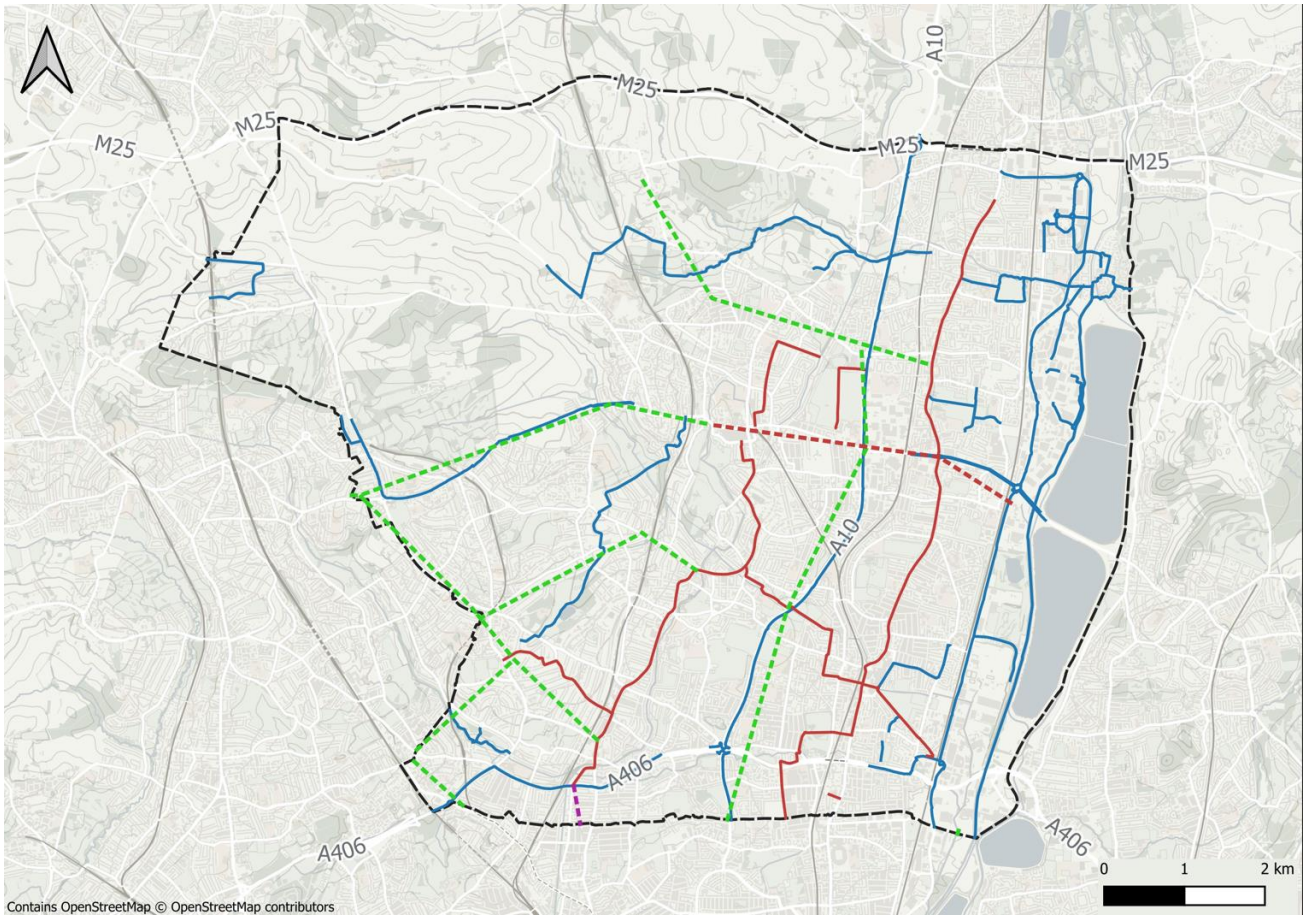
National Highways have recently upgraded J25 of the M25 (completed September 2022), in the 5-year Delivery Plan 2020-2025 there are no future upgrades of the strategic road network (SRN) within, or in proximity of, LB Enfield.

The GLA and TfL have made the following commitments within/in proximity of Enfield:

- Piccadilly Line frequency upgrades to 27 train per hour in the peak from mid-2027.
- New 94 Tube trains (Siemens Mobility) for London Underground to replace the 1970s-built Piccadilly line fleet from 2025.
- Arnos Grove is being considered for step free access. Great Northern have applied for funding to make Enfield Chase and Gordon Hill step free.
- Wildflower road verges programme, in Enfield along the A10 Great Cambridge Road.
- Enable and support London's sustainable growth and development through improved bus services and journey experience. (TfL Bus Action Plan)
- To support walking as mode of transport in Outer London by identifying opportunities for new walking trips, improving access to town centres and transport interchanges, and reducing the impact of traffic on local streets and increase walking to school. (TfL Walking Action Plan)
- .
- A commitment to develop and promote the tools that support London boroughs in the planning of balanced outcomes, maximising efficient use of road space such as through supporting the Low Traffic Neighbourhood and 20mph road programmes. (TfL Cycle Action Plan)
- To continue to safeguard the Crossrail 2 corridor, following the decision to stop the design development in October 2020, until such a time the railway can be progressed. Crossrail 2

runs along the West Anglia Main Line branch and New Southgate branch serving the Meridian Water, Ponders End, Brimsdown and Enfield Lock stations.

Figure 3-1 Potential Cycle corridors (source: TfL Cycle Action Plan)



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TfL is committed to work with Outer London boroughs to plan new cycle routes focused on town centres and deliver on the objective of 70 per cent of Londoners living within 400m of a cycle route by 2030. TfL Cycle Action Plan and strategic cycle analyses show that future cycle routes priorities are include the A110, A105, A111 and A10.

Enfield Council and TfL have agreed a comprehensive package of interventions that will improve bus capacity and connectivity to support the homes and jobs planned at Meridian Water (TfL Bus Action Plan). These include:

- Expanding the bus network so it connects the site to local rail stations, increasing the number of destinations.
- Establishing a central public transport and active travel spine.
- Ensuring high-quality bus priority remains at the heart of the development.
- Restructuring and simplifying local bus routes to integrate the site with neighbouring communities and town centres.
- Redirecting local bus routes away from the A406, which offers a poor walking and waiting environment for bus customers.

Through the Local Implementation Plan (LIP) Programme TfL works with the local authorities to deliver transport schemes, with the objective to meet the Mayor Transport Strategy and London Plan objectives. Currently, LBE receives circa £1.2M per annum plus additional discretionary funding for cycle network development and bus priority, however funding remains a constraint and Enfield will seek additional funding where possible for measures that comply with our transport strategy and Infrastructure Delivery Plan list of schemes.

4 CONSTRAINTS AND GAPS IN PROVISION

Taking into consideration the current transport network provision, and the future commitments considerations are made with regards to constraints and gaps in provision based on general network coverage in relation to planned growth and capacity of the network to accommodate the planned growth.

The network capacity testing was carried out via modelling, as introduced earlier in the document. The capacity test covered the forecast demand modelling (MoTioN), the highway network (LoHAM model) and the public transport network (Railplan model). Outputs from the transport model can be found within the Local Plan Transport Assessment published under a separate cover.

The constraints and gaps have been identified by ways of comparison between the “Local Plan” growth scenario and the “Future Baseline”. The Local Plan growth scenario include the projection stated in the table below.

Table 4-1 Enfield Growth (Local Plan and beyond)

Growth type	Quanta
Housing (number of units)	25,044
Jobs (number of)	28,721
Retail (sqm)	64,145
Retail jobs* (number of)	3,665
**Estimated using Employment Density Assumptions (GLA, 2016)*	

The spatial distribution of the Local Plan growth is illustrated in Figure 5-1 and 5-2, for housing and employment respectively, on the basis of the traffic model zones.

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Figure 4-1 Local Plan housing growth map

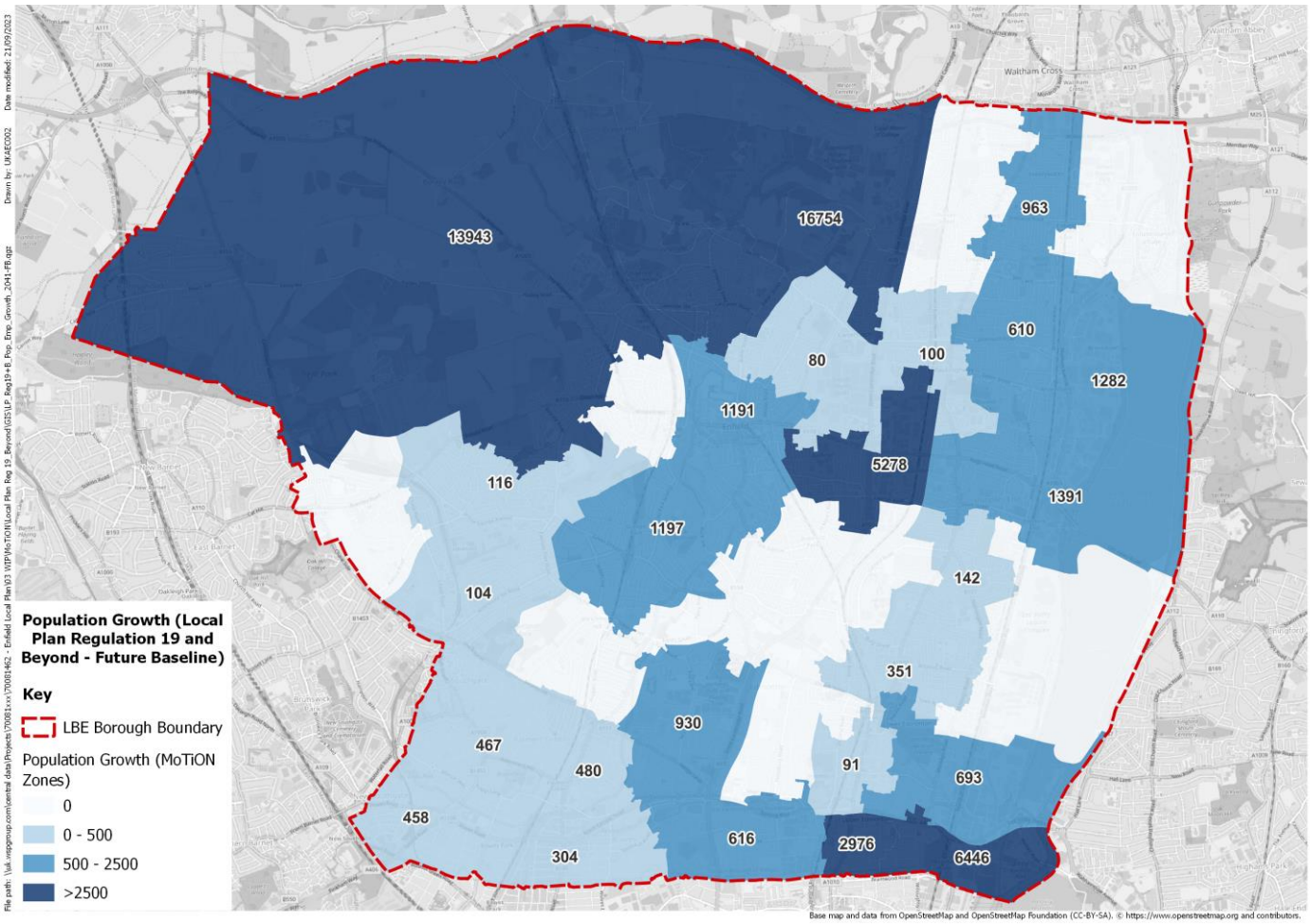

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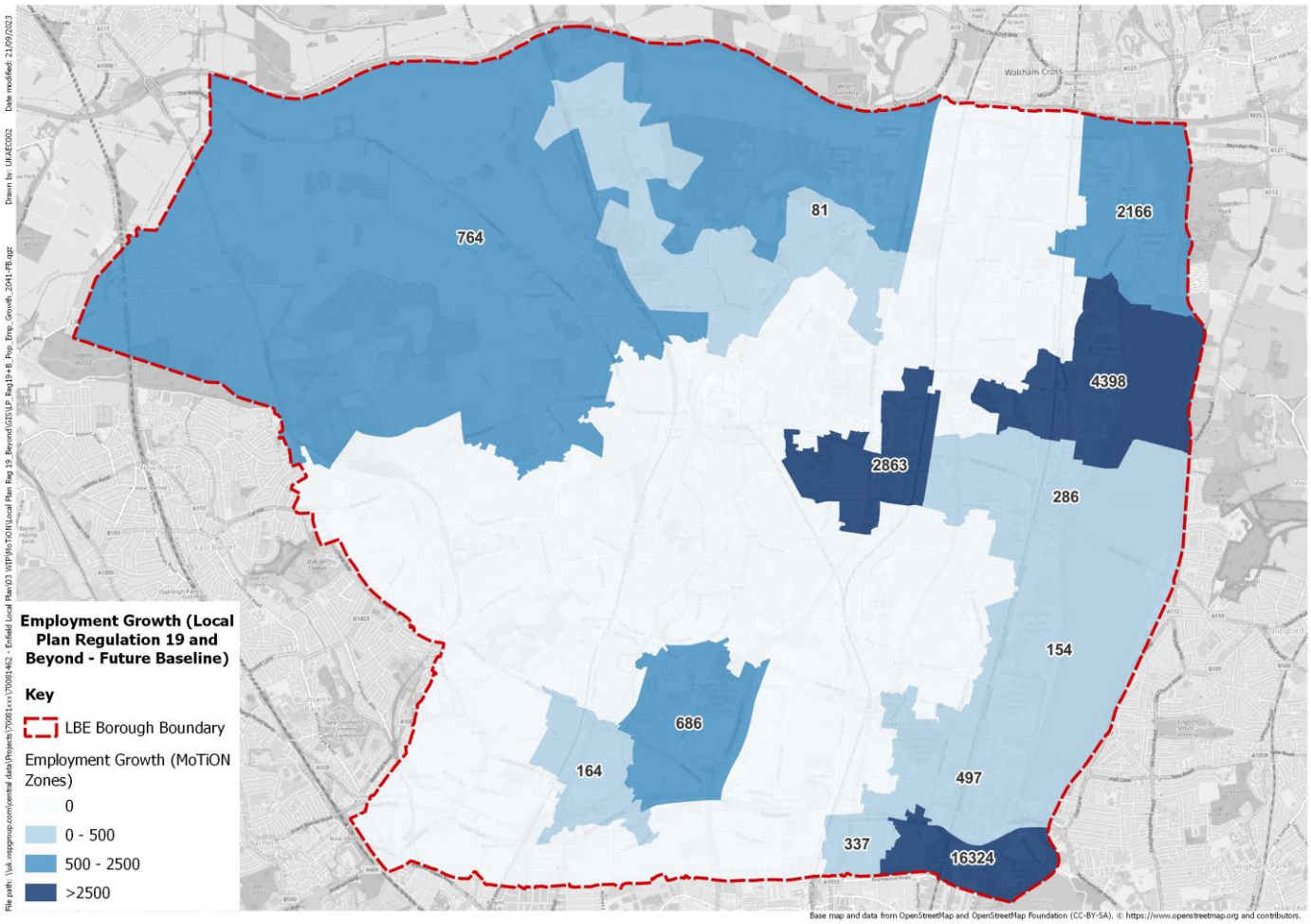
Figure 4-2 Local Plan employment growth map



MODAL SHIFT

The MoTioN model predicts daily multi-modal demand across Enfield based on land use quanta and socio-economic parameters, the model embeds the London Plan 2021 and Mayor's Transport Strategy targets and objectives including modal shift towards sustainable travel as noted in Table 4-2 below. MoTioN indicates the proposed Local Plan growth would likely result in:

- An overall increase of c16% daily travel across all modes compared to the future baseline.
- Similar mode shares maintained between the Future Baseline and the Local Plan scenario.
- Active travel modes increase accounts for c30% of the overall increase, and the public transport modes account for c25%

Table 4-2 Enfield daily travel demand forecast (MoTioN model)

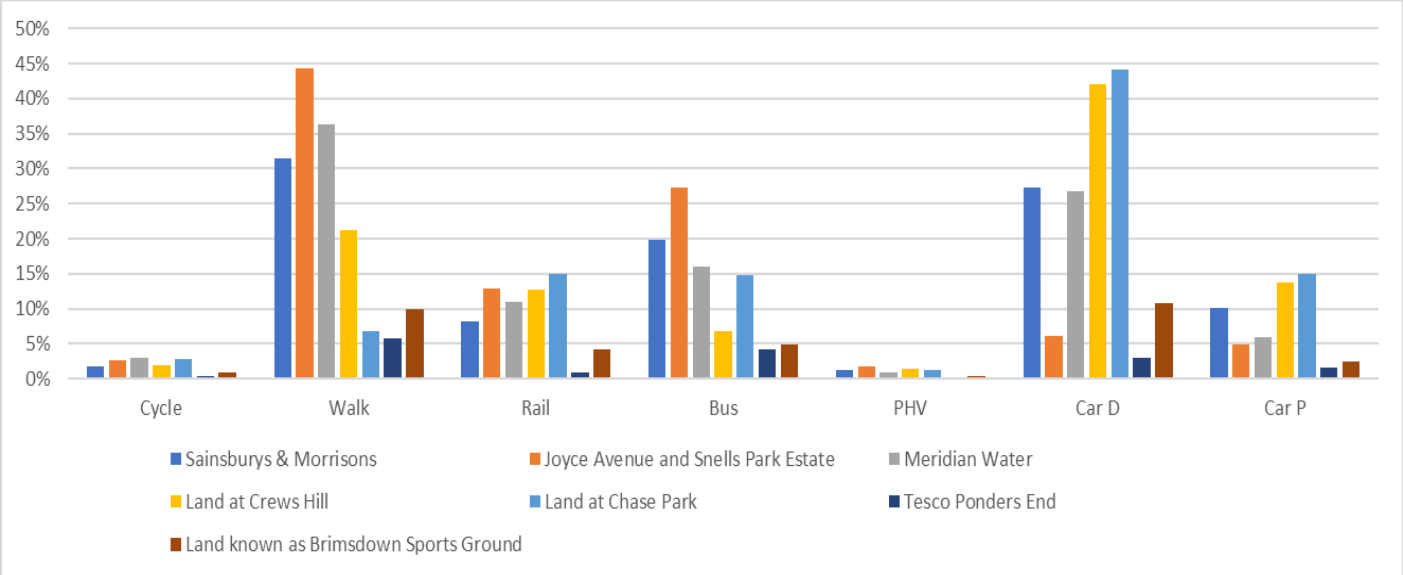
	LBE Future Baseline 2041 (It7)		LBE Local Plan 2041 (It7)	
	Demand (trips)	Mode Share	Demand (trips)	Change % (Local Plan vs Future Baseline)
Cycle	15,081	2%	18,294	21%
Walk	211,640	26%	246,631	17%
Rail	86,156	11%	97,701	13%
Bus	131,063	16%	151,652	16%
PHV	11,164	1%	12,840	15%
Car D	250,715	31%	291,455	16%
Car P	100,081	12%	113,698	21%
Total	**805,900**	**100%**	**932,271**	**16%**

The London wide GLA objective of 80 per cent travel by sustainable modes is ambitious and will require both infrastructure and behavioural change to be realised. The London Travel Demand Survey (LTDS 13) 2017-20 reports Enfield's sustainable travel (similarly aligned to MoTioNs' model predictions) to account for 54.9% of the mode share, whilst London wide sustainable travel accounts for 65.6%.

In line with the policy framework, measures will be required to support and achieve model shift of c25% towards sustainable modes in the next 20 years, including:

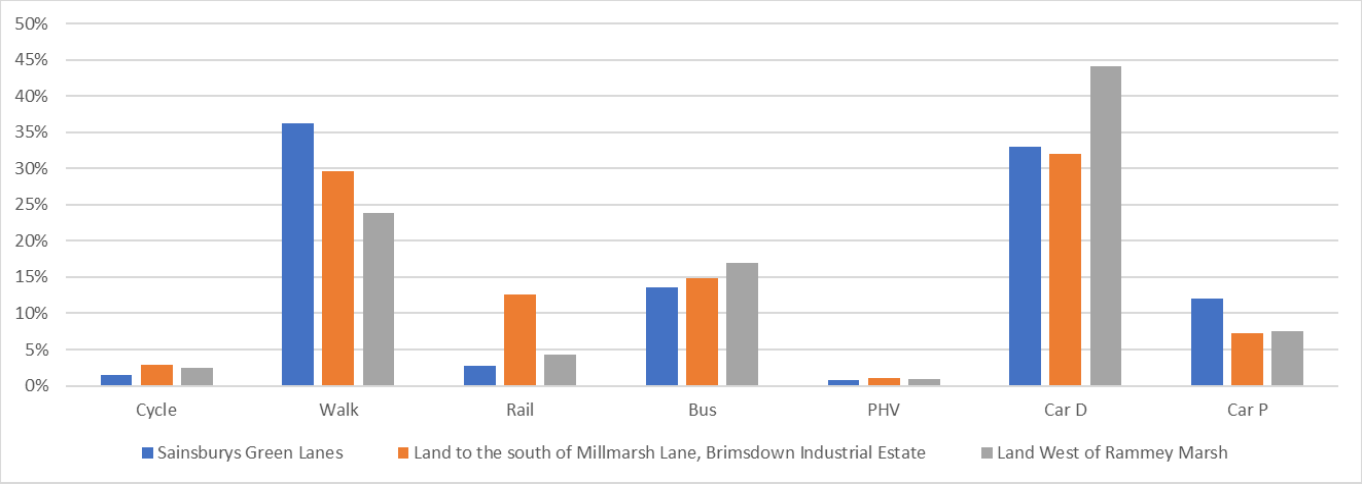
- Promoting and improving public transport services.
- Promoting and improving walking and cycling networks.
- Promoting the benefits of active travel.
- Limit car ownership in new developments and areas of good and excellent public transport accessibility.

Figure 4-3 Enfield housing led site allocations with 500+ units multi-modal travel forecast (MoTioN model)



Within the Local Plan growth key contributors with potential to modal shift are the main site allocations, in the Figure 4-3 and Figure 4-4 are presented the forecast multi-modal travel for the housing led sites with over 500 new units and the key employment sites.

Figure 4-4 Enfield key employment site allocations multi-modal travel forecast (MoTioN model)



ACTIVE TRAVEL

The Mayor Transport Strategy indicates that modal shift to sustainable travel can be achieved by realising the cycle potential, this includes *extending the cycle network to within 400 meters of 70 per cent of Londoners*.

Currently the cycle network in Enfield serves some important routes (A1010, A105) however the areas of significant Local Plan growth are not all served by consistent standard of cycle infrastructure. Key growth areas around Meridian Water, Chase Park and Crews Hill will require upgrade of cycle provision or new cycle infrastructure to realise their modal shift potential, as identified by TfL's Cycling Action Plan 'Potential cycle corridors' reported in Figure 3-1:

- Theobald's Park Road and Clay Hill Road linking Crews Hill site allocation.
- A110 Enfield Road, Slade Hill, Southbury Road linking Chase Park site allocation, Enfield Town, Sainsbury's & Morrison's site allocations and Ponders End.
- A10 Great Cambridge Road north-south corridor.
- A1055 Meridian Way linking Meridian Water site allocation.

As well as good quality routes, cycle parking infrastructure will need to be strengthened at transport hubs, local centres and key leisure and services destinations and provision of cycle facilities promoted on employment site allocations.

Similarly, the walking potential of these significant areas of growth relies on a good quality infrastructure as well as nearby destinations (transport stations, stops, services and amenities) to be realised. Currently the areas of significant growth are located far from existing local centres, as indicated by Figure 3-8, however the major site allocations provide sufficient density to justify the creation of new local centres by providing complementary land uses and services on site. The mix of land uses will create opportunities for short walkable journeys or linked walking trips within the new major sites and nearby areas.

The need for mix land uses to drive sustainable development, including transport, is reflected in the site allocations which refer to “provision of flexible mix of uses to include retail and community” and new transport links. Linkages to surrounding areas for active modes will need to be realised to deliver safe and suitable network for walking, for example through the TfL LIP programme and/or via development contributions.

STRATEGIC ROAD NETWORK

The M25 runs along the northern boundary of LB Enfield, the nearest junctions linking the borough network are Junction 24 (west) and J25 (east).

Junction 24 (known as Potters Bar Interchange) is a grade separated part signalled roundabout, the M25 main carriageway dives under the roundabout which links the merge/diverges with local roads:

- A north approach from Potters Barn (A111 Southgate Road) a single carriageway one lane per direction road forming a give way with J24.
- The Ridgeway (south) a single carriageway one lane per direction road forming a give way with J24; and
- The A111 Stag Hill (south) a single carriageway one lane per direction road forming a give way with J24.

The circulatory capacity is 2 lanes, the only signalled arm is the eastbound diverge from the M25 which is c250m long and features two lanes. The junction does not provide pedestrian or cycle infrastructure.

Junction 25, located c5 miles east of Potters Bar Interchange, is a grade separated signalled roundabout. J25 (Waltham Cross Interchange) was recently upgraded by National Highways. The roundabout links the merge/diverge with the A10 Great Cambridge Road north and south of the M25. The A10 is a dual carriageway three lanes per direction road. The circulatory capacity is three lanes between the eastbound diverge and the A10 south approach, two lanes in the remaining sections. The junction also features pedestrian and cycle facilities, although it is not a pleasant experience for cyclists or pedestrians.

Following on a summary of the SRN junction performance is presented in Table 4-3.

Table 4-3 M25 Junction 24 and 25 LoHAM model assessment summary

Scenario	AM peak	PM peak
Junction 24 Base year	The M25 carries between 5,800 and 6,500 pcu's[13] per direction. The merge and diverge lane west of junction carry 730 pcu's each whilst the one to the east are the most and least busy with the westbound diverge carrying 990 pcu's and the eastbound merge 460 pcu's. The circulatory lanes are most at pressure between the westbound diverge east of the junction and the approach to/from Southgate Road (Potters Barn). The eastbound diverge west of the junction and the southbound along the A111 Stag Hill are over capacity. The eastbound diverge modelling also indicates long queues.	The M25 carries between 5,200 and 6,700 pcu's per direction. The merge and diverge lane north of junction carry between 670-770 pcu's each. The diverge south of the junction is the least busy with 470 pcu's and the eastbound merge is busier with 1,250 pcu's. The circulatory lanes are most at pressure between the Southgate Road (Petters Barn) approach and the M25 westbound direction merge. Similarly to the AM the diverge west of the junction and the southbound along the A111 Stag Hill are over capacity, as well as the Stag Hill northbound approach in the immediate vicinity of the junction. The eastbound diverge experiences queues.
Junction 24 Future baseline	Slight change in traffic flows, the main traffic movement through does not change. M25 westbound diverge, through the junction to Southgate Road is the busier section. Same capacity and delay pinch points, albeit values are changed slightly.	Slight change in traffic flows, the main traffic movement through does not change. From the Southgate Road approach to the M25 westbound merge is the busiest section. Capacity-wise similar results to the base, in addition the southbound approach to the junction from Southgate Road is over capacity as well as the westbound approach from The Ridgeway. The M25 main carriageway lanes in the westbound direction are also over capacity and the modelling indicates queuing.
Junction 24 Local Plan	As result of the Local Plan growth, along the main M25 carriageway increase in traffic flows are noticeable westbound c130 pcu's (east of the junction) and eastbound c85 pcu's (west of the junction).	The evening peak Local Plan scenario indicates a slight decrease to a no noticeable change in traffic flows along the main M25 carriageway.

[13] PCU is a Passenger Car Unit is a measure used primarily to assess highway capacity, for modelling purposes. Different vehicles are assigned different values, according to the space they take up.

	The additional highway trips reach the junction from the southern approaches Stag Hill (c120 pcu) and The Ridgeway (c140 pcu), the latter also indicates an increase of inbound trips (c 100pcu). Link delay increases are noticeable on the already at capacity links (M25 eastbound diverge, Stagg Hill).	The Ridgeway and Southgate Road, as well as the circulatory lanes show an increase of traffic between 70 and 150 pcu's per direction. Link delay increases are noticeable on the already at capacity links (M25 eastbound diverge, Stagg Hill).
Junction 25 Base year	The M25 carries between 4,700 and 6,500 pcu's per direction. The merge and diverge lane west of junction carry 680 to 770 pcu's each whilst the one to the east are the busiest with the westbound diverge carrying 1,860 pcu's and the eastbound merge 1,280 pcu's. The circulatory lanes are most at pressure between the A10 Great Cambridge Road north approach and the M25 westbound merge. The M25 westbound main carriageway lanes are at capacity, as well as the westbound diverge. The A10 north approach is over capacity northbound and southbound in the immediate proximity of the junction.	The M25 carries between 5,200 and 6,700 pcu's per direction. The merge and diverge lane west of junction carry 830 pcu's each whilst the one to the east are the busier with the westbound diverge carrying 1,260 pcu's and the eastbound merge 900 pcu's. The circulatory lanes are well used, and the capacity pinch points are noticeable at same location as in the morning scenario, as well as along the eastbound diverge and circulatory sections northbound between the A10 south and north approaches.
Junction 25 Future baseline	Slight change in traffic flows, the main traffic movement through does not change. The section between the A10 Great Cambridge Road north approach and the M25 westbound merge is the busiest. The A10 north approach is improved in the future baseline, the eastbound diverge performs slightly worse.	Slight change in traffic flows, the main traffic movement through does not change. The section between the A10 Great Cambridge Road north approach and the M25 westbound merge is the busiest. Same capacity and delay pinch points as in the base year, albeit values are changed slightly.
Junction 25 Local Plan	As result of the Local Plan growth, along the main M25 carriageway increase in traffic flows are noticeable westbound c150 pcu's (east of the junction) and along the A10 south approach in a southbound direction an increase of c85 pcu's. An increase in delay is noticeable at the A10 approaches in the immediate vicinity of the junction and along the M25 westbound diverge.	In the evening peak very similar levels of traffic are noted across J25 compared to the future baseline, with the major increase being the eastbound main carriageway of 78 pcu's. Same capacity and delay pinch points as in the future baseline scenario, albeit values are changed slightly.

TRANSPORT FOR LONDON ROAD NETWORK (TLRN)

TfL is responsible for managing the Transport for London Road Network and are responsible for the maintenance, management and operation of London's traffic signals. The A10 and A406 are part of the TLRN, and cater for significant Enfield as well as longer journey travel and freight.

The LoHAM model indicates that the Future Baseline is likely to be affected by congestion and delay to a similar degree as the base year. The table 5-3 below indicates TLRN link approaches with capacity over 90 per cent in the Future Baseline. The Table 5-4 indicates the additional capacity issues likely to arise due to the Local Plan growth.

Table 4-4 LoHAM Future Baseline base link Volume over Capacity (90% plus) Peak hours

Road link	AM	PM
A10 southbound between Turkey Street and Hoe Ln	✓	
A10 junction with Carterhatch Ln various approaches	✓	✓
A10 junction with Lincoln Rd various approaches	✓	✓
A406 between A1055 and A1009	✓	✓
A406 junction with A10 various approaches	✓	✓
A406 westbound approach and northbound turn into A1010	✓	
A406 junction to A105 various approaches including A111 Hedge Ln between A406 and A105	✓	✓
A406 junction with Powys Ln various approaches	✓	✓
A406 junction with A110 and Wilmer Way various approaches	✓	✓
A406 junction with A109 various approaches	✓	✓

Table 4-5 LoHAM Local Plan base link Volume over Capacity (90% plus) Peak hours

Road link	AM	PM
A10 junction with A110 Southbury	✓	✓
A10 junction with Church Street	✓	✓
A406 between A1055 and A1009 and approaches	✓	✓

Both the A406 and A10 experience high volume of daily traffic, and high volume of traffic collisions. TfL should continue to explore opportunities with Enfield to improve the A10 and A406 corridors and maintain a fit for purpose TLRN network, safe and adequate to cater for the future demand.

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RAILWAYS, TFL LONDON UNDERGROUND AND OVERGROUND

The Railplan public transport model was used to benchmark constraints on the public transport rail, LU and LO network, two indicators were considered: line crowding and station capacity.

The crowding model considers peak period from 0700hrs to 1000 hrs (morning peak) and from 1600hrs to1900hrs (evening peak). The rail network shows minimal change and no constraints on the line capacity, with only the following being observed which are within acceptable operating capacity:

- In the morning peak period crowding change from “no passenger standing” to “1-2 passenger standing/sqm” seen at Grange Park to Winchmore Hill and Bush Hill Park to Edmonton Green.
- In the evening peak period crowding change from “no passenger standing” to “1-2 passenger standing/sqm” seen at Winchmore Hill to Grange Park; crowding change from “1-2 passenger standing/sqm” to “2-3 passenger standing/sqm” at Seven Sisters to Bruce Grove and White Hart Lane.

Figure 4-5 Rail, Lu and LO Future Baseline AM crowding level (source: Railplan)

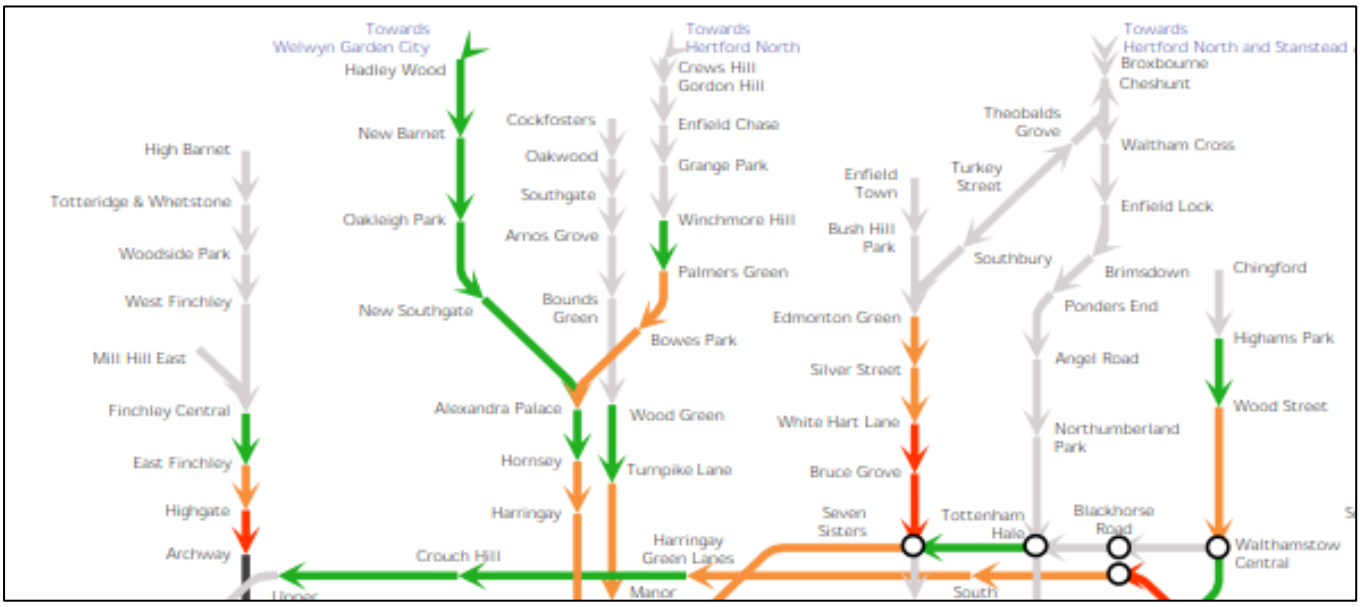

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Figure 4-7 Rail, Lu and LO Local Plan AM crowding level (source: Railplan)

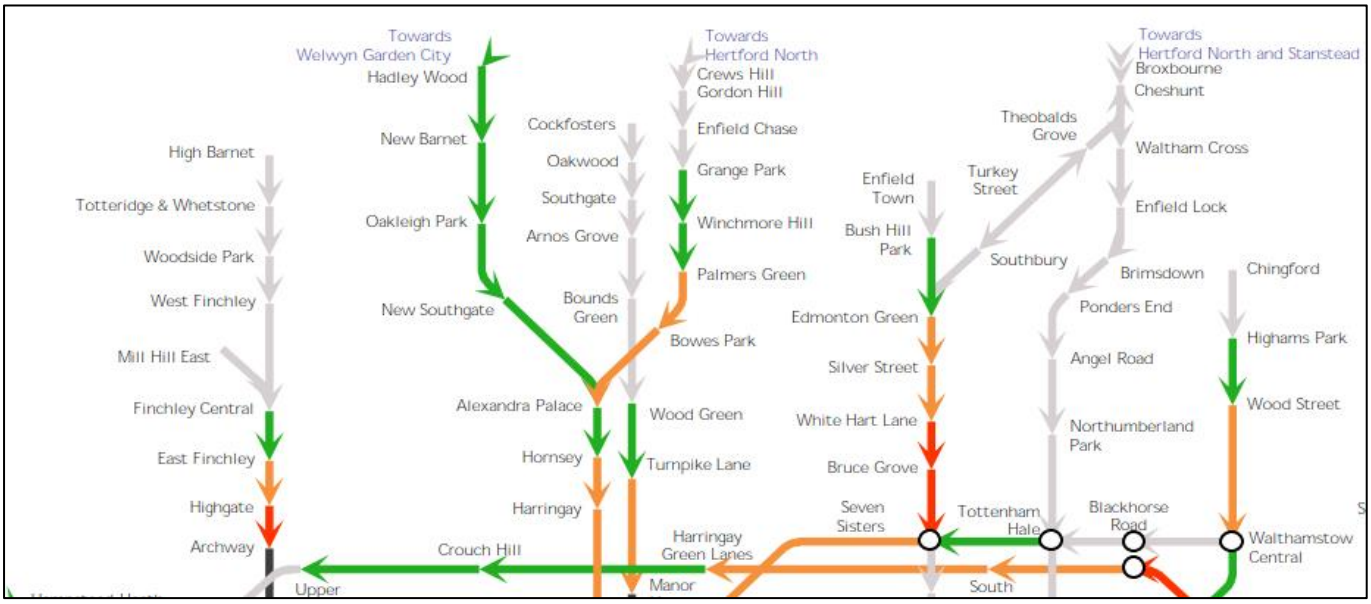

Figure 4-6 Rail, Lu and LO Future Baseline PM crowding level (source: Railplan)

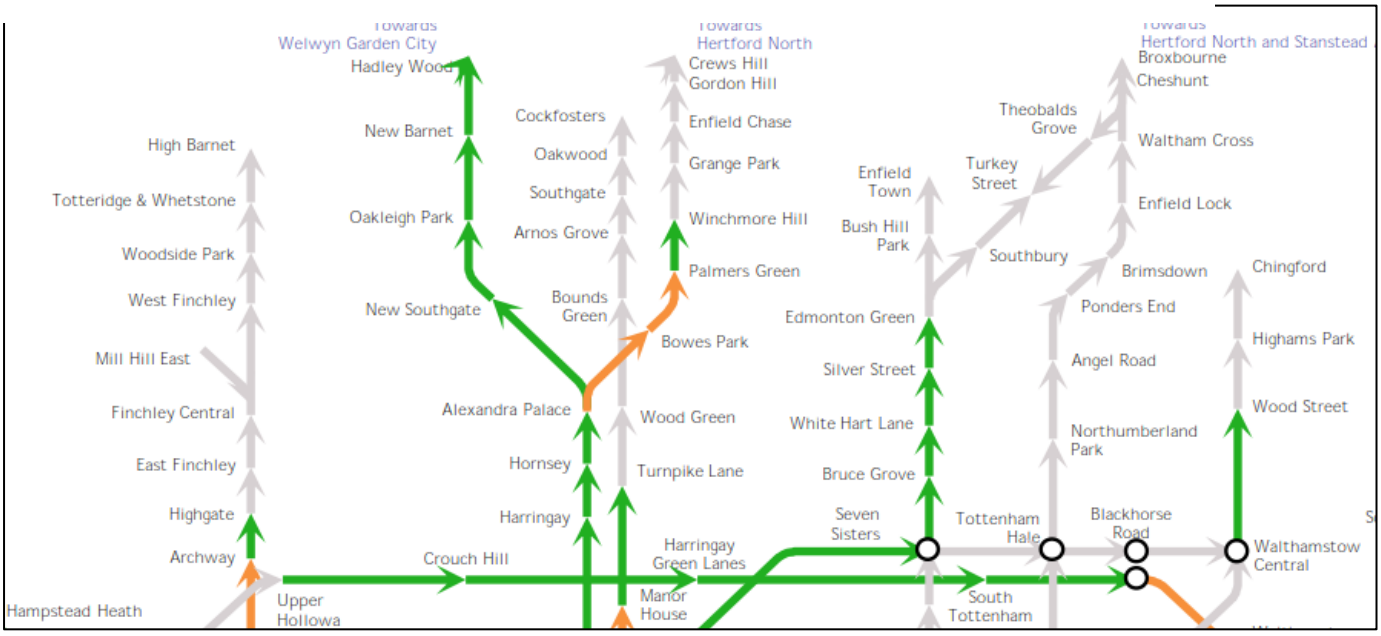

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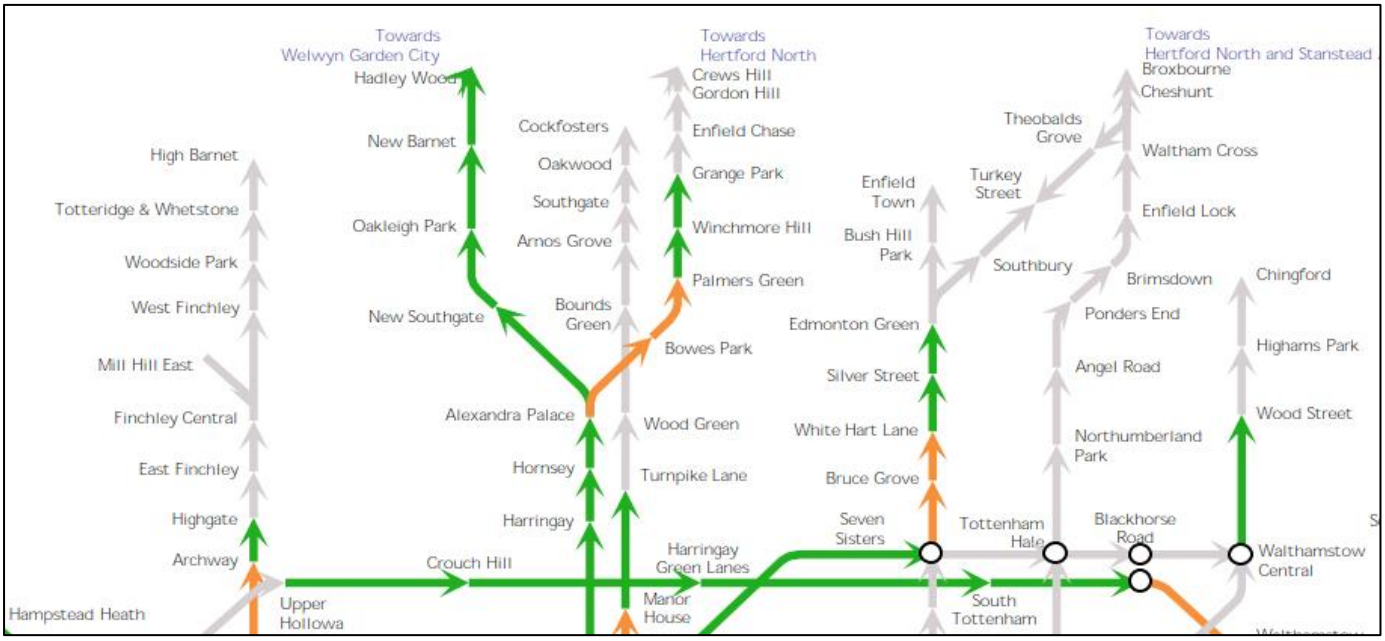
Figure 4-8 Rail, Lu and LO Local Plan PM crowding level (source: Railplan)



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BUSES

Changes in bus patronage have also been assessed using Railplan. The model predicts significant increases in bus demand, some of which in areas that have excellent bus frequency already, such as Enfield Town, the A1010 and the A406. The Figures 5-9 and 5-10 following on demonstrate the change in bus demand in the morning and evening peak period.

Figure 4-9 Bus patronage changes AM (source: Railplan)

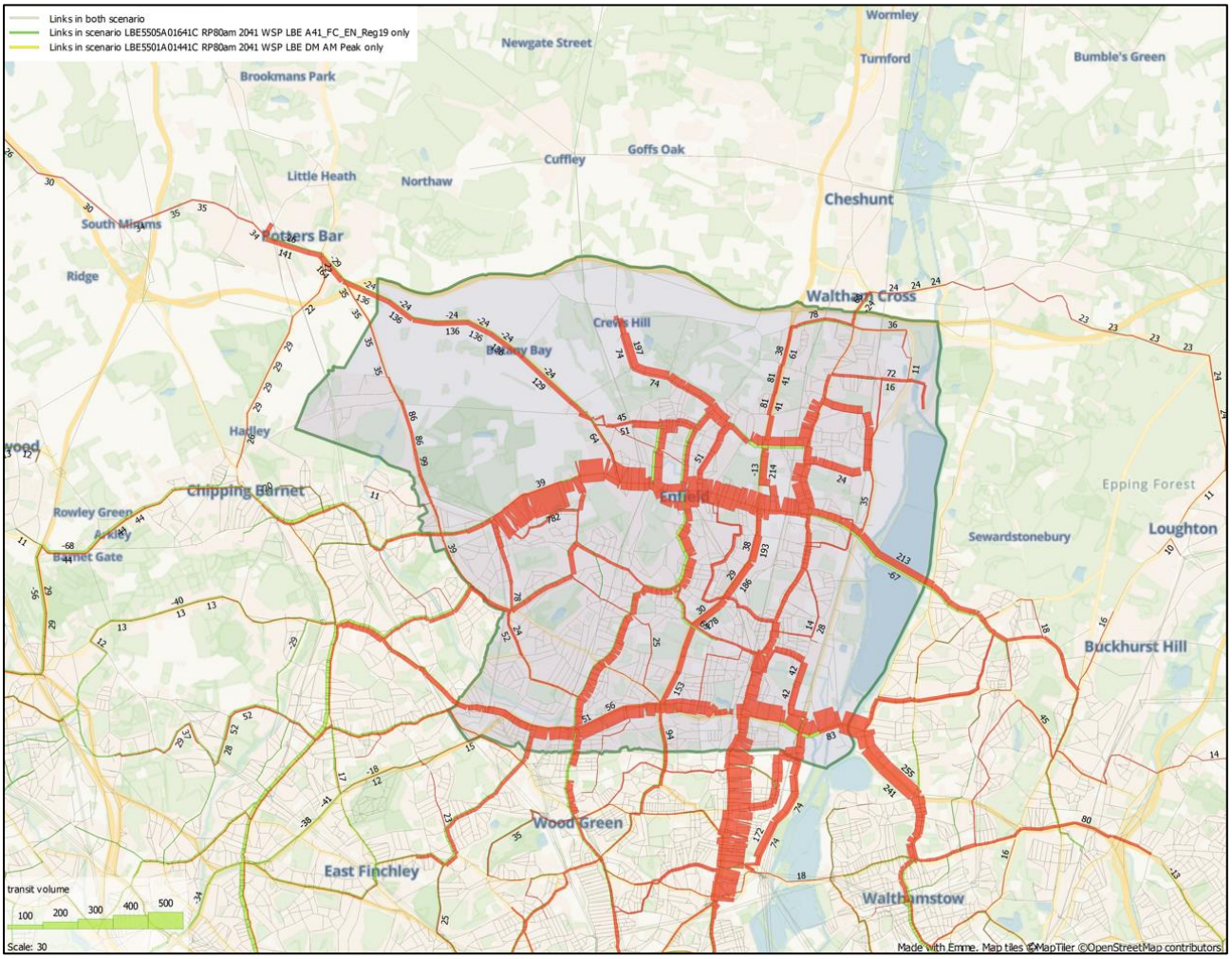

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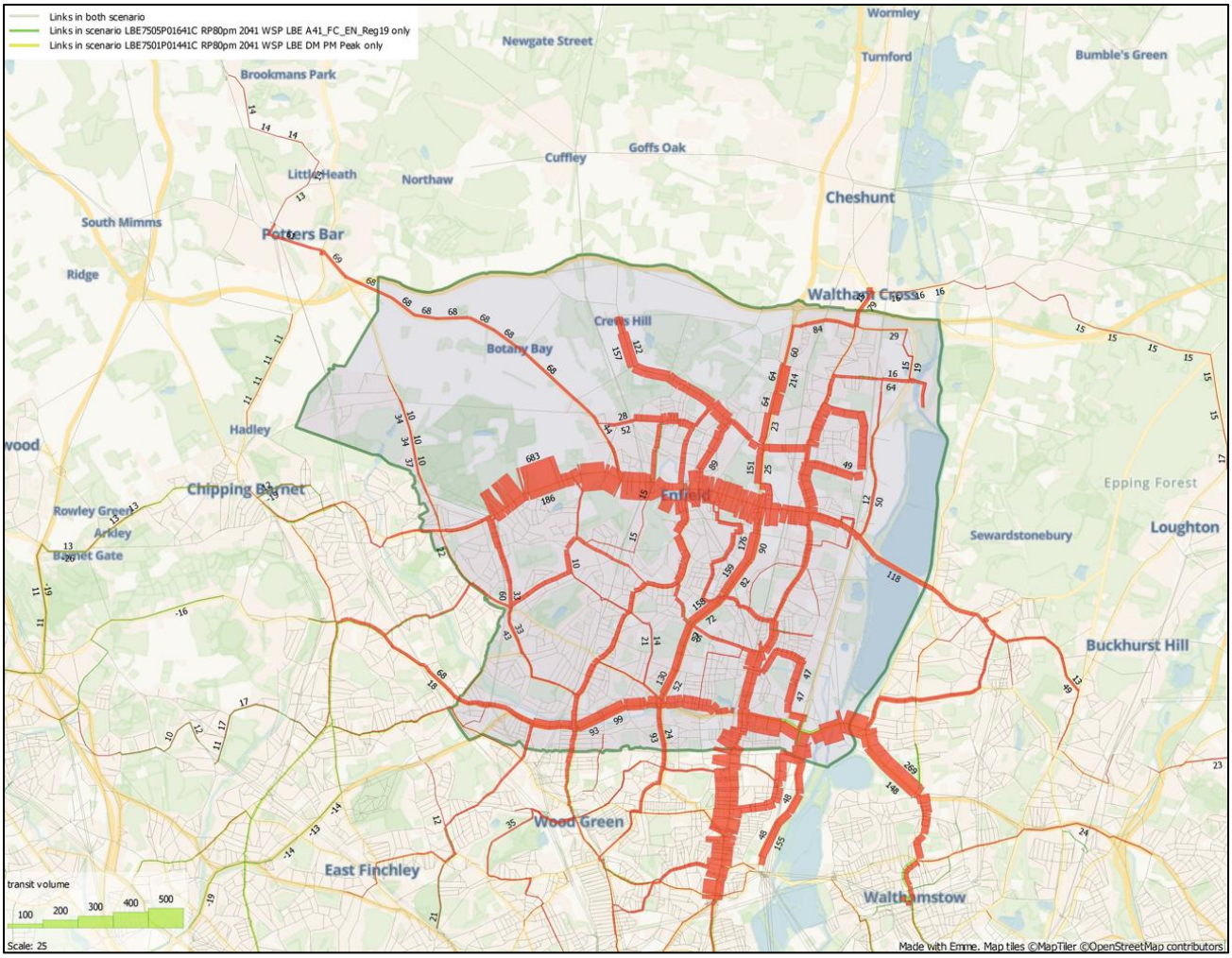
Figure 4-10 Bus patronage changes PM (source: Railplan)



As a result of the Local Plan several bus services are at risk of becoming overcrowded, these include route 313 (westbound) in the evening period, and in the morning period:

- Route 491 northbound
- Route 191 southbound
- Route 313 wetsbound (already over capacity in Future Baseline)

- Route 192 southbound
- Route 307 westbound

TfL regularly monitors the performance of buses, including their usage, speed and reliability. The Local Plan increases in both traffic flows, contributing to network congestion and delay, and bus patronage is a contributing factor to bus performance.

In line with London Plan and Mayor's Transport Strategy buses play an important role in achieving the 80 per cent travel by sustainable modes. Whilst increased bus capacity will account for future patronage, a reliable service is key to delivering a great bus experience and competitive journey times.

To tackle the constraint in bus capacity therefore as well as opportunities to improve serve frequency and capacity it will be important that Enfield and TfL work jointly on managing road space on the following corridors aiming to deliver reliable bus services as one of the objectives:

- The A110 between the A111 to the west and the A1010 to the east.
- The A1010 between Edmonton and south of the A406.

Alternatives to this could be fare re-structuring to make the north-south LO and rail links forecast to have capacity a more attractive alternative to buses along the A1010.

In addition to the above it is clear from Figure 3-4 that night time and 24 hour bus service coverage does not extend to service new major Enfield site allocations such as Chase Park, Crews Hill and in a limited capacity Meridian Water. Consideration should be given to extending night time bus services to achieve modal shift for existing and new passengers travelling at those times.

5 CONCLUSION

The London Plan (2021)[14] adopts an integrated approach for London's strategic economic, environmental, transport and social development over the next 20-25 years.

In terms of housing, the London Mayor, prioritises 'good growth' with an emphasis on building affordable homes. The GLA's recent 'Strategic Housing Market Assessment' shows that London requires approximately 66,000 additional homes a year. The London Plan has forecast the city to develop 520,000 homes over the next 10 years. Ten-year housing targets have been established for each London borough. The housing targets for each borough set out in the London Plan are the baseline target for planning for housing in London. Enfield has a 10-year housing target of 12,460 completed homes by 2028/29.

The Local Plan set a target for homes to be delivered over the next 20-plus years, in line with GLA targets and the Transport Assessment of the Local Plan growth has found the Enfield network is largely fit for purpose provided the Local Plan policies, Mayor Transport Strategy and NPPF sustainable transport objectives can be achieved.

To enable this, a constraint and gap analysis was carried out benchmarking the coverage, operation and capacity of the borough network to accommodate the Local Plan growth.

The TfL strategic modelling suite including a forecast demand model (MoTioN) and highway assignment model (LoHAM) and public transport model (Railplan) have been interrogated to ascertain the future capacity constraints and gaps in the transport network. The work carried out was assured by TfL and outputs shared and discussed with stakeholders (National Highways, Network Rail, adjoining local planning and highway authorities).

The transport network capacity to cope with the Local Plan demand has been benchmarked comparing the Future Baseline and Local Plan scenarios. Some constraints and gaps have been identified on the multi-modal transport network across all scenarios.

On balance the committed and planned future infrastructure and transport programmes described in this review, alongside the continued Council investment in sustainable transport initiatives such as new infrastructure, road safety, noise and air quality management and public transport improvements working alongside TfL and Network Rail will provide the basis to facilitate a modal shift and safe operation of the transport network, supporting the Local Plan growth.

[14] https://www.london.gov.uk/sites/default/files/the_london_plan_2021.pdf