LBR 2.52.1

ATKINS

Billet Road

High Level Transport Study

London Borough of Redbridge

14 January 2016

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Atkins Transportation (Atkins) has been appointed by The London Borough of Redbridge (LBR) to provide transport planning consultancy services to support a review and feasibility study of a site for potential Local Plan Allocation. A key part of the draft Local Plan is the need for some 16,845 new homes to be completed over the 15 year period to 2030 (1,123 new homes per annum). An Opportunity Site has been identified by LBR – Billet Road Site (land to the north of Billet Road) and an early stage indicative site assessment by LBR shows that the site could yield between approximately 1,100 and 1,600 units.

LBR has asked Atkins to produce a High Level Transport Study (TS) Report as evidence to support the draft Local Plan. This TS is intended as a review of the proposed site in the context of the need for, and provision of, new housing in Redbridge, with a view to establishing what levels of development on the site is deliverable and can be accommodate on the highway network over the plan period of 15 years.

The TS reviews existing traffic and transport conditions including base traffic volumes in the locality of the site to identify any key areas of congestion and relate back to the indicative plan produced by the borough, as well as site access constraints. In order to assess the impact of development at the site, likely vehicular trips generated by the site was secured from the TRICS database (http://www.trics.org/) and cross referenced with committed developments in the vicinity of the Opportunity Site. These trips were then distributed onto the local road network in the vicinity of the site utilising data secured from 2001 Census data for LBR. Once these trips have been distributed via a bespoke spreadsheet trip generation and distribution model, the TS assesses the likely impact of the varying development yield at the site upon the local road network by assessing traffic flows and road link capacity utilisation.

The existing traffic flows were factored using data from the TEMPRO database in order to consider the likely impact of the development yields in the Local Plan Year 2030 and draw together initial views as to any likely mitigation measures that, in accordance with the National Planning Policy Framework 2012 (NPPF), would be necessary to make the development acceptable in planning terms – to address with sustainable access the traffic impact for the site.

An assessment of the predicted impact of development at the site, across two development yield scenarios – Low and High for the year 2030 – indicates that both yield scenarios would push one road (Billet Road) over practical, and approaching theoretical capacity during the PM Peak. The roads in the immediate vicinity of the site were processed through a Significance Matrix designed to categorise the impacts, the overall development impact by road is as follows (irrespective of development yield):

- Hainault Road: ‘Moderate’ Impact;
- Billet Road: ‘Moderate’ to ‘Major’ Impact; and
- B177 Barley Lane: ‘Minor’ to ‘Moderate’ Impact.

It is important to note that, whilst Hainault Road and the B177 Barley Lane remain within both practical and theoretical capacity, these roads are primarily residential, and that therefore without mitigation some potential loss of amenity and increased severance for residents may be anticipated based upon the volume of traffic flow increases. It has been identified that there is likely to be a moderate to major impact on Billet Road; however the majority of development traffic is predicted to travel west on Billet Road to reach the A12, whilst some residences front Billet Road to the west of the site, it is predominantly a carrier of through traffic and is therefore less sensitive as a receptor, and it is still forecast to remain within theoretical capacity.

Some roads within the vicinity of the site cater for bus routes which would potentially be impacted by the volume of increase in traffic flows on these roads in terms of reduced Journey Time and increased journey times during Peak Hours. Additionally, some roads within the vicinity of the site make existing provision for cycle infrastructure on-road which may potentially be impacted by the volume of increase in private vehicle traffic flows in terms of road safety, perceived danger, and cyclist amenity – this would require careful consideration at detailed design stage and potential mitigation measures.

The planning process can be used to ensure the introduction of a range of travel demand management measures that can supress the volume of single occupancy vehicles generated by the development. The assessment in this report has assumed an un-restrained approach to car park provision, however the

implementation of parking provision at or below policy requirements and a 'lining and signage' road marking strategy across the development to limit availability of on-street parking would inherently reduce the vehicle trip forecasts. Further reductions in single occupancy car trips can be achieved through a range of measures including those that can be delivered and monitored through School and Residential Travel Plans imposed as a planning condition, and include provision of car club spaces, car sharing and enticements to use alternative active travel modes and public transport.

With the site 'unlocked', accessibility to local services and public transport on foot and bicycle will be enhanced, for example improved access to Chadwell Heath Station and bus services that route along the A12, once pedestrian infrastructure and access points have been delivered. As part of the transport strategy the opportunity to improve public transport including penetration by bus that could improve the PTAL rating of the site – subject to sufficient yields justifying diversion, or provision of a new service, should be considered for discussion with bus operators.

It is recommended that to progress any development scenario for the site to planning, a detailed modelling exercise will be required to consider the impact of development proposals in terms of highway network capacity with localised junction capacity assessments covering an agreed spatial extent to arrive at necessary interventions to mitigate the traffic impact of development.

Reflecting the spatial scope of assessment, it is reasonable to consider that whilst the links assessed in this High Level TS can largely accommodate traffic forecasts in each development scenario, without mitigation, junction capacity can be a constraint. The following junctions would need to be reviewed to ascertain whether mitigation will be required: Hainault Road / A12 Eastern Avenue, Hainault Road / Billet Road, and Billet Road / A112 Whalebone Lane North. These are the nearest junctions to the development site, and those likely to be impacted by vehicles travelling to the higher order road network.

The impact of the development yields on the A12 Eastern Avenue was not assessed as part of this study, as agreed during scoping; however, due to its high traffic flow and the proportion of development-generated trips forecast to utilise the A12, further study of the impact of any quantum of development upon the A12, and the opportunity for a Left-In/Left-Out access junction on the A12 that would take a proportion of the traffic off the local road network, is suggested.

The assessment would need to refine background traffic growth forecasts and agree trip rates to reflect the confirmed land use schedules and the transport / access strategy. Given the scale of development, it may be appropriate to draw upon traffic data from (as available) the latest strategic traffic model for the area, currently TfL's Saturn based ELHAM Strategic Highway Assignment Model. The other technical assessments should also be refined, including a PTAL assessment to confirm the information sourced from WebCAT, accident analysis with data from the local highway authority and an assessment of impact on all modes including public transport.

High Level Transport Study

1. Introduction

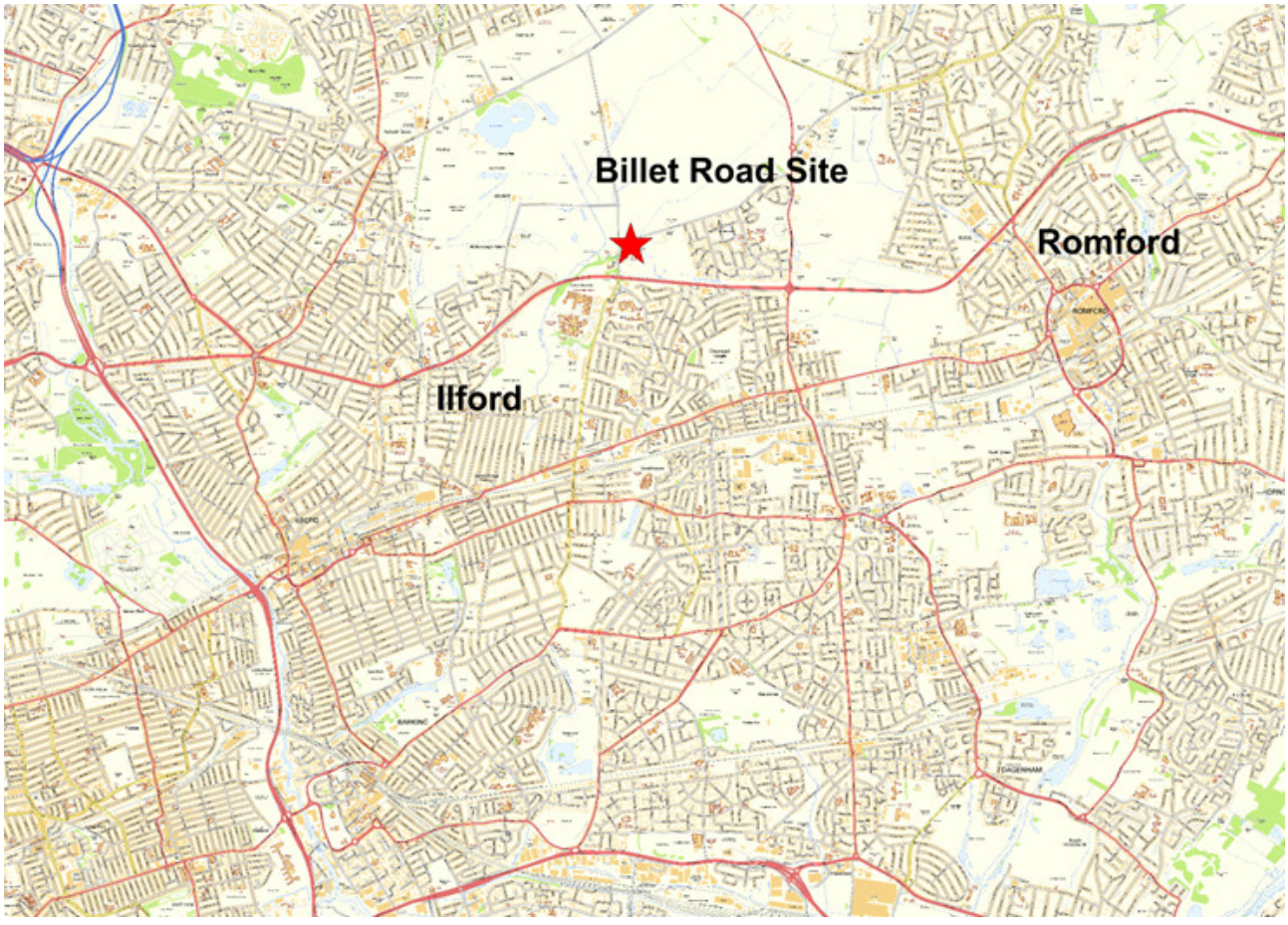
1.1. Background

Atkins Transportation (Atkins) has been appointed by The London Borough of Redbridge (LBR) to provide transport planning consultancy services to support a review and feasibility study of a site's potential Local Plan Allocation.

A key part of the draft Local Plan is the need for some 16,845 new homes to be completed over the 15 year Local Plan period to 2030 (1,123 new homes per annum). An Opportunity Site has been identified by LBR's Planning and Regeneration department – Billet Road – located between the A12 to the south and Billet Road to the north.

As the Local Plan is a strategic document it does not set out in detail specific development requirements for the Opportunity Site. However, given the significance of the Opportunity Site, a high-level indicative assessment of the site has been prepared by the Council's Planning & Regeneration Service to establish the likely level of development. This assessment shows that the site could yield between approximately 1,100 and 1,600 new homes with supporting on-site infrastructure. Figure 1-1 shows the Billet Road site's spatial context.

Figure 1-1 Billet Road Site - Spatial Context



LBR has asked Atkins to produce a High Level Transport Study (TS) Report as evidence to support the draft Local Plan. This TS is intended as a review of the proposed site in the context of the need for, and provision of, new housing places in Redbridge, with a view to establishing what level of development on the site is deliverable and can be accommodated on the highway network over the plan period of 15 years.

Specifically, the TS sets out to review existing traffic and transport conditions including base traffic volumes in the locality of the site and identify any key areas of congestion, and relate back to the plans for Local Plan allocation produced by the borough, as well as site access constraints. It considers the cumulative impact of development of the borough and, via a spreadsheet trip generation and distribution model, assesses the likely additional number of vehicular movements generated by development at the site in order to consider the likely impact that additional vehicular movements generated by development of the broad scale and type proposed would have, reflecting the location of the site and its existing transport network.

This has been used to consider the likely impact of each development yield in Local Plan Year 2030 and draw together initial views as to any likely mitigation measures that, in accordance with the National Planning Policy Framework 2012 (NPPF) would be necessary to make the development acceptable in planning terms – to address with sustainable access the traffic impact for the site.

This TS is intended to provide a transport evidence base to support LBR's Local Plan and has therefore given due consideration to NPPF and, as practicable, specifically touched on key issues highlighted in the accompanying Planning Practice Guidance Note ***'Transport Evidence Base in Plan Making'***. It has also been developed in broad accordance with the methodology outlined in the Department for Transport (DfT) document ***'Guidance on Transport Assessments'*** (GTA). With the emergence of the NPPF, GTA was archived in October 2014, however it is still widely referred to, and is considered to provide best practice guidance in producing Transport Statements and Transport Assessments. Reflecting the spatial scope and scale of development, it has been produced cognisant of principles set out within TfL's Best Practice Guidance (online update 2014).

1.2. Report Structure

The scope of assessment has been agreed with LBR Highways and the following sections of this report describe the work that was undertaken during the study in response to the brief. The report is structured as follows:

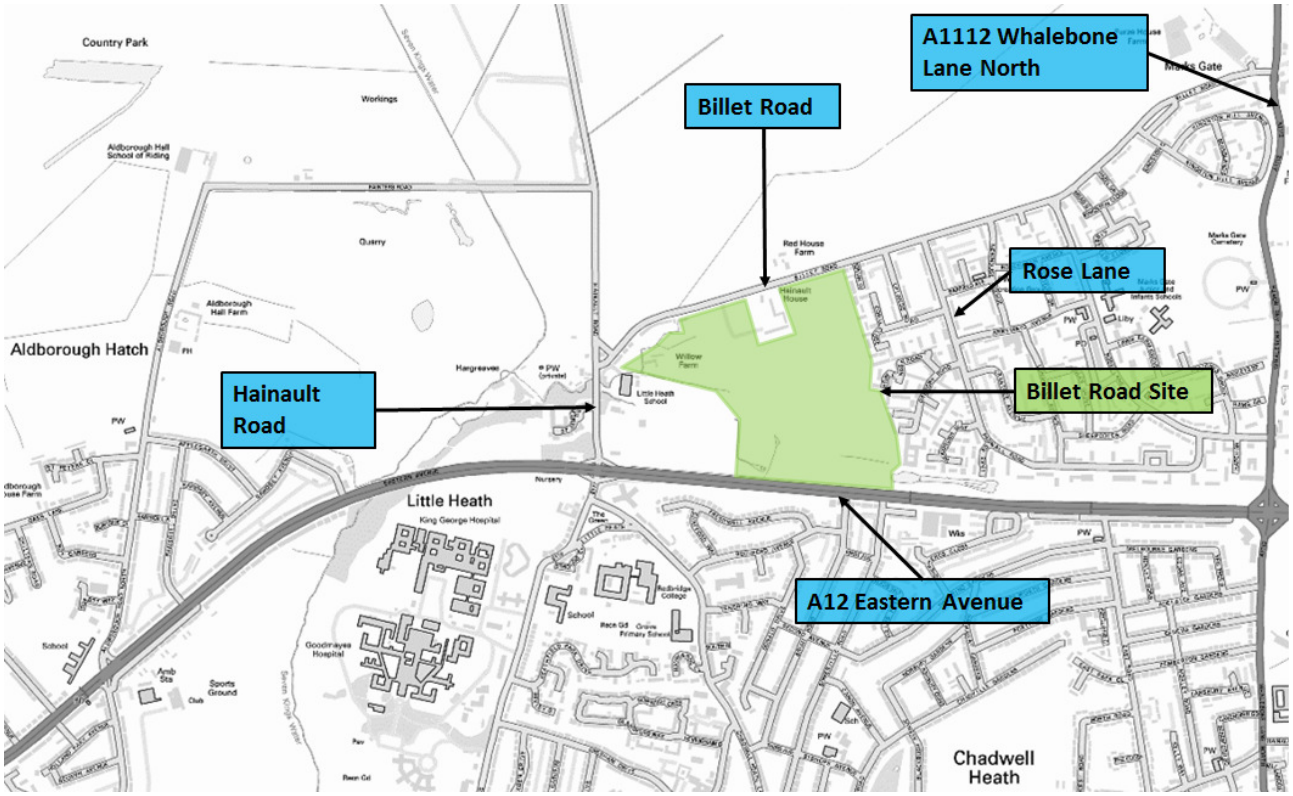
- Section 2 – Existing Conditions;
- Section 3 – Future Year Conditions;
- Section 4 – Development Scenarios;
- Section 5 – Trip Generation Assessment;
- Section 6 – Impact Assessment; and
- Section 7 – Conclusions and Recommendations;
- Appendix A – Traffic Survey Data; and
- Appendix B – TRICS Sites.

2. Existing Conditions

2.1. Site Location

The Billet Road site comprises land bordered by Billet Road to the north, the A12 to the south, residential properties to the east, and residential properties, Little Heath School, West Ham United Little Heath Sports Ground and Chadwell Heath Lawn Tennis Club to the west. Figure 2-1 presents the location of the Billet Road site.

Figure 2-1 Billet Road Site Location



2.2. Pedestrian Network and Facilities

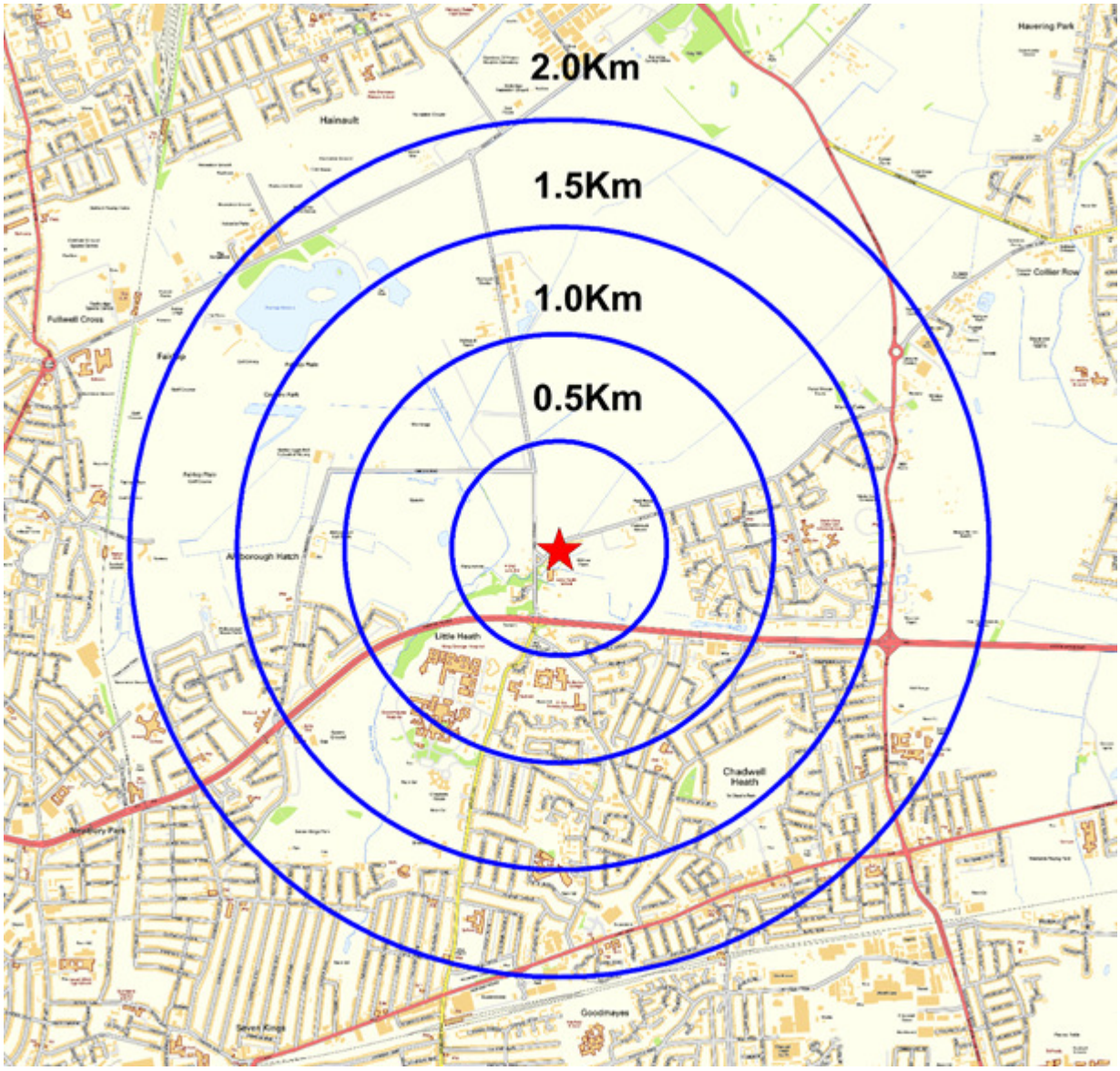
Planning guidance highlights the emphasis being placed on the integration of land use, transport and planning decisions. In order to achieve good integration, developments should be located within easy accessibility to local facilities and public transport. Guidance by the Chartered Institution of Highways and Transportation (CIHT) in their publication 'Guidelines for Providing for Journeys on Foot' (2000), suggests that in terms of commuting, walking to school and recreational journeys, walk distances of up to 2,000m can be considered, with the desirable and acceptable distances being 500m and 1,000m, respectively. These are shown in Table 2-1.

Table 2-1 CIHT Walk Journey Distance and Time Threshold

CIHT Standard	Distance (m)		Walk Time (mins)	
	Commuting, walking to school & recreation	Other non-commuting journeys	Commuting, walking to school & recreation	Other non-commuting journeys
Desirable	500	400	06.15	05.00
Acceptable	1,000	800	12.30	10.00
Considered	2,000	1,200	25.00	15.00

Existing pedestrian facilities have been identified within the review of the existing local highway network, Section 2.5. A walking isochrone map is depicted in Figure 2-2, which identified that many surrounding services, amenities and other settlement areas can safely be accessed within a 15-25 minute (2km) walk.

Figure 2-2 Billet Road Site - Walking Isochrone Map



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The site is supported by a network of pedestrian footways. These are, in general, lit, in a good state of repair, of a low gradient and of sufficient width. It should be noted however, that a number of junctions do not make provision for dropped kerbs or tactile material (i.e. Figure 2-3), which may impede the use of footways by those less physically able.

Figure 2-3 Junction of Billet Road and Hainault Road: Lack of Dropped Kerbs and Tactile Material

2.3. Cycling Network and Facilities

As detailed in Department for Communities and Local Government (DCLG) Planning Policy Guidance 13 (PPG13) (2011), an acceptable cycle distance is considered to be up to 5km, which approximately equates to a 20 minute cycle ride (based on an average cycling speed of 16kph as per London Cycle Design Standards – Chapter 4, Paragraph 4.4.15). Whilst PPG13 is superseded it is still regarded as a suitable benchmark for determining acceptable cycle / walk distances.

2.3.1. Billet Road Site

The study area is well served by cycle routes, comprising:

- Signed Routes – marked in blue;
- Quieter Roads: recommended by other cyclists – marked in yellow;
- Adjacent but separated from the road – marked in brown;
- Greenways: shared use routes – marked in green; and
- Pedestrian Only Routes: cyclists must dismount – marked in purple.

The extent of the local cycle network in the study area is shown in Figure 2-4 with a 5km isochrone map for the site is shown in Figure 2-5 which identified that many surrounding services, amenities and other settlement areas can safely be accessed by cycle within an acceptable 20 minute journey time.

Figure 2-4 TfL Cycle Route Map: Billet Road Site

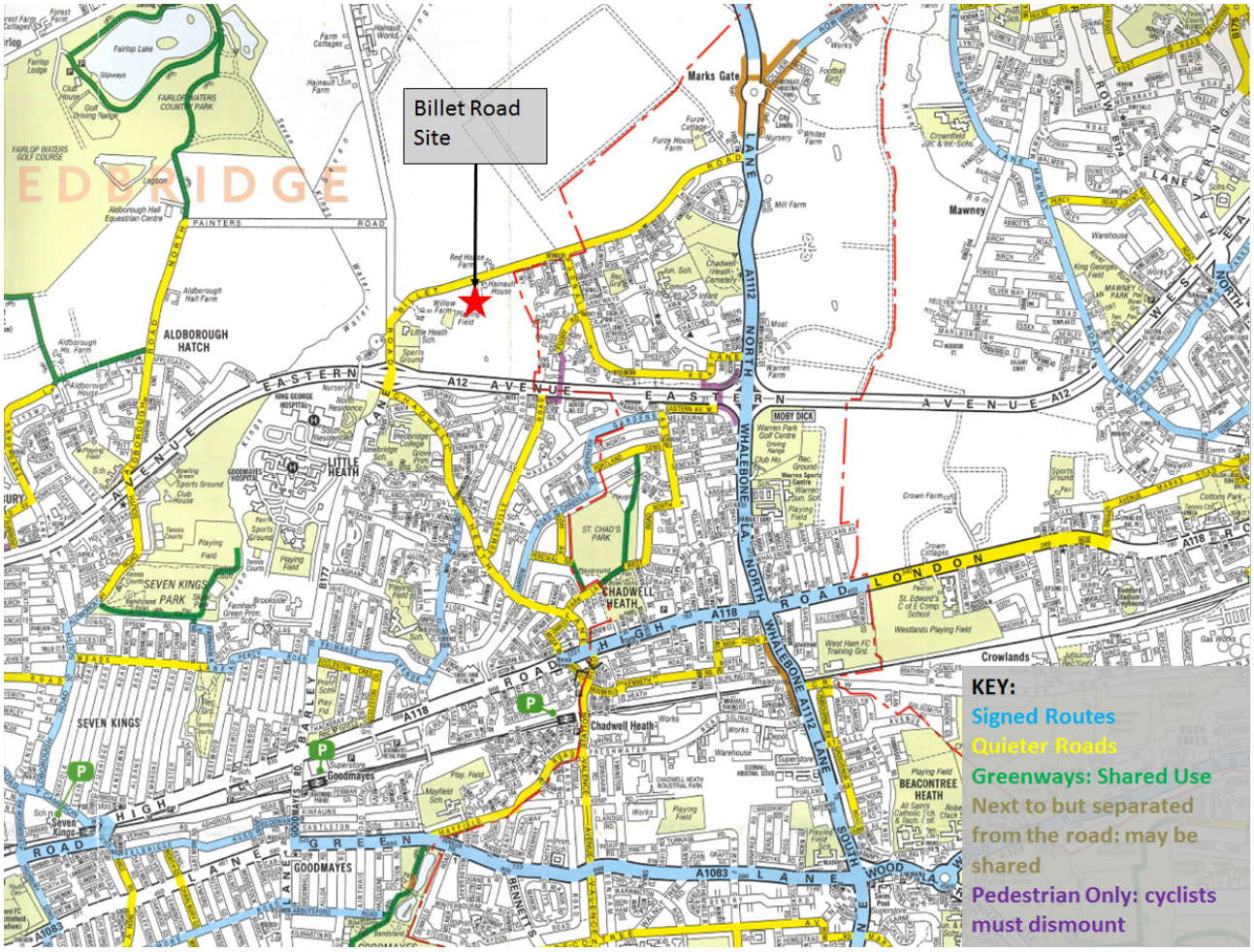

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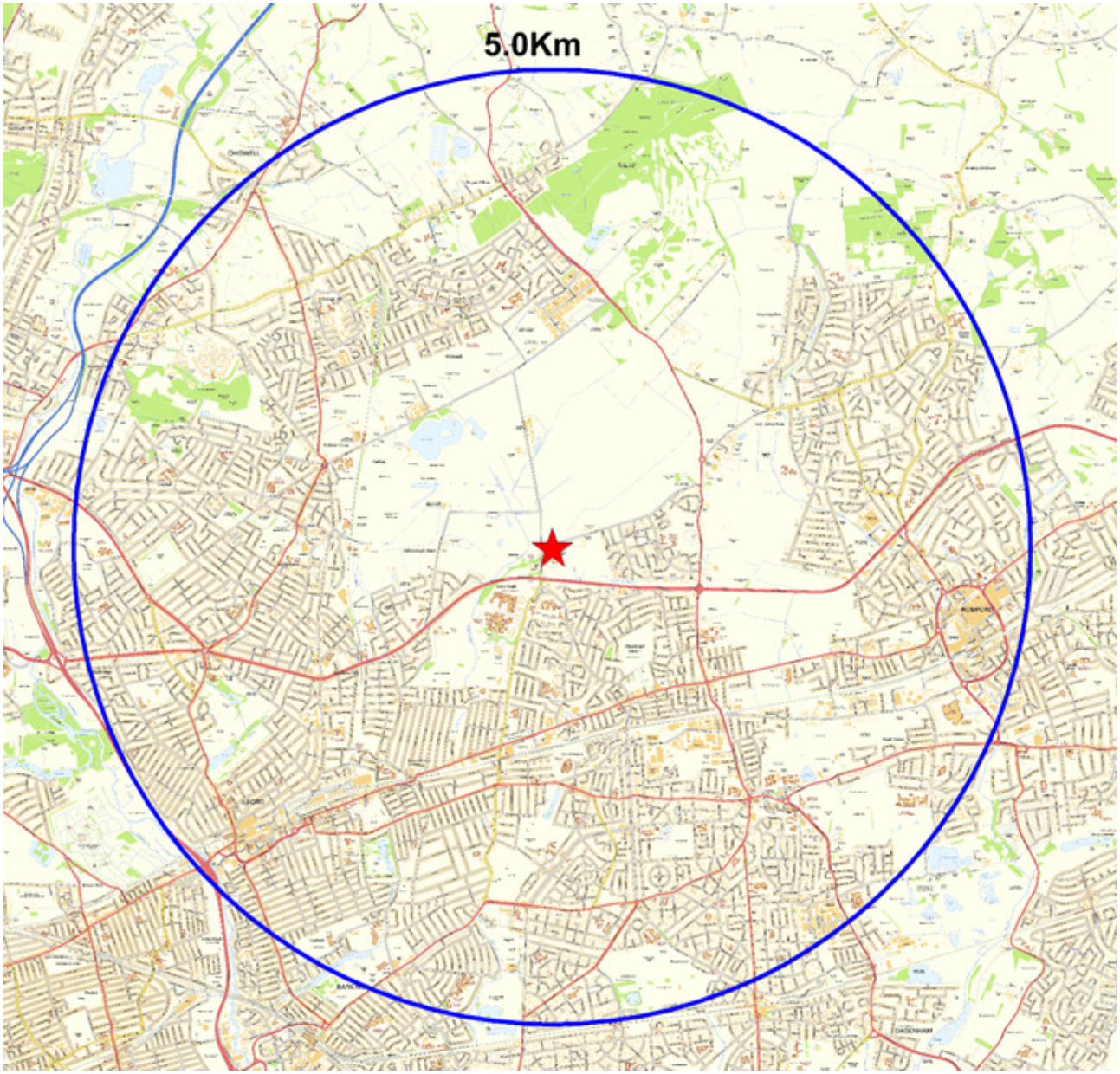
Figure 2-5 Cycle Distance Isochrone: Billet Road Site



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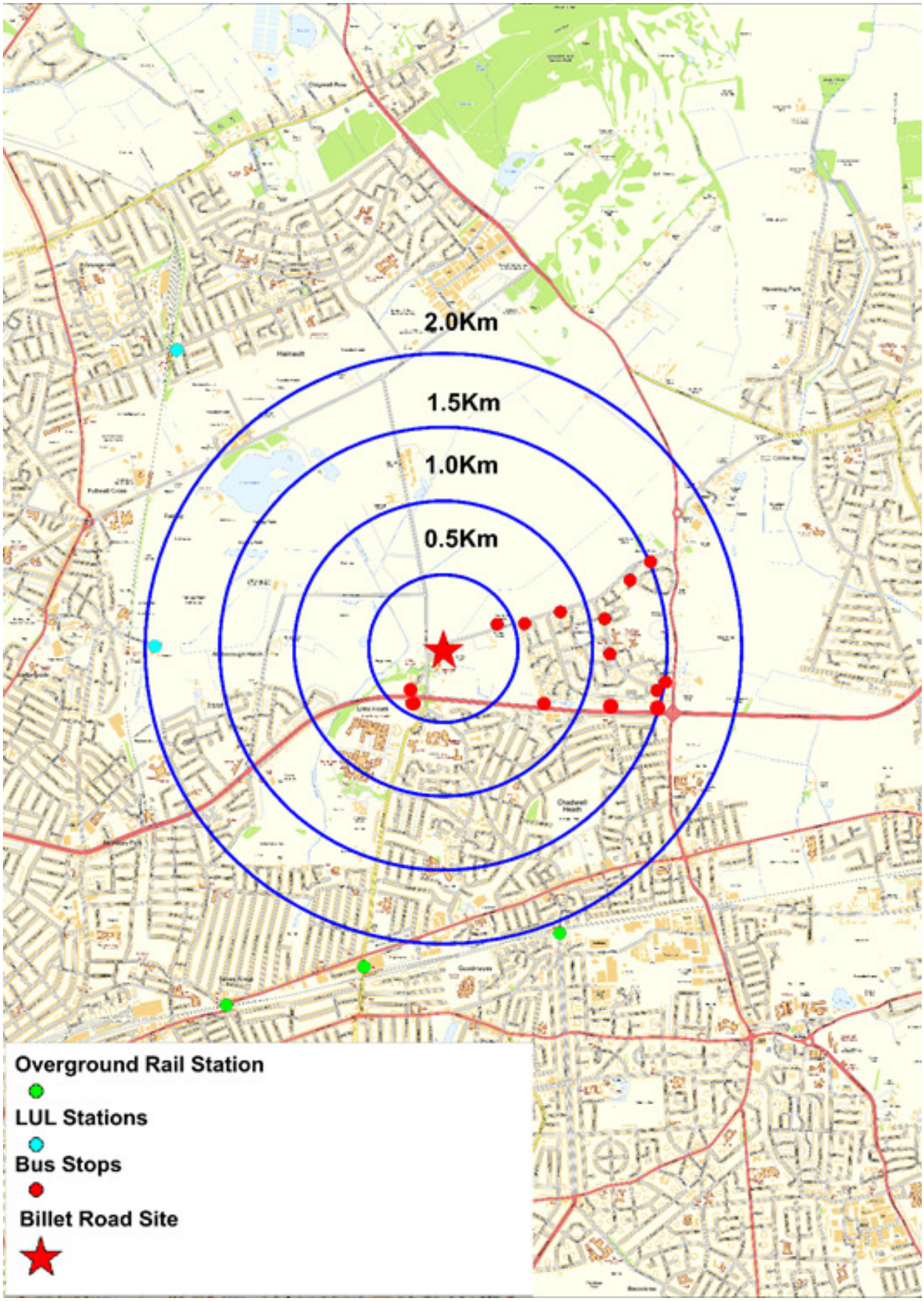
2.3.2. Cycling Improvements

It is important to note that LBR will benefit from the introduction of London Quietways Route Number 6, which will run from Aldgate to Hainault; Phase One of this route will run from Victoria Park to Hainault. This route is explored in further detail in Section 3.1.

2.4. Public Transport

Public Transport services and frequencies are described, by mode, for the Opportunity Site below. Figure 2-6 depicts the nearest public transport stops and stations to the site.

Figure 2-6 Public Transport Services Accessibility



2.4.1. Mainline and Suburban Rail Services

The services illustrated below represent the mainline and suburban rail services in the immediate vicinity of the site providing connections to Essex and Central London. It is important to note that Crossrail services will be delivered in Redbridge – improving public transport access and reducing journey times – these services are further explored in Section 3.1.1.

The nearest mainline Overground Railway Station to the Billet Road site is Chadwell Heath, approximately 1.8km south of the site. Services are operated by TfL Rail with average destinations and peak service frequencies shown in Table 2-2.

Table 2-2 Chadwell Heath Station Services

Destination	Average Peak Frequency (per hour)
London Liverpool Street	13
Shenfield	6

2.4.2. Underground Rail Services

The Billet Road site is served by the London Underground network via Central Line services. The nearest Underground Stations to the site are Newbury Park and Barkingside, both approximately 2.3km from the site. Central Line services operate from both stations approximately 14 times per hour during peak.

2.4.3. Bus Network

Section 2.4.3 outlines the bus network services in the immediate vicinity of the site, including origin and destination, nearest stop, and average peak service frequency.

The Billet Road site is well served by the bus network, three bus routes operate within a 640 metre walking distance (eight minute walk) of the site. Bus service routes and average peak frequencies are shown in Table 2-3.

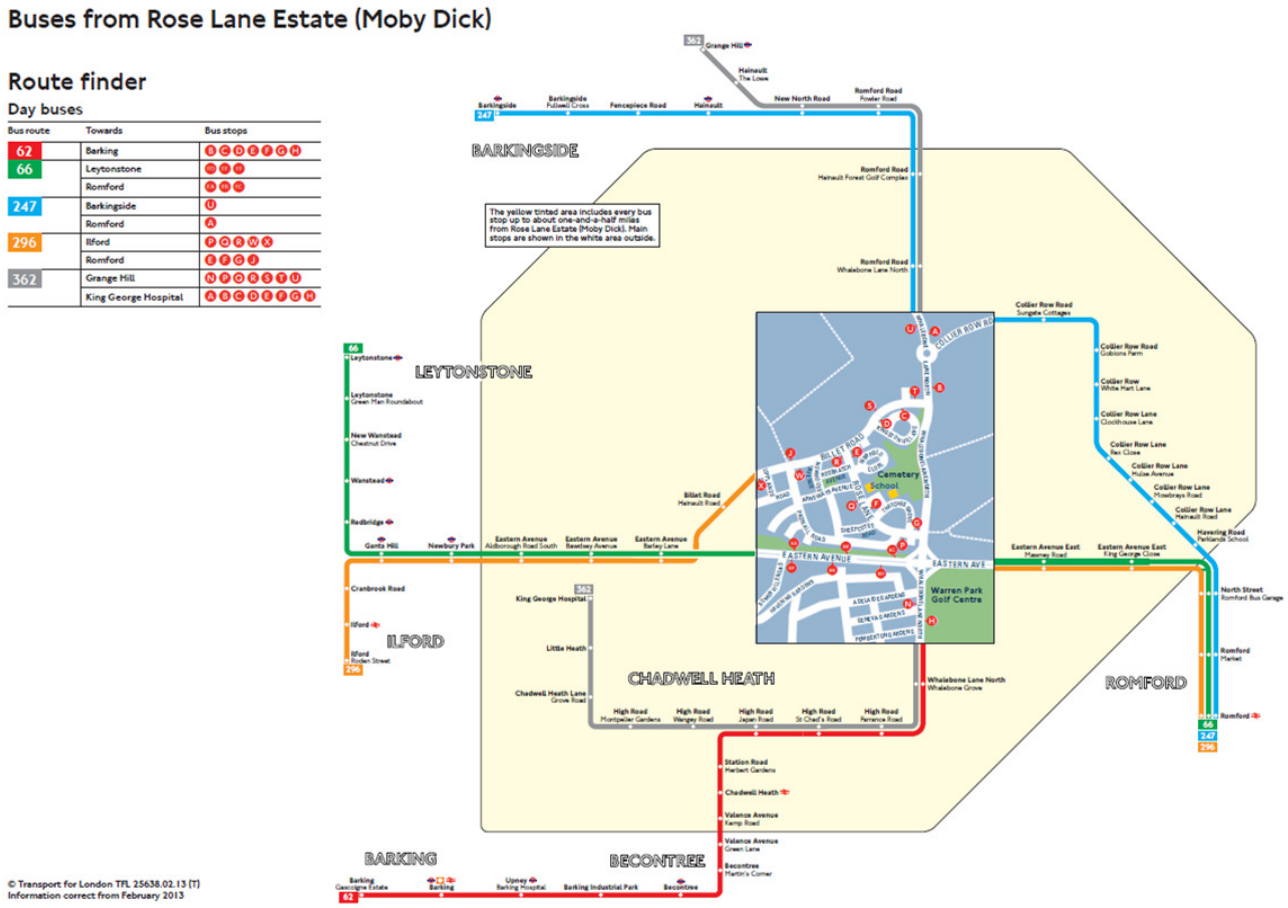
Table 2-3 Bus Routes: Billet Road Site

Route	Origin	Destination	Nearest Stop	Average Peak Frequency
296	Romford Station	Roden Street	X Hainault House	3 per hour
62	Marks Gate Billet Road	Gascoigne Estate	E Rose Lane / Billet Road	5 per hour
362	Manor Road	King George Hospital	E Rose Lane / Billet Road	2 per hour

As this identifies, there are a number of frequent bus services accessible to the site. A number of services route along Billet Road, the B177, and the A12.

A TfL bus service map which presents the bus routes that currently serve the site locations in their wider spatial context are presented in Figure 2-7.

Figure 2-7 TfL Bus Services Map: Billet Road Site



2.4.4. Public Transport Accessibility Level (PTAL)

TfL's WebCAT tool (https://tfl.gov.uk/webcat) has been used to determine the PTAL score of the Billet Road site.

The PTAL methodology takes into account the time taken to access the public transport network, including:

- The walk time to various public transport services;
- The average waiting time for each services; and
- The reliability of each service.

The methodology is based on a walk speed of 4.8km/h and considers Underground and rail stations within a 12 minute walk (960m) of the site, and bus stops within an eight minute walk (640m).

An Equivalent Doorstep Frequency (EDF) is calculated for each of the public transport services accessible from the site based on the above criteria. These individual EDF values are then weighted to provide an accessibility index (AI) value for each service accessible from the site. The sum of the AI's for each mode are then aggregated to provide a single measure of accessibility for the site. The total AI value is compared against the PTAL bandings, as depicted in Table 2-4.

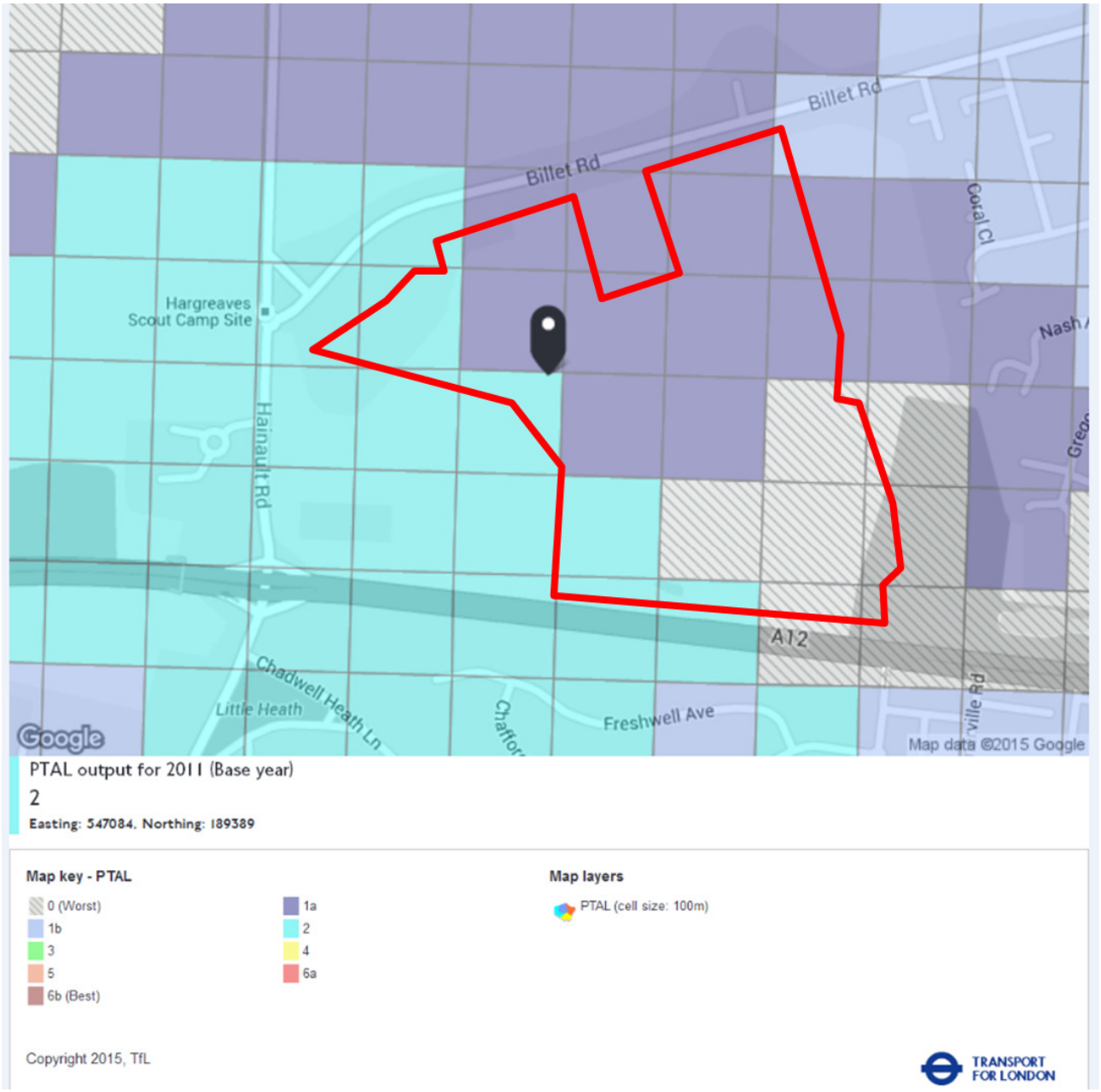
Table 2-4 PTAL Bandings

PTAL Score	Range of Index (AI)	Description
1a	0.01 – 2.50	Very Poor
1b	2.51 – 5.00	Very Poor
2	5.01 – 10.00	Poor
3	10.01 – 15.00	Moderate
4	15.01 – 20.00	Good
5	20.01 – 25.00	Very Good
6a	25.01 – 40.00	Excellent
6b	>40.01	Excellent

WebCAT indicates that the Billet Road site straddles PTAL 0/1a to 2 which, according to TfL's PTAL guidance document, indicates 'very poor' levels of access to public transport to the north and east of the site, and 'poor' levels of access to the south and west of the site. This reflects limited access to rail services across the site, however there are a number of buses routing along Billet Road, Rose Lane, and the A12.

Figure 2-8 depicts the existing PTAL for the Billet Road site.

Figure 2-8 Existing PTAL: Billet Road Site (TfL WebCAT)



It must be noted that the PTAL score is a comparative assessment covering the whole of London. Therefore, although a useful indicator, it should be considered that in the context of the site location and, as one would realistically expect and as is evidenced in WebCAT, that the further out from Central London the lower the PTAL scores that are generally achieved. The PTAL scores are likely to improve once bus penetration is delivered and pedestrian permeability across, and within, the site is improved.

2.5. Local Highway Network

This section of the report identifies the existing local highway network in the immediate vicinity of the site based on site observations from Thursday 19th November 2015.

2.5.1. Billet Road

Billet Road (Figure 2-9) is approximately six and a half to seven metres wide, is subject to a 30mph speed limit, and is well lit by a continuous system of street lighting.

Figure 2-9 Billet Road (looking west)

Generous footways are present on the southern side of Billet Road for the entirety of the road's length, however footways on the northern side are only present for approximately 30 metres of its westernmost extent and 60 metres at its easternmost extent.

The nearest bus stops to the Billet Road Site are located on Billet Road. The nearest bus stops are located 25m and 75m east of the easternmost potential site access location for eastbound and westbound services respectively. The nearest services to the western potential site access point are located 38m and 230m west of the site access for eastbound and westbound services respectively. It should be noted that the bus stops on the northern side of the road are sited on narrow, and sometimes overgrown, sections of footway.

One of the stops located on the northern side of Billet Road (depicted in Figure 2-10) has no shelter or seating. The stop located opposite No 52 Billet Road, on the northern side of Billet Road, does make provision for shelter and seating (Figure 2-11). Both of these stops are potentially difficult for pedestrians to access as no footway runs along the northern side of Billet Road and there are no crossings in the immediate vicinity of these two stops. Pedestrians wishing to access services utilising these stops will have to wait for gaps in traffic on Billet Road.

Figure 2-10 Billet Road: Bus Stop on Northern Side (to east of Hainault House)

Figure 2-11 Billet Road Bus Stop on Northern Side (opposite No 52 Billet Road)

2.5.2. Rose Lane

Rose Lane (Figure 2-12) connects Billet Road to the A1112, it is approximately seven and a half metres wide, is subject to a 20mph speed limit, and is well lit by a continuous network of street lighting.

Figure 2-12 Rose Lane

A number of bus services run along Rose Lane; the road also possesses a shopping parade which makes provision for a number of local services, including a number of convenience stores, a pharmacy, and a post office (Figure 2-13). A school and a library are also located on Rose Lane.

Figure 2-13 Rose Lane Local Services

2.5.3. Hainault Road

Hainault Road (Figure 2-14) is approximately six and a half metres wide, is subject to a 30mph speed limit at its southernmost extent – up to just past the junction with Billet Road – thereafter to the north it is subject to a 40mph speed limit.

Figure 2-14 Hainault Road

Footways are present on both sides of the road up to the junction with Billet Road; thereafter a footway is only present on the eastern side of the road.

A signalised pedestrian crossing is located just to the north of the junction with St James' Gardens; this crossing possesses dropped kerbs and tactile paving material.

2.5.4. A12 Eastern Avenue

The A12 Eastern Avenue (Figure 2-15) is a dual carriageway approximately 20 metres in width (including the central reservation) with two lanes in each direction – the carriageway width in each direction is approximately 7 metres. The A12 is subject to a 50mph speed limit, dropping to a 40 mph speed limit approximately 70 metres east of the junction with Bawdsey Avenue.

Figure 2-15 A12 Eastern Avenue

Footways approximately two to three metres in width, sometimes separated from the carriageway by a grass verge, are present on the southern side. The A12 is well lit by continuous network of street lights.

The A12 Eastern Avenue is a Red Route Clearway – with no stopping permitted at any time. Speed management and control is present, with fixed speed enforcement cameras located approximately 60 metres east of Ramsgill Drive, approximately 70 metres east of Aldborough Road South, and approximately 0.4km east of the junction with the A1112 Whalebone Lane North.

Pedestrian crossings are facilitated by signalised crossings, a pedestrian flyover bridge and subways. A signalised pedestrian crossing, with dropped kerbs but with no tactile paving provision, is located at the junction with the B177 Barley Lane. A further signalised staggered crossing with dropped kerbs, tactile paving and guard railing is situated at the junction with Aldborough Road South, to the east of Aldborough Road South. Pedestrian subways are located to the west of Aldborough Road South and to the north of Hertford Road, the latter leading to Newbury Park Railway Station.

A flyover pedestrian bridge is situated approximately 75 metres to the west of the junction with the B177 Barley Lane.

2.5.5. B177 Barley Lane

The B177 Barley Lane (Figure 2-16) is approximately 10 metres wide, is subject to 30mph speed limit and is well lit by a continuous network of street lighting.

Figure 2-16 B177 Barley Lane

Footways of a good condition, approximately two metres wide, are present on both sides of the road along the entirety of its length.

No 18T Lorries are permitted between 0000-0700 hours and 2100-0000 hours Monday-Friday, on Saturday between 0000-0700 hours and 1300-0000 hours, or on Sunday at any time, except permit holders.

A cycle lane is present on Barley Lane, from the junction with Little Heath south, however vehicles were observed to be frequently parked in the cycle lane, requiring cyclists to regularly re-join vehicular traffic.

Double-yellow lines are present southbound from Little Heath. On the northbound footway, adjacent to the Hospital, signs advise that No Stopping is permitted Monday to Friday 0800-1820 hours, 'Loading Only' 0800-1720 hours, with a 20 minute maximum stopping period and no return within two hours.

'School Keep Clear' zig-zags are located outside of the main vehicular entrance to Newbridge School and 'School Keep Clear' zig-zags, operating 0800-0930 hours and 1430-1600 hours are located outside the pedestrian entrance to Barley Lane Primary School, to the south of the junction with Eccleston Crescent.

A signalised crossing is situated to the south of Newbridge School, with tactile paving and guard railing, and a further signalised crossing is present at the junction of the B177 and the A118, with tactile paving and guard railing.

Zebra Crossings are located to the north of the junction with Gresham Drive, to the north of the junction with Douglas Road, and to the north of the junction with Atholl Road. Pedestrian refuge islands are situated to the south of the junction with Gresham Drive, to the south of the junction with Douglas Road, and to the south of the junction with Atholl Road.

The junctions with adjoining roads possess dropped kerbs and / or raised surfacing and tactile paving, facilitating uncontrolled crossing where controlled crossing sites are not present.

2.5.6. A1112 Whalebone Lane North

The A1112 Whalebone Lane North (Figure 2-17) is approximately eight and a half metres wide, is subject to a 30mph speed limit, and is well lit by a continuous network of street lighting.

The A1112 Whalebone Lane North connects Billet Road to the A113 in the north and the A12 in the south.

Figure 2-17 A1112 Whalebone Lane North (at the junction with Rose Lane)

A carriageway located cycle track is present along northbound and southbound carriageways; this cycle track occasionally moves from the carriageway to the footway in the proximity of junctions before returning to the carriageway. Footways are present on both sides of the road.

Signalised pedestrian crossing points are located just to the north of the junction with Rose Lane and just to the south of the junction with Billet Road.

2.6. Local Services / Facilities Access

The Billet Road Site is well situated, with access to a diverse array of local services and facilities. The local services availability is listed, and depicted visually in Section 2.6

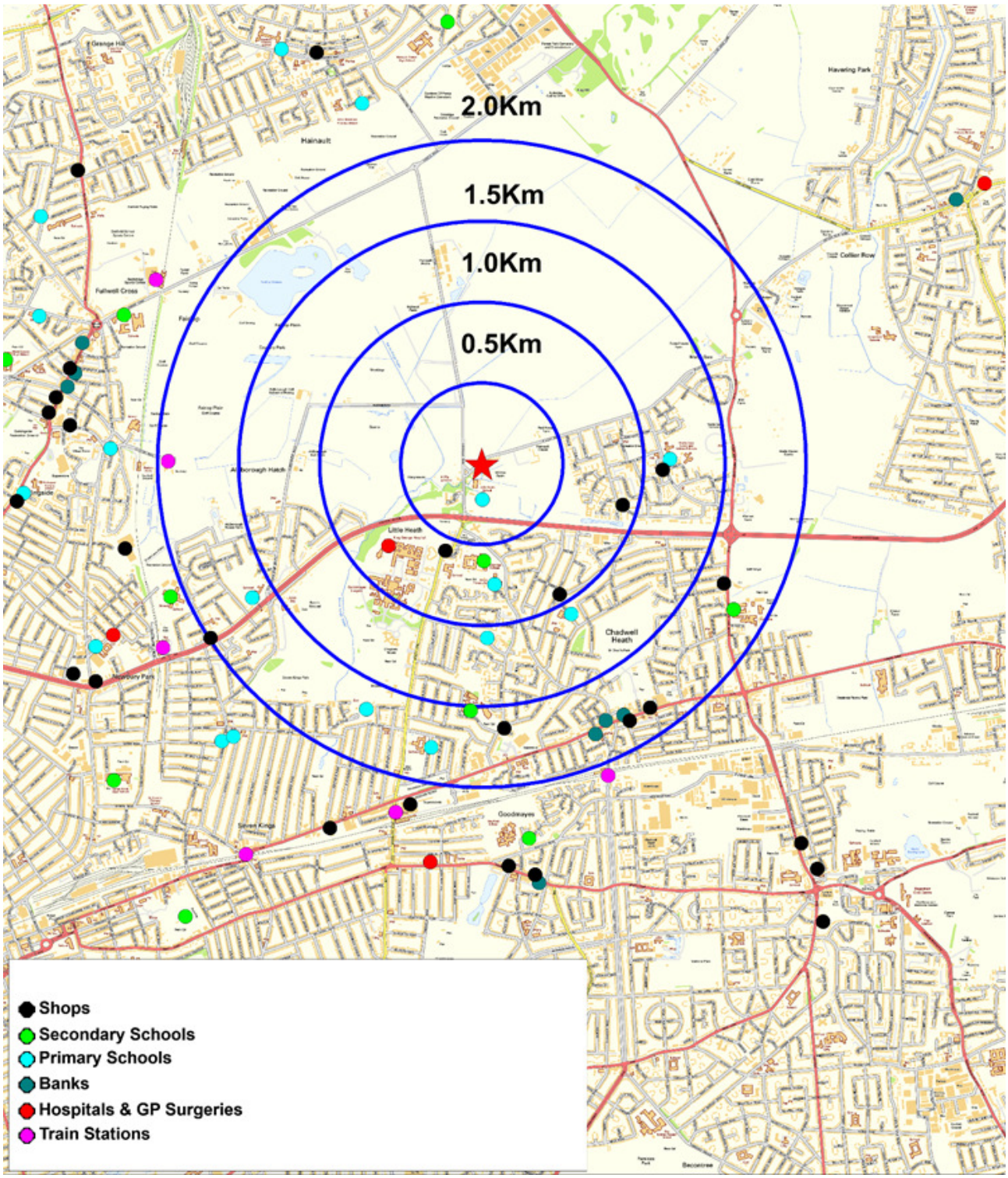
The site is located approximately 2.3km north-east of Goodmayes Local Centre, consisting of a range of small independent shops, a major supermarket and a home improvement store. It is located approximately 4km from the District Centre of Gants Hill consisting of a variety of specialist shops, as well as a good selection of restaurants, bars and leisure facilities and is approximately 4km from the Metropolitan Centre of Romford. Those services closest in proximity to the site are described below:

- Hospital –King George, approximately 900m southwest of the site;
- GP's Practice – Goodmayes Medical Practice, approximately 2.5km south of the site;
- Bus Stop – Hainault House (Billet Road), approximately 100m north of the site;
- Train Station – Chadwell Heath, approximately 1.8km south of the site;
- Underground Station – Newbury Park / Barkingside Underground Station, approximately 2.3km from the site;
- Convenience Shop – 107 Rose Lane, approximately 750m east of the site;
- Library – Marks Gate Community Centre & Library – 135 Rose Lane, approximately 750m east of the site;
- Supermarket – 97-131 High Road, approximately 1.5km south-east of the site;

- Bank – 4 Wangey Road, approximately 1.5km south of the site;
- Nearest extant Primary School – Marks Gate Infant and Primary Schools, approximately 700m east of the site; and
- Nearest extant Secondary School – Little Heath School, approximately 500m west of the site.

The above referenced site services are depicted in Figure 2-18.

Figure 2-18 Billet Road - Local Services



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2.7. Accident Analysis

Standard practice dictates that the recent accident history associated with the local highway network is considered. In the absence of data from local sources, Atkins has reviewed the Crashmap web resource. Crashmap uses data collected by the police about road traffic collisions occurring on British roads where someone is injured. This data is approved by the National Statistics Authority and reported on by the Department for Transport each year. This site uses data obtained directly from official sources but compiled in to an easy to use format showing each incident on a map. It is the only up-to-date online map of the UK crash database and contains over a million incidents. It doesn't present the level of detail available from locally held databases, however it provides an indication of the frequency and severity of accidents in the local area for identifying trends appropriate for this high level study.

Collision data for the three most recent years available on Crashmap (http://www.crashmap.co.uk/): 2012, 2013 and 2014 is presented in Table 2-5.

Table 2-5 Collision Data

Road	Total No of Collisions	No of Slight Injury	No of Serious Injury	No of Fatal Injury
Billet Road (entirety – approx. 1.9km)	4	4	0	0
Hainault Road (entirety – approx. 2.2km)	12	12	0	0
B177 Barley Lane (between the A12 and the A118 High Road – approx. 1.8km)	31	28	3	0
Rose Lane (entirety – approx. 0.9km)	6	5	1	0
A1112 Whalebone Lane North (between the A12 and Romford Road – approx. 2.4km)	30	24	5	1

This data illustrates that whilst there are a number of incidents recorded over the most recently available three year period covering 2012-2014 inclusive, there was only one fatal injury recorded and 5% resulting in serious injury. As such, is can be considered that there are no safety sensitive roads or junctions in the immediate vicinity that would be impacted by additional trips associated with potential development of the Opportunity Site.

Information extracted from Crashmap is depicted in Figure 2-19 and Figure 2-20.

Figure 2-19 Crashmap: Billet Road, Hainault Road, A1112 Whalebone Lane North

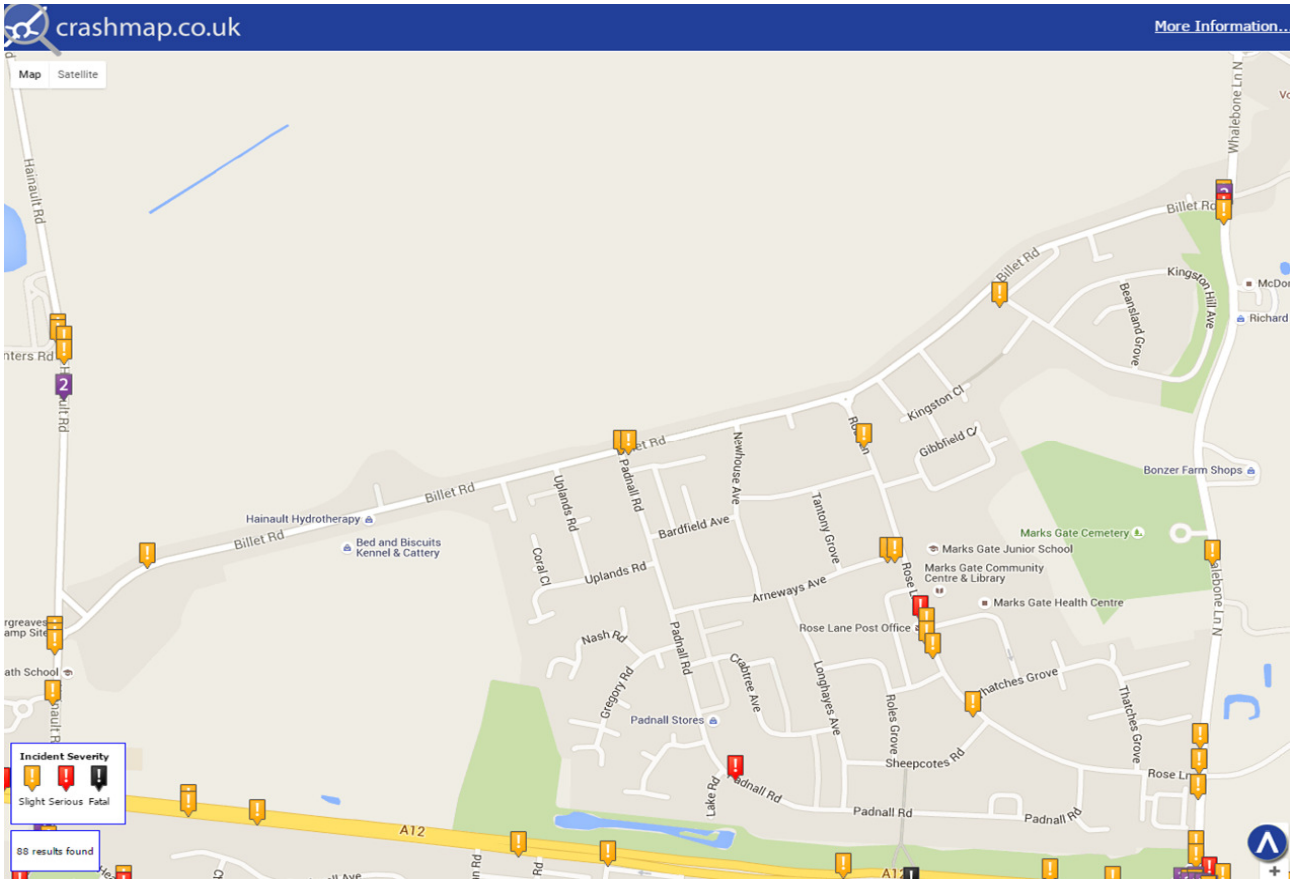
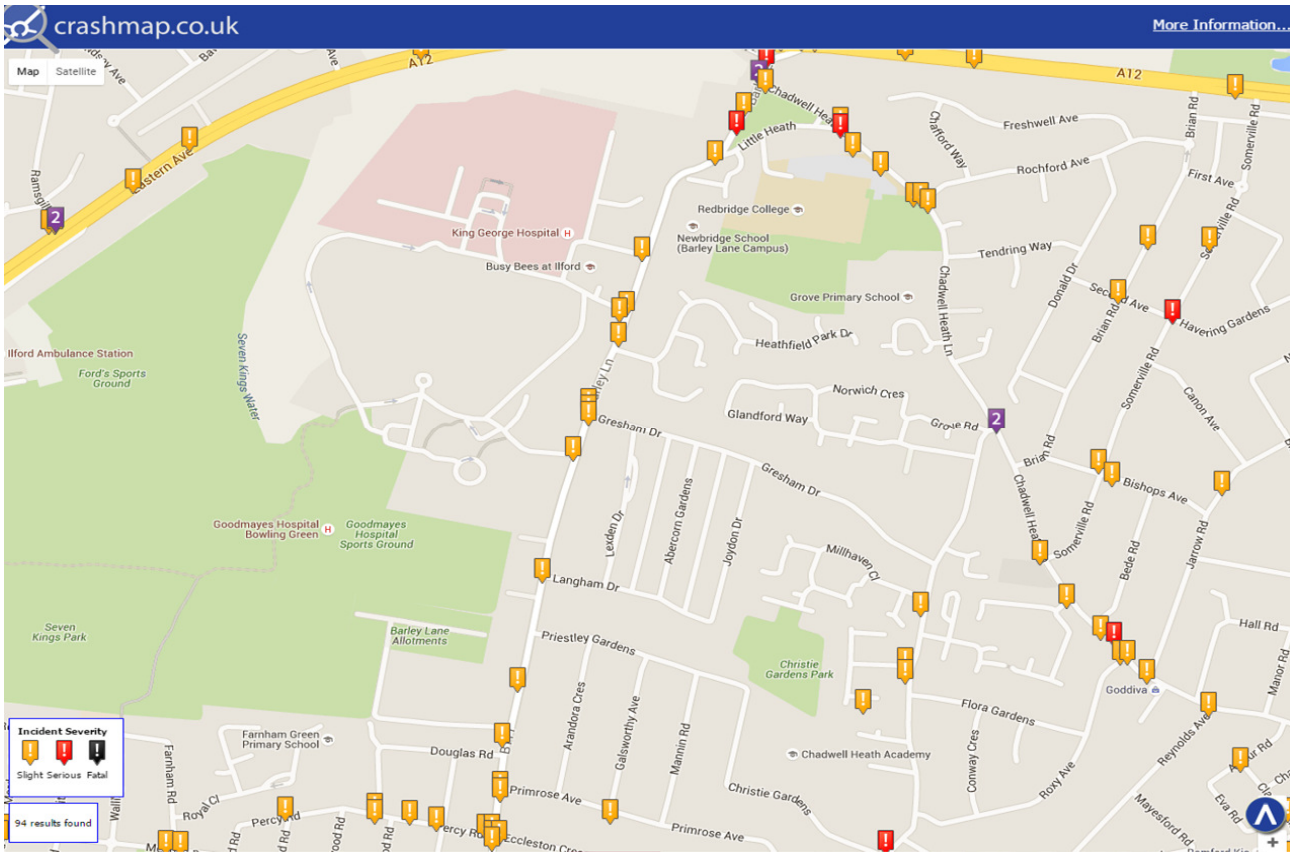


Figure 2-20 Crashmap: B177 Barley Lane



2.8. Existing Traffic Conditions

In order to gain an understanding of how the current local highway network in the vicinity of the site operates traffic surveys have been commissioned following scoping liaison with Ian Butcher at LBR in October 2015. In undertaking the surveys a number of factors are considered prior to the collection of data. General conditions considered specific to traffic data being commissioned include:

- Checking that there are no significant road works in the vicinity;
- Whether there are any outside factors influencing sustainable travel, such as rail or bus strikes; and
- Ensuring that data is not collected during a school or public holiday period.

All of these parameters were checked prior to the commissioning of the traffic surveys.

Following receipt of the traffic data the actual conditions were then checked, including weather conditions. The check did not highlight any 'abnormal' conditions.

2.8.1. Automatic Traffic Counts

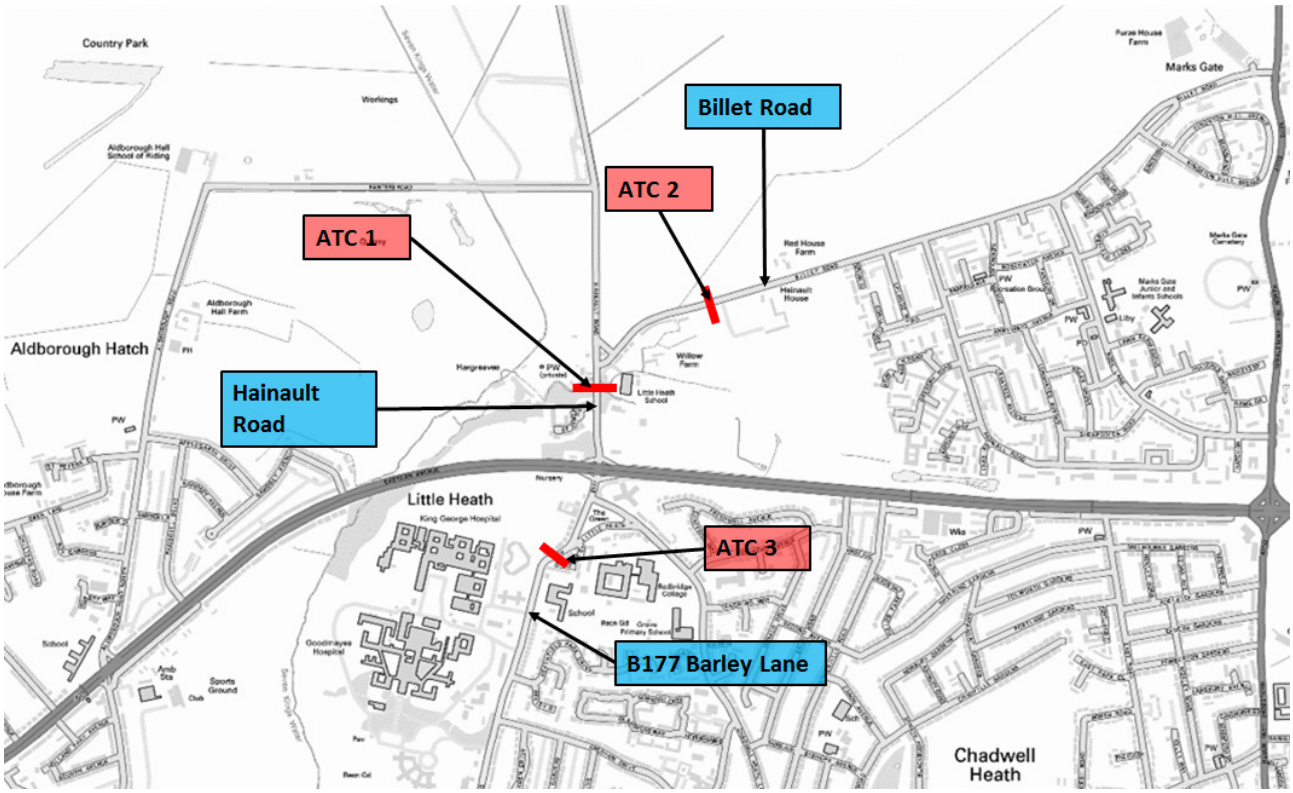
Traffic data was collected over the period from Wednesday 4th November to Tuesday 10th November 2015 upon agreement of dates and site locations with LBR using Automatic Traffic Count (ATC) Surveys placed on:

- Hainault Road (approximate location – adjacent to Little Heath School); and
- Billet Road (approximate location – 45 metres east of 82 Billet Road).

Data from a prior survey was utilised for the B177 Barley Lane – adjacent to Redbridge College. This ATC Survey ran between Friday 10th July 2015 and Saturday 18th July 2015.

The locations of the three ATCs are depicted in Figure 2-21.

Figure 2-21 ATC Locations



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The ATCs counted the number of vehicles using these roads each hour over this period. The full survey results are presented in Appendix A. The flows recorded at a specific point, in proximity to the ATC, with an unobstructed clear-way, may not be an assessment of the road as a whole or junctions.

The recorded number of vehicles identified by the ATC counters was then converted into the number of Passenger Car Units (PCUs) as per recognised industry best practice. The conversion factors are applied to different vehicle types such as private cars, vans, buses, and heavy goods vehicles, to give a single number reflecting road space occupation. A single car has a value of 1 PCU and this rises to 2.9 for a large heavy goods vehicle (Department for Transport: Transport Analysis Guidance (TAG) TAG Unit A5.4, 2014).

In order to consider a worst case scenario, the day with the highest traffic flows will be considered as part of this assessment. This was identified as being Thursday 5th November 2015 for Billet Road and Hainault Road. From the surveys conducted in July 2015 for the B177 Barley Lane the date with the highest traffic flows was identified as Friday 10th July 2015.

Table 2-6 summarises the peak period traffic flows along the surveyed roads for Hainault Road, Billet Road and the B177 Barely Lane. Initial high-level survey results analysis indicated that network Peak Hours occur between 0800-0900 hours (AM) and 1700 -1800 hours (PM).

Table 2-6 Billet Road Existing Hourly Base Traffic Flows (PCUs) AM and PM Peak Periods

Period	Hainault Road		Billet Road		B177 Barley Lane		Total
	Direction	PCU Count	Direction	PCU Count	Direction	PCU Count	
07:00-08:00	Northbound	486	Eastbound	181	Northbound	347	
	Southbound	479	Westbound	652	Southbound	657	**2802**
Total	**Combined**	**965**	**Combined**	**833**	**Combined**	**1004**	
08:00-09:00	Northbound	556	Eastbound	308	Northbound	409	
	Southbound	445	Westbound	466	Southbound	761	**2945**
Total	**Combined**	**1001**	**Combined**	**774**	**Combined**	**1170**	
09:00-10:00	Northbound	530	Eastbound	359	Northbound	433	
	Southbound	468	Westbound	267	Southbound	664	**2721**
Total	**Combined**	**998**	**Combined**	**626**	**Combined**	**1097**	
15:00-16:00	Northbound	651	Eastbound	581	Northbound	434	
	Southbound	564	Westbound	183	Southbound	498	**2911**
Total	**Combined**	**1215**	**Combined**	**764**	**Combined**	**932**	
16:00-17:00	Northbound	712	Eastbound	868	Northbound	260	
	Southbound	533	Westbound	140	Southbound	436	**2949**
Total	**Combined**	**1245**	**Combined**	**1008**	**Combined**	**696**	
17:00-18:00	Northbound	488	Eastbound	984	Northbound	415	
	Southbound	522	Westbound	173	Southbound	532	**3114**
Total	**Combined**	**1010**	**Combined**	**1157**	**Combined**	**947**	

Figures may not add up due to rounding of numbers

2.8.2. Link Capacity

A link capacity assessment of the existing situation on the key roads within the vicinity of the site has been undertaken using the methodology set out in DMRB TA 79/99. The traffic volumes are based on a 60/40 directional split in the flow, based on these guidelines, and have been compared against theoretical lane capacities to estimate if the roads are currently operating under, at, or over capacity.

It is important to note that link capacity assessments only assess traffic flows in the immediate vicinity of the ATC site location, and assume unobstructed clear-way, they are not therefore necessarily an assessment of the operation of the entire road, or of junctions that may impact conditions on the road links during peak hours.

In order to classify the roads, the road width, type of carriageway, and speed limit has been used, as per the DMRB methodology, where practicable.

The roads in the vicinity of the Billet Road site have been classified as:

- Hainault Road: "UAP3" with a width of approximately 9 metres;
- Billet Road: "UAP3" with a width of approximately 7 metres; and
- B177 Barley Lane: "UAP3" with a width of approximately 9.8 metres.

DfT guidance states that a ratio of flow to capacity of below 0.85 means that the link operates satisfactorily, above 0.85 it is approaching capacity, and beyond 1.00 it is over capacity and queues and delays may result. One-way flows are represented using the busiest flow 60 percent figure of the link in the AM and PM Peak Hours, with the results for the site summarised in Table 2-7.

Table 2-7 Billet Road Site: Existing AM and PM Peak Hour Link Flow Analysis

Period	Location	Traffic Flow	Lanes / Direction	Theoretical Capacity	Ratio of Flow to Capacity
AM Peak Hour 08:00-09:00	Hainault Road	601	1	1530	0.39
	Billet Road	464	1	1110	0.42
	B177 Barley Lane	702	1	1530	0.46
PM Peak Hour 17:00-18:00	Hainault Road	606	1	1530	0.40
	Billet Road	694	1	1110	0.63
	B177 Barley Lane	568	1	1530	0.37

Figures may not add up due to rounding of numbers

The above traffic flow and link capacity table indicates that all of the assessed roads in the immediate vicinity of the site are currently operating under capacity, with the highest flow to capacity ratio being 0.63 on Billet Road during the PM Peak Hour. As such, existing link capacity is not considered to be an issue in the vicinity of the site.

2.8.3. Speed Data

Vehicle speeds for the site, measured by the ATCs and summarised for all vehicles recorded over the surveyed period are shown in Table 2-8.

Table 2-8 Traffic Speeds (all recordings) on surrounding roads during survey periods

Location	Direction	85th Percentile Speed Band
Hainault Road	Northbound	26 – 30mph
	Southbound	26 – 30mph
Billet Road	Eastbound	31 – 35mph
	Westbound	31 – 35mph
B177 Barley Lane	Northbound	31 – 35mph
	Southbound	31 – 35mph

The recorded 85th percentile traffic speeds for Hainault Road were observed to be within the 30mph speed limit, however the recorded 85th percentile speeds across Billet Road and the B177 Barley Lane were slightly in excess of the posted speed limit. It should be noted that speeds are collected 24 hours a day for a week long period and therefore capture speeds that may not be representative of those observed during either AM or PM Peak Hour Periods.

On the basis of the above, excessive vehicle speeds may be a potential issue on the surrounding road network in the vicinity of the site.

3. Future Year Conditions

As this site is being considered for Local Plan allocation for the period 2015 to 2030, a future year baseline of 2030, reflecting the end year of the impending Local Plan, has been selected to reflect future baseline conditions.

3.1. 2030 Committed Transport Schemes

3.1.1. Crossrail

The London Borough of Redbridge will be further connected to Central London and Home Counties to the west of the City as a result of Crossrail, which will have a phased introduction schedule as follows:

- Liverpool Street to Shenfield: due to open May 2017;
- Paddington to Shenfield: due to open in May 2019; and
- Full through service (out to Reading at its westernmost extent): due to open in December 2019.

Four stations within LBR will form part of the Crossrail route:

- Ilford
- Seven Kings
- Goodmayes; and
- Chadwell Heath

Crossrail will see new trains introduced to the line – at 200m in length these will be capable of carrying up to 1,500 passengers – new station facilities - all stations will also be step-free to improve accessibility - and Public Realm improvement works.

Chadwell Heath Station and surrounding area improvements include:

- Platform extensions to accommodate the new, 200m long Crossrail trains;
- Installation of additional track to the east of the station to allow the turn-back of Crossrail trains, where necessary;
- New platform lighting;
- Improvements to the ticket hall;
- New station signage, help points, customer information screens, and CCTV;
- Footway widening and resurfacing;
- Major junction improvements;
- An enhanced bus interchange;
- A new zebra crossing located directly outside the station; and
- A car pick-up and drop-off point linked to the station via a new staircase

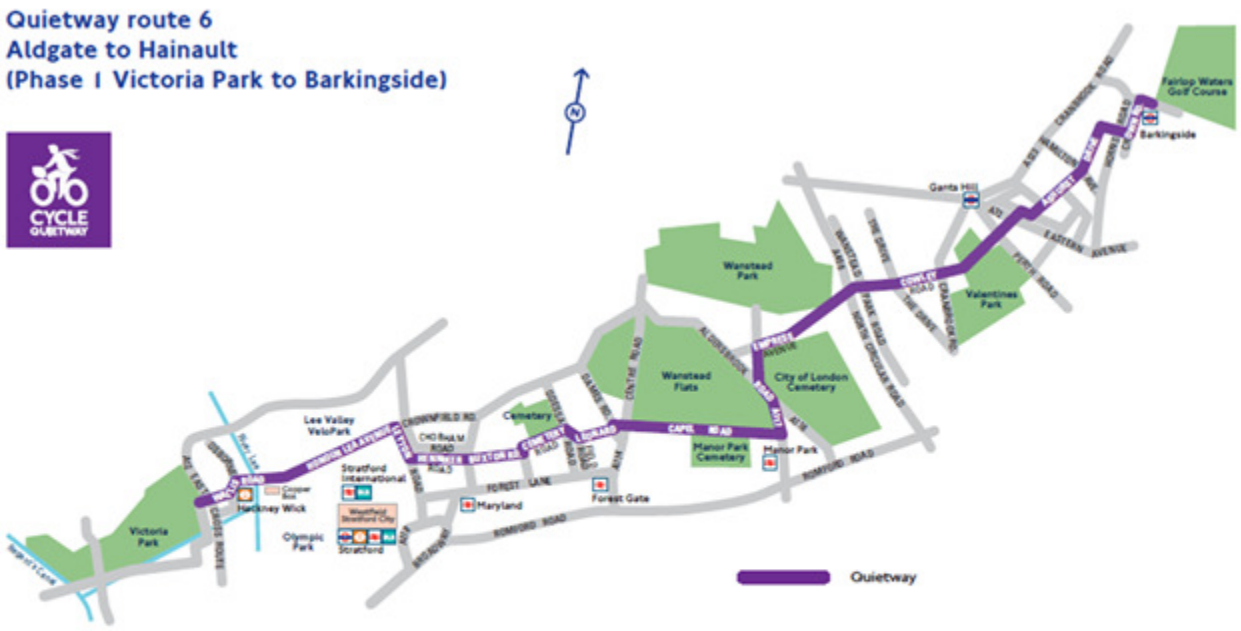
All stations on the Crossrail route will make provision for step free access to improve accessibility for all.

3.1.2. London Quietways

London Quietways, together with the Central London Grid, Cycle Superhighways and Mini Holland programmes are providing safe and direct cycle infrastructure as part of the Mayor of London's vision for cycling.

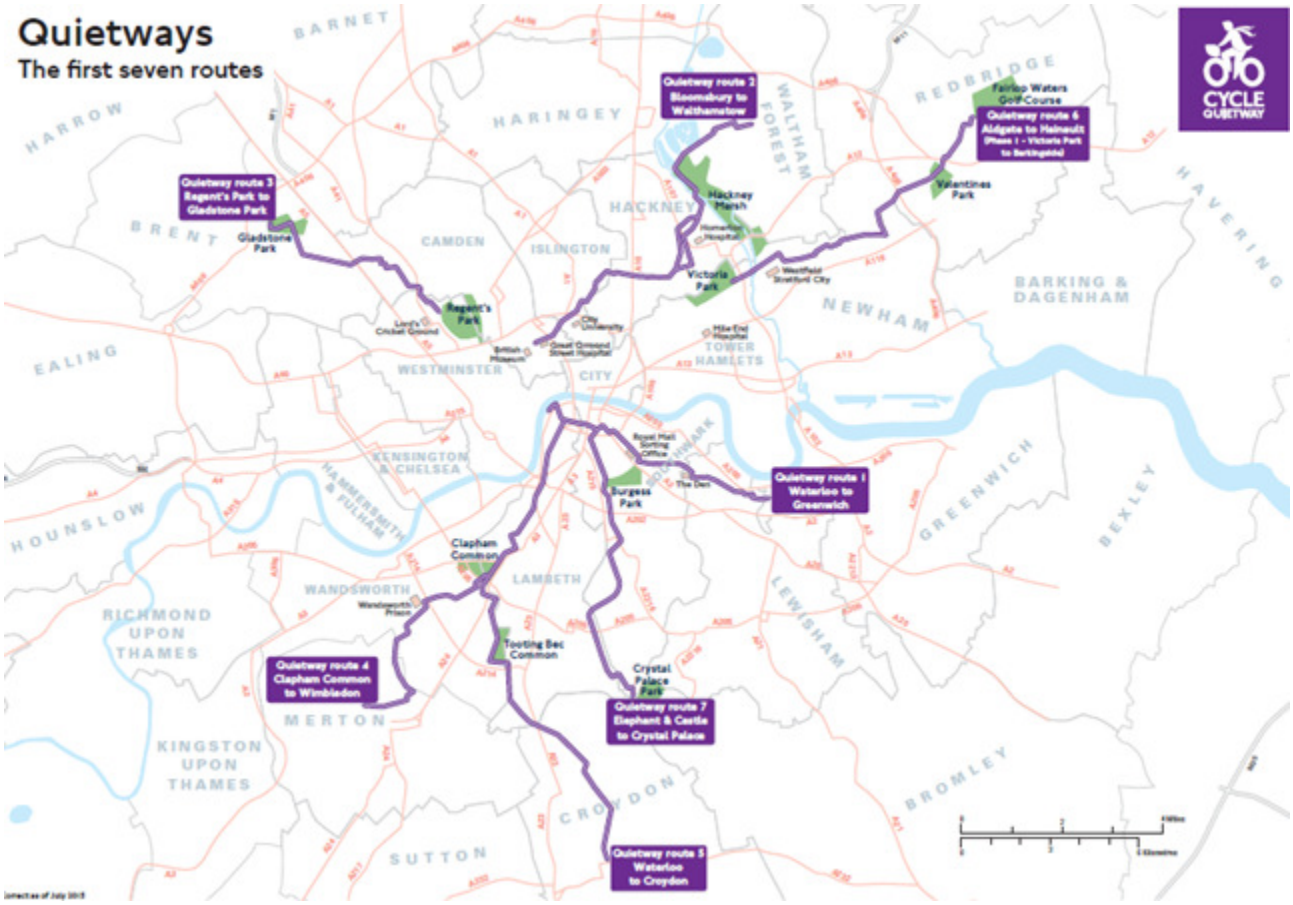
LBR will benefit from the introduction of London Quietways Route Number 6, running from Aldgate to Hainault (once completed). Phase 1 of this route will run from Victoria Park to Barkingside; this phase of Route 6 is depicted in Figure 3-1 and is displayed in the context of the other six routes in Figure 3-2.

Figure 3-1 London Quietway Route 6: Phase 1



TfL, working in collaboration with London Boroughs and partners such as Sustrans, are delivering seven Quietway routes by mid-2016. These routes will overcome barriers to cycling, targeting less confident cyclists who want to use low-traffic routes, while also providing for existing cyclists who want to travel at a gentler pace. To develop the new continuous cycle routes new wayfinding, surface and junction improvements will be introduced and barriers, such as chicanes, will be removed.

Figure 3-2 London Quietways: The First Seven Routes



3.1.3. Changes in Public Transport Accessibility

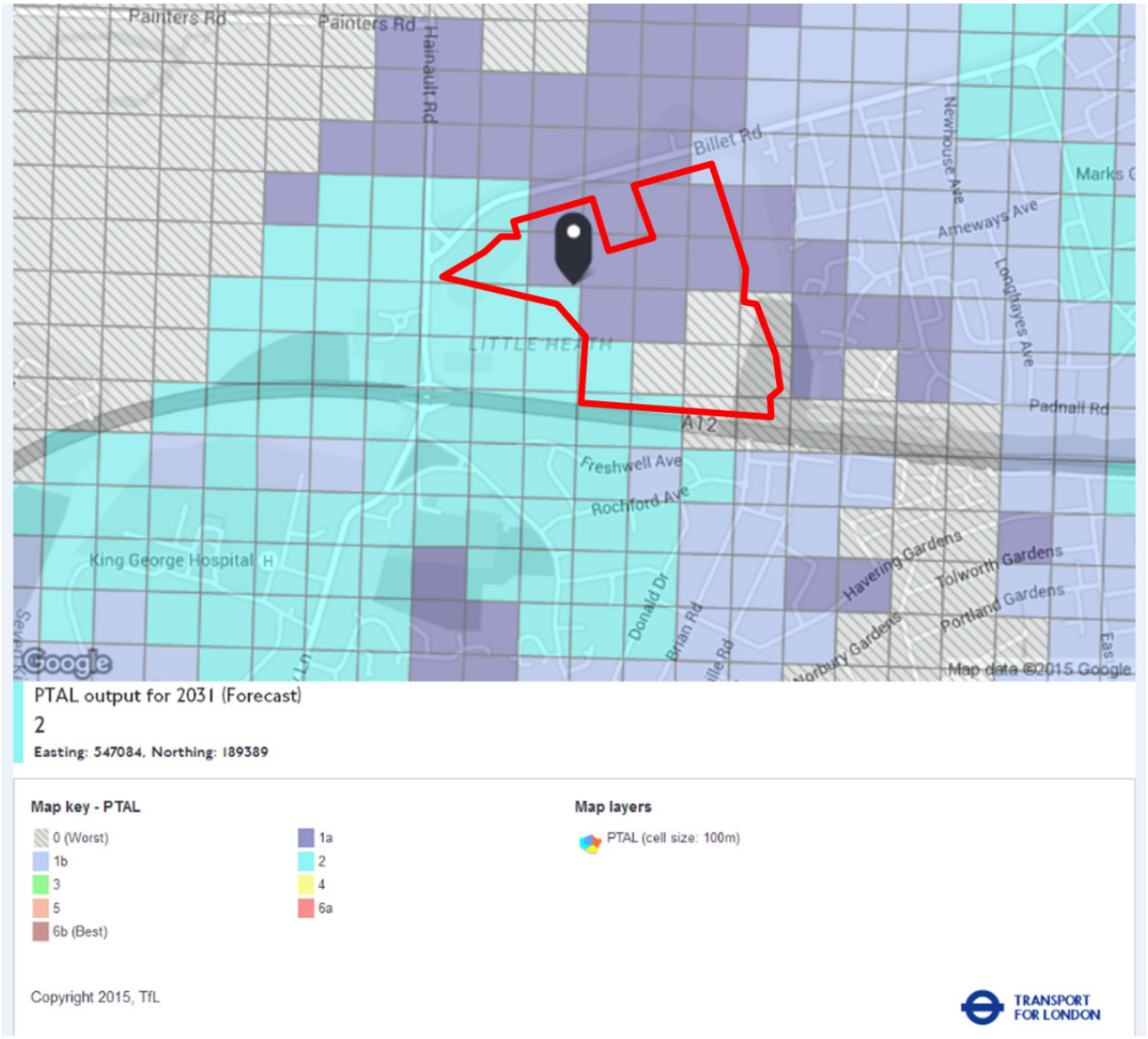
In order to contextualise the potential options for the Opportunity Site, and the impact of development of the site alongside extant consented development in the vicinity, PTAL reports for future years have been run to ascertain future public transport accessibility levels with committed transport schemes.

As a proxy for 2030 Plan Year, the 2031 Forecast Year includes committed and funded National Rail, London Overground, Tube and Bus service improvements (bus services based on Base Year plus a 3% service frequency uplift), and Crossrail 1. Crossrail 2 is not included in the 2031 forecast year as it is not yet fully funded.

Figure 3-3 illustrates the forecasted PTAL values for the site and its immediate vicinity for the year 2031. It is noted that whilst the Opportunity Site is located just outside of the Crossrail growth corridor, there is no change in PTAL levels forecast for the site as a result.

It is however important to note that WebCAT cannot take into account potential revisions to pedestrian accesses, paths, or bus penetration for sites that have not been allocated or consented for development. The Future Year PTAL values are therefore likely to improve as a result of this site alteration.

Figure 3-3 Billet Road Site: Future Forecasted PTAL 2031



3.2. 2030 Baseline Highway Network Capacity Assessment

3.2.1. TEMPRO Growth

As this site is being considered for Local Plan allocation for the period 2015 to 2030, traffic flow data secured from the ATC surveys has been factored using TEMPRO (Version 6.2) growth figures to provide predicted traffic flows for 2030 – the end year of the impending Local Plan.

Since 2008, it has generally been considered that traffic growth in London remains fairly stagnant, reflecting both economic health and in the context of investment in public transport. However, reflecting a plan year to 2030, and significant levels of growth in the area expected not least from the Crossrail Growth Corridor, and to be robust TEMPRO growth factors have been applied to the 2015 existing traffic count data.

The figures presented in Table 3-1 are considered realistic growth factors considering the planned growth in the region. TfL's Sub-Regional Transport Plan for the East and Southeast indicates that the region is forecasted to accommodate almost half of the population growth across London, and nearly a quarter of its

employment growth. As a result, the sub-region is expected to see an average 25% increase in total trips by 2031.

Table 3-1 presents the growth figures secured from TEMPRO for LBR for the period 2015 – 2030. It illustrates that traffic volumes are predicted to increase by 22.9% in the AM Peak and 22.7% in the PM Peak within Redbridge between 2015 and 2030.

Table 3-1 TEMPRO Growth Factors

Peak	2015 – 2030
AM	1.2291
PM	1.2275

A bespoke set of assessment criteria have been developed in order to consider the effect of the development yield scenarios for the site on the key links within the local highway network. This considers 2030 baseline – reflecting the Local Plan horizon derived from TEMPRO growth (NTM adjusted), with and without development, as a cumulative impact assessment. At this stage, no discounting has been made to reflect potential account for the site within the TEMPRO database, which is considered robust.

3.2.2. 2030 Future Year Volumes

Table 3-2 presents the forecasted traffic flow figures for the site once the TEMPRO growth figures from Table 3-1 have been applied to the ATC survey data.

The largest increase in PCUs is predicted to be 268 on the B177 Barley Lane.

Table 3-2 2015 Base vs. 2030 Base Traffic Flow Analysis

Period	Location	2015 Base Traffic Flow	2030 Base Traffic Flow	Increase	
				PCU	%
AM Peak Hour 08:00-09:00	Hainault Road	1001	1230	229	23%
	Billet Road	774	951	177	23%
	B177 Barley Lane	1170	1438	268	23%
PM Peak Hour 17:00-18:00	Hainault Road	1010	1240	230	23%
	Billet Road	1157	1420	263	23%
	B177 Barley Lane	947	1163	216	23%

Figures may not add up due to rounding of numbers

3.2.2.1. 2030 Link Capacity Utilisation

Table 3-3 presents the 2015 link flow capacity utilisation data from Table 2-7 alongside the TEMPRO adjusted ratio of flow to capacity to enable comparison of base link capacity utilisation without development over the duration of the Local Plan. This illustrates that all of the roads within the immediate vicinity of the site are predicted to continue to operate within capacity.

Table 3-3 2015 Base vs. 2030 Base Link Capacity Utilisation Analysis

Period	Location	Lanes / Direction	Theoretical Capacity	2015 Base Ratio of Flow to Capacity	2030 Base Ratio of Flow to Capacity	Increase	
						V/C	%
AM Peak Hour 08:00-09:00	Hainault Road	1	1530	0.39	0.48	0.09	23%
	Billet Road	1	1110	0.42	0.51	0.09	22%
	B177 Barley Lane	1	1530	0.46	0.56	0.10	22%

Period	Location	Lanes / Direction	Theoretical Capacity	2015 Base Ratio of Flow to Capacity	2030 Base Ratio of Flow to Capacity	Increase	
						V/C	%
PM Peak Hour 17:00-18:00	Hainault Road	1	1530	0.40	0.49	0.09	23%
	Billet Road	1	1110	0.63	0.77	0.14	22%
	B177 Barley Lane	1	1530	0.37	0.46	0.09	24%

Figures may not add up due to rounding of numbers

It is important to note that link capacity assessments only assess traffic flows in the immediate vicinity of the ATC site location, and assume unobstructed clear-way, they are not therefore necessarily an assessment of the operation of the entire road, or of junctions.

4. Development Scenarios

Two scenarios are being explored for the site – a Low and a High Yield. Details of the proposed scenarios are presented in Section 4.1 and Section 4.2.

For the purpose of facilitating impact assessment the site has had a quantum of development apportioned to areas within the site boundary based upon the location and viability of existing, and potential, access points, and the geographic constraints of the site. This approach has been applied consistently to each Yield Scenario, with the likely split of houses / flats agreed as appropriate with LBR

4.1. Low Yield Scenario

The Low Yield Scenario for the site comprises approximately 1,100 new homes with an overall mix of 49% flats and 51% houses.

- Potential Access Point A – approximately 283 houses and 272 flats
- Potential Access Point B – approximately 283 houses and 272 flats

4.2. High Yield Scenario

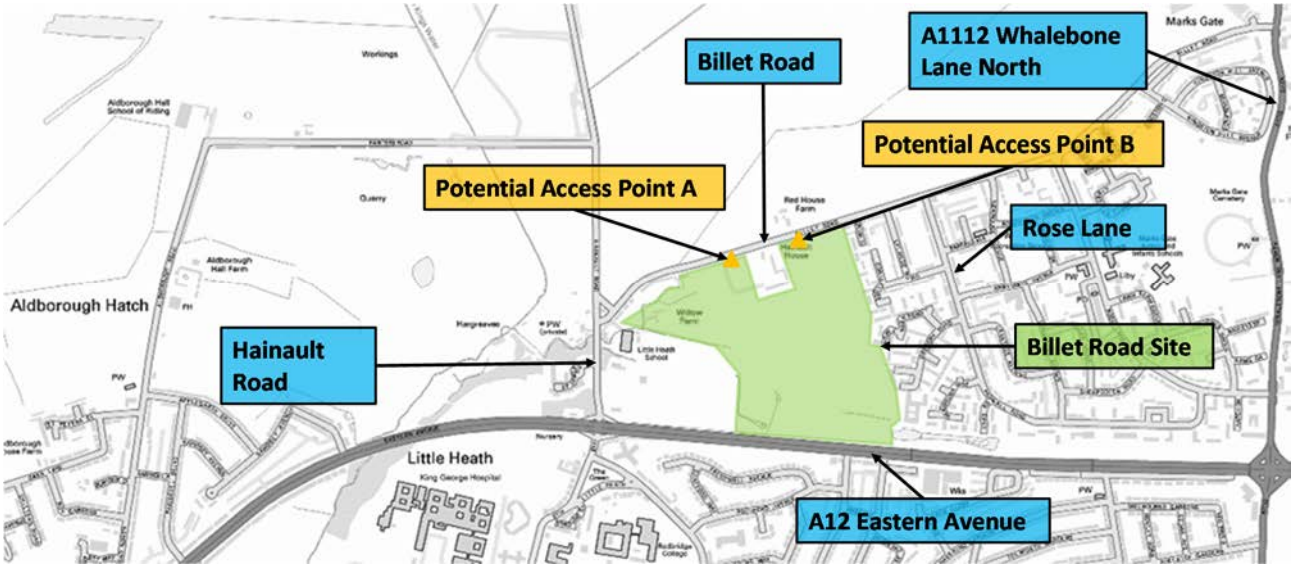
The High Yield Scenario for the site comprises approximately 1,600 new homes with an overall mix of 77% flats and 23% houses.

- Potential Access Point A – approximately 186 houses and 621 flats
- Potential Access Point B – approximately 186 houses and 621 flats

4.3. Site Access

As agreed with LBR, two potential vehicular access points to tie into the local road network only have been explored as part of this High Level TA; these approximate locations are depicted in Figure 4-1.

Figure 4-1 Approximate Locations of Potential Site Access Points



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4.3.1. Potential Access Point A

An existing access point (Figure 4-2) is located to the west of Hainault House and to the east of Property No. 62 Billet Road.

Figure 4-2 Potential Access Point A

The extant access point is approximately three metres wide, too narrow to facilitate two-way vehicular movement. It is advised that a CPO and subsequent widening of this access point be considered further to ensure safe two-way vehicular access, along with pedestrian access.

4.3.2. Potential Access Point B

Whilst there is no existing secondary access point, it is advised that a secondary access point be explored to the east of Hainault House – potentially immediately to the east of the gateway depicted in Figure 4-3.

Figure 4-3 Potential Access Point B

In order to facilitate a secondary site access point at this approximate location, a CPO and engagement with property owners will need to be explored further in order to provide safe pedestrian and vehicular access at this location. This point on Billet Road possesses good sight lines in both directions, and is not in the immediate vicinity of a junction.

4.3.3. Site Access Summary: Opportunity for Billet Road Site

Potential Access Point A: The extant access point is approximately three metres wide, too narrow to facilitate two-way vehicular movement. It is advised that widening of this access point (potentially including a CPO) be considered further to ensure safe two-way vehicular access, along with pedestrian access.

Potential Access Point B: There is no existing secondary access point to the site. In order to facilitate a secondary site access point at this approximate location, a CPO and engagement with property owners will need to be explored further in order to provide safe pedestrian and vehicular access at this location. This point on Billet Road possesses good sight lines in both directions, and is not in the immediate vicinity of a junction.

Ensuring that the site has permeability on an east-west axis for pedestrians and vehicles would firstly encourage bus penetration, which would increase accessibility and PTAL values – with a potential associated reduction in private vehicle reliance – and, secondly, improve access to local amenities and services for pedestrians.

4.3.4. Pedestrian Permeability

Ensuring that pedestrian routes exist within the site boundaries, at a minimum across north-south and east-west axis' will ensure permeability for pedestrians and increase the accessibility of local services.

It is suggested that provision of a pedestrian access to the south be further explored; this would connect the site to the A12 Eastern Avenue which would improve permeability, connectivity and access to facilities to the south and a wider range of bus services.

4.4. Access Overview

As the design and quantum of development at the site evolves, further study will be required to examine the optimum location of access points to the site. It is likely that improvements to the current access point, as well as land acquisition, will be required in order to facilitate the necessary number of safe vehicular, pedestrian, and cycle access points into the site.

5. Trip Generation Assessment

5.1. Trip Rates

The TRICS 2015(b) v 7.2.1 database has been interrogated in order to identify trip rates for the residential properties that comprise the proposed development for the site. TRICS is the UK and Ireland's national system of trip generation analysis containing in excess of 2,600 sites across over 100 types of land use and development. The programme includes a database of sites classified by size and land use that have been surveyed for trip generation information.

Sites with similar characteristics to the proposed developments can be selected from the database and used to predict the number of trips that will be generated. TRICS does not provide data on what parking restrictions, if any, have been applied at the individual sites surveyed. This TS assumes that parking will be provided at both proposed development sites in line with LBR parking standards, though at this stage no view has been taken on the level of parking restraint to be applied to each respective site.

The full details of TRICS site selections and outputs for the residential and educational land uses are presented in Appendix B. This method is endorsed by the DfT.

5.1.1. Appropriate TRICS Sites

The selection of sites for the residential element of the Opportunity Site was based on land use (private housing and private flats, Land Use 03, Categories A and C respectively), location type (primarily Suburban and Edge of Town) and comparable PTAL values to the proposed development site. It is believed that these parameters present a robust assessment for the development site.

5.1.2. Residential Trip Rate

For the purposes of this assessment it has been assumed that the AM Peak Hour and PM Peal Hour are 0800-0900 and 1700-1800 hours respectively. This produces the vehicular trip rates outlined in Table 5-1 and Table 5-2.

Table 5-1 TRICS Residential (Houses) Trip Rates

Period	Arrivals	Departures	Total
AM Peak Hour	0.105	0.207	0.312
PM Peak Hour	0.256	0.173	0.429
Daily	**2.28**	**2.344**	**4.624**

Table 5-2 TRICS Residential (Flats) Trip Rates

Period	Arrivals	Departures	Total
AM Peak Hour	0.043	0.101	0.144
PM Peak Hour	0.104	0.066	0.170
Daily	**0.783**	**0.828**	**1.611**

The trip rates extracted from TRICS for this TS were compared, cross-referenced, and validated against committed developments in the immediate vicinity of the site and are considered robust.

5.2. Mode Share

Using data from the 2011 Census, it is possible to derive a mode share for journey to work trips made by residents of Redbridge Borough, as summarised in Table 5-3, and displayed in Figure 5-1.

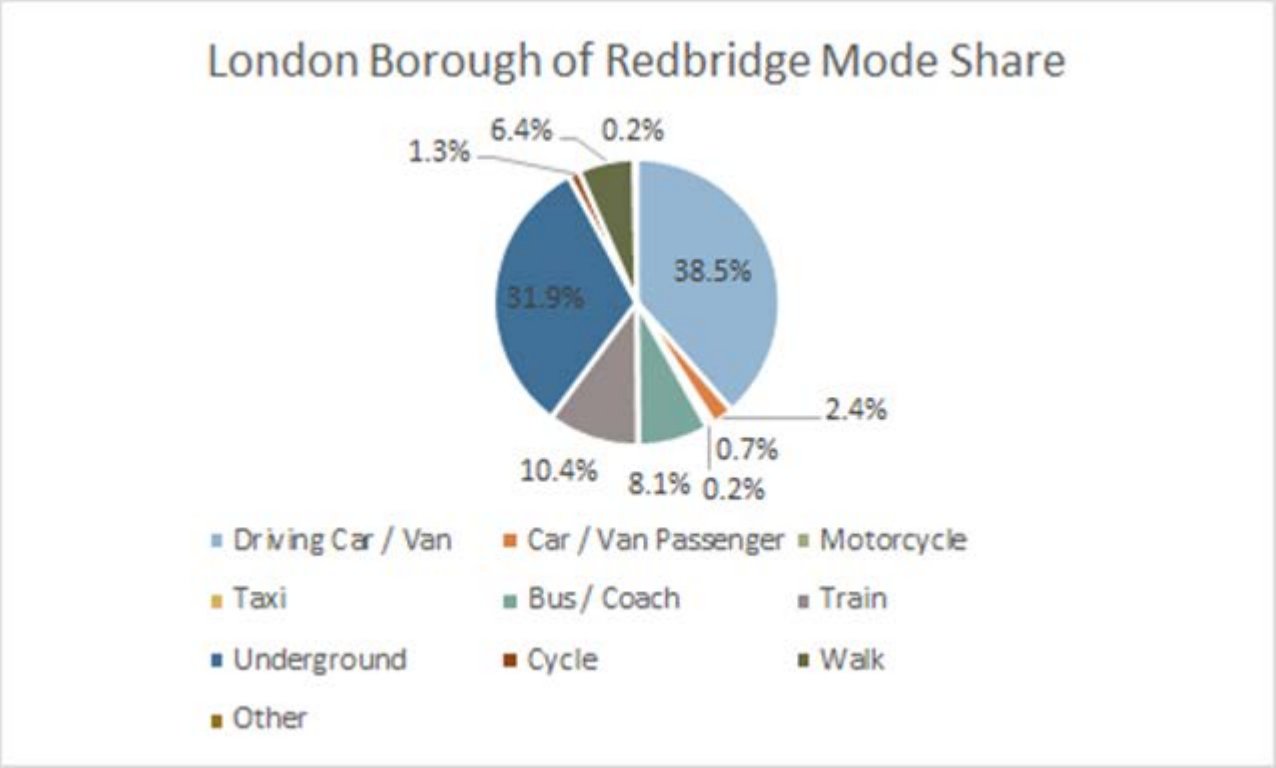
Table 5-3 2011 Census Mode Share

Mode	Percentage of Redbridge Residents
Driving a private vehicle	38.5%
Passenger in a private vehicle	2.4%
Motorcycle	0.7%
Taxi	0.2%
Bus / Coach	8.1%
Train	10.4%
Underground	31.9%
Bicycle	1.3%
Walk	6.4%
Other	0.2%
TOTAL	**100.0%**

The data from the 2011 Census indicates that a total of 40.9% of daily trips are undertaken by car. In total 49.9% of trips are vehicular (including taxis, motorcycles, buses and coaches). 50% of trips are predicted to be made by sustainable modes.

Given that the proposed site is located in an area with relatively low PTAL values –varying between PTAL 0 and 2 – these trip rates are considered representative and reflect the potential level of trips by both vehicular and sustainable modes that would be generated by the sizes and uses of developments proposed at this location.

Figure 5-1 London Borough of Redbridge Mode Share



5.3. Vehicular Trip Generation

As outlined in Section 4, development proposals for the site comprise two yield scenarios: Low and High. The Low Yield comprises approximately 1,100 homes, spread across two ingress / egress points. The High Yield comprises approximately 1,600 homes, again with two ingress / egress points.

5.3.1. Low Yield Trip Generation

As outlined in Section 4, the Low Yield Scenario for the site comprises approximately 1,100 homes. Table 5-4 depicts the vehicular trips generated by the site in the proposed Low Yield Scenario, across all land uses (residential flats and residential houses).

Table 5-4 Low Yield Trip Generation

Potential Access Point	Mode	AM Peak Hour	PM Peak Hour	Daily
Potential Access A	Vehicle	127	168	1747
Potential Access B	Vehicle	127	168	1747
All Potential Accesses	**Vehicle**	**254**	**336**	**3494**

As shown in Table 5-4 a worst-case of 336 vehicular trips would be generated during the PM Peak Hour, whilst 254 vehicular trips would be generated in the AM Peak.

5.3.2. High Yield Trip Generation

As outlined in Section 4, the High Yield Scenario for the site comprises approximately 1,600 homes. Table 5-4 depicts the vehicular trips generated by the site in the proposed High Yield Scenario, across all land uses (residential flats and residential houses).

Table 5-5 High Yield Trip Generation

Potential Access Point	Mode	AM Peak Hour	PM Peak Hour	Daily
Potential Access A	Vehicle	147	185	1857
Potential Access B	Vehicle	147	185	1857
All Potential Accesses	**Vehicle**	**294**	**370**	**3715**

N.B. Figures may not add up due to rounding

As shown in Table 5-4 a worst-case of 370 vehicular trips would be generated during the PM Peak Hour, whilst 294 vehicular trips would be generated in the AM Peak.

Table 5-6 summarises the total trips, across both Peak Periods, and Total Daily Trips, across all potential access points for the site, to facilitate a comparison of the Low and High Yield forecasted generated vehicular trips.

Table 5-6 Trip Generation Comparison

	Low Yield	High Yield
Total Daily Trips	3493	3715
Total AM Peak Trips	254	294
Total PM Peak Trips	336	370

N.B. Figures may not add up due to rounding

5.4. Vehicular Trip Distribution and Assignment

5.4.1. Distribution Principles

In order to distribute the Trip Generation figures secured from TRICS Census Data was utilised. As 2011 Census Data at a Ward level for the Origin and Destination of workplace and residence by transport mode is currently unavailable, data from the 2001 Census at a Ward level was secured and sensitivity tested against the 2011 Borough level Origin and Destination of workplace and residence covering London Borough Redbridge.

A comparison of the core employment regions across the 2001 Census data at Ward and Borough levels, and the 2011 Census data at Borough level is presented in Table 5-7.

Overall the difference between Ward and Borough levels is not significant enough to warrant utilisation of older data from the 2001 Census, therefore more recent Origin Destination information from the 2011 Census at a Borough level has been utilised for assessment purposes within the scope of this study.

Table 5-7 Census Data Comparison: Residence – Employment Region

Residence Region	Employment Region	Aldborough Ward 2001 Census	Redbridge Borough 2001 Census	Redbridge Borough 2011 Census
Redbridge	Redbridge	17.2%	16.7%	13.3%
Redbridge	London	39.2%	44.0%	42.1%
Redbridge	South East	0.3%	0.8%	0.9%
Redbridge	East	1.9%	5.1%	6.8%

5.4.2. Assignment

Based on 2011 Census information for London Borough of Redbridge, mode share information for travelling to work can be extracted, this information is presented in Figure 5-1

As Origin Destination data at a Ward level is not yet available for 2011 Census data, trips from the 2011 Census that occur within the London Borough of Redbridge (either within or between wards) have been distributed evenly across the selected distribution roads.

Vehicle movements between boroughs have been assigned to the higher order road network based on the quickest route – derived from Google Maps, including both distance and journey time; the primary routes that these vehicular movements utilise are:

- The M25;
- The M11;
- The A408;
- The A12; and
- The A13.

Vehicular trips generated by the site have been allocated to the following local distributor roads, at the following percentages, depending on which road provides the quickest route (balancing distance and journey time) to the higher order road network roads.

- Hainault Road Northbound – 8.98%;
- Hainault Road Southbound – 0.16%;
- Billet Road Eastbound – 12.06%;
- Billet Road Westbound – 5.31%;
- B177 Southbound – 35.02%
- A12 Eastbound – 9.07%; and
- A12 Westbound – 29.40%.

5.5. Multi-Modal (Sustainable Transport) Trip Generations

Applying the mode share information derived from the 2011 Census information on LBR residents' method of travel to work (Section 5.2) to the trip generation information extracted from the TRICS database (Section 5.1) generates the following indicative multi-modal sustainable transport (non-private vehicle) daily trips for the site by development yield, shown in Table 5-8.

Table 5-8 Multi-Modal (Sustainable Transport): Daily Trip Generation

Mode	Development Yield	
	Low	High
Public Transport	4,305	4,577
Walk	547	581
Cycle	111	118
Total	4,963	5,276

6. Impact Assessment

This section outlines the impact assessment of the proposed site, and its two yield scenarios. As this site is being considered for potential land allocation for LBR's 2015 – 2030 Local Plan this chapter will assess the impact of the site for 2030 – the end year of the impending Local Plan - in order to assess long-term impact and potential viability of the proposed site.

6.1. Assessment Methodology

6.1.1. Prediction of Impacts

Whilst this report has largely followed the structure and content of a Transport Statement, the '***Transport evidence base in plan making'*** PPG accompanying NPPF places emphasis on consideration of transport-related environmental impacts and including accessibility, congestion, mobility and safety. As such, whilst not explicitly required, an approach to dealing with the traffic data has been adopted to include an Environmental Impact Assessment (EIA) criteria approach to better understand the likely impacts on the development not only in terms of indicative highway capacity, but also in terms of severity of impact and how this might impact on local communities.

The likely traffic flow changes on the road network with development scenarios has been assessed using a set of criteria developed for the study. The criteria used for the identification and assessment of potentially significant impacts is summarised below and follows in approach the considerations for traffic and transport assessment under EIA as informed by DMRB Volume 11 ***'Environmental Assessment'*** (1993 and updates), Institute of Environmental Assessment (IEA) ***'Guidelines for the Environmental Assessment of Road Traffic'*** (1993), and professional judgement as relevant for assessing traffic flow changes where a significant increase reflects:

- An increase in traffic flows (i.e. HGV or all vehicles) where the increase is greater than 40 vehicles per day in urban areas; and
- Where a significant change in delay relating to congestion resulting from the development scenarios on key links as agreed with the Local Highway Authority and measured as a ratio of flow to capacity, or Volume / Capacity (V/C).

Based on the IEA Guidance, during the operational phase of development, a significant impact in traffic levels (i.e. HGVs and all vehicles) and driver and passenger delay is defined as a 10% increase in Peak Hour two-way traffic flows and / or increases in traffic flows that cause the design capacity to be exceeded, on links that would not otherwise be congested.

The assessment criteria for percentage increase has been set in this context, and further in terms of capacity in accordance with DfT Guidance where 85% means that the link operates satisfactorily, above 85% it is approaching capacity, and beyond 100% it is over capacity. These are summarised in Table 6-1.

Table 6-1 Assessment Thresholds

% Increase	V/C	Impact
<5%	<85%	Low
5-10%	85-100%	Medium
>10%	>100%	High

6.1.2. Evaluation and Assessment of Significance of Impacts

Typically, such criteria are developed from a matrix approach comprising the value / sensitivity of the resource on one axis and the magnitude of the predicted effect on the other. As such, to assess the likely magnitude of impact arising from the predicted increase in traffic volumes, this has been aligned against a review of the forecast V/C of links assessed, as per the spatial scope agreed with LB Redbridge Highways for the AM and PM network Peak Hours. The Impact Significance Matrix is summarised in Table 6-2.

Table 6-2 Traffic Impact Significance Matrix

		Magnitude of Impact		
V/C	% Increase	<5%	5-10%	>10%
<85%		Minor	Minor	Moderate
85-100%		Moderate	Moderate	Major
>100%		Major	Major	Major

For each scenario, the links considered in this assessment have been categorised in accordance with the above matrix in order to identify where impacts are likely to be considered 'Moderate' requiring some level of mitigation and 'Major' that are likely to require more significant levels of intervention to accommodate the development proposals. At this stage, no assessment has been undertaken of residual impacts.

6.2. Vehicular Impact

6.2.1. Traffic Volume Impact

Table 6-3 and Table 6-4 presents the 2030 TEMPRO-adjusted base traffic flow information in PCUs to enable assessment of the likely impact of the Low Yield and High Yield development scenarios.

Table 6-3 2030 Low Yield Development Traffic Flow Analysis

Period	Location	2030 Base Traffic Flow	2030 Low Yield Traffic Flow	Increase	
				PCU	%
AM Peak Hour 08:00-09:00	Hainault Road	1230	1418	188	15.3%
	Billet Road	951	1171	220	23.1%
	B177 Barley Lane	1438	1528	90	6.3%
PM Peak Hour 17:00-18:00	Hainault Road	1240	1487	247	19.9%
	Billet Road	1420	1704	284	20.0%
	B177 Barley Lane	1163	1280	117	10.1%

Figures may not add up due to rounding of numbers

Table 6-3 shows that Billet Road is predicted to experience the biggest increase in traffic flows – an additional 220 and 284 PCUs are forecast in the AM and PM Peak Hours respectively.

Table 6-4 2030 High Yield Development Traffic Flow Analysis

Period	Location	2030 Base Traffic Flow	2030 High Yield Traffic Flow	Increase	
				PCU	%
AM Peak Hour 08:00-09:00	Hainault Road	1230	1447	217	17.6%
	Billet Road	951	1206	255	26.8%
	B177 Barley Lane	1438	1541	103	7.2%
PM Peak Hour 17:00-18:00	Hainault Road	1240	1512	272	21.9%
	Billet Road	1420	1733	313	22.0%
	B177 Barley Lane	1163	1292	129	11.0%

Figures may not add up due to rounding of numbers

Table 6-4 shows that Billet Road is predicted to experience the largest increase in traffic flows – an additional 255 and 313 PCUs are forecast in the AM and PM Peak Periods respectively.

6.2.2. Link Capacity Utilisation Assessment

Table 6-5 and Table 6-6 present the forecasts 2030 base ratio of flow to capacity in comparison with the predicted impact of the development yield scenarios on the local highway network.

Table 6-5 2030 Low Yield Development Link Capacity Utilisation Analysis

Period	Location	Lanes / Direction	Theoretical Capacity	2030 Base Ratio of Flow to Capacity	2030 Low Yield Ratio of Flow to Capacity	Increase	
						V/C	%
AM Peak Hour 08:00-09:00	Hainault Road	1	1530	0.48	0.56	0.08	16.7%
	Billet Road	1	1110	0.51	0.63	0.12	23.5%
	B177 Barley Lane	1	1530	0.56	0.60	0.04	7.1%
PM Peak Hour 17:00-18:00	Hainault Road	1	1530	0.49	0.58	0.09	18.4%
	Billet Road	1	1110	0.77	0.92	0.15	19.5%
	B177 Barley Lane	1	1530	0.46	0.50	0.04	8.7%

Figures may not add up due to rounding of numbers

Table 6-5 indicates that, with Low Yield development generated trips included in the network flows for 2030, that only Billet Road in the PM Peak Period is forecast to operate over capacity, with a ratio of flow to capacity of 0.92 during the PM Peak Period. This is approaching theoretical capacity.

Table 6-6 presents the link capacity utilisation analysis for High Yield development on top of 2030 TEMPRO-derived base traffic flows.

Table 6-6 2030 High Yield Development Link Capacity Utilisation Analysis

Period	Location	Lanes / Direction	Theoretical Capacity	2030 Base Ratio of Flow to Capacity	2030 High Yield Ratio of Flow to Capacity	Increase	
						V/C	%
AM Peak Hour 08:00-09:00	Hainault Road	1	1530	0.48	0.57	0.09	18.6%
	Billet Road	1	1110	0.51	0.65	0.14	27.5%
	B177 Barley Lane	1	1530	0.56	0.60	0.04	7.1%
PM Peak Hour 17:00-18:00	Hainault Road	1	1530	0.49	0.59	0.10	20.4%
	Billet Road	1	1110	0.77	0.94	0.17	22.1%
	B177 Barley Lane	1	1530	0.46	0.51	0.05	10.9%

Figures may not add up due to rounding of numbers

Table 6-6 indicates that, similar to the Low Yield scenario in 2030, the High Yield development scenario sees only Billet Road is forecasted to operate over capacity, with a slightly higher ratio of flow to capacity of 0.94 in the PM Peak Period. This is approaching theoretical capacity.

It is important to note that link capacity assessments only assess traffic flows in the immediate vicinity of the ATC site location, and assume unobstructed clear-way, they are not therefore necessarily an assessment of the operation of the entire road, or of junctions.

6.3. Multi-Modal (Sustainable Transport) Impact

As outlined in Section 5.5, the Low Yield is predicted to generate 4,963 trips across Public Transport, Walking and Cycling, whilst the High Yield is predicted to generate 4,577 trips across the same modes.

Whilst the site does not score a high PTAL value, it is nevertheless within 1.8km of Chadwell Heath Station (a 23 minute walk) and within 2.3km of Barkingside and Newbury Park LUL Stations (a 29 minute walk).

The majority of bus stops in the immediate vicinity of the site are situated on the Billet Road and Rose Lane. In addition to these stops route number 66 routes along the A12; this service could be made accessible through the provision of a pedestrian access link to the south of the site.

The predicted trip numbers generated by the development are not thought likely to present a substantial issue for the capacity of public transport, however the future capacity of the Central Line would need to be reviewed as part of any development.

Pedestrians utilising Billet Road, Rose Lane, the B177 Barley Lane and the A1112 Whalebone Lane North to reach bus stops, stations, or to continue on foot are well provided for in terms of extant footways and crossing points.

The A12 makes provision for north-west pedestrian crossings via an overpass bridge to the west of the junction with the B177, a signalised junction with dropped kerbs but no tactile material or railings situated to the east of the same junction.

6.4. Impact Summary

An assessment of the predicted impact of development at the Billet Road Site, across all development yield options – Low and High Yield for the year 2030 – indicates that both yield options would push one road – Billet Road – operating over its practical capacity, and approaching its theoretical capacity, during the PM Peak (operating at a ratio of flow to capacity of 0.92 and 0.94 in the Low and High Yields respectively).

Once the roads in the immediate vicinity of the site have been processed through the Significance Matrix the overall development impact by road is as follows (irrespective of development yield):

- Hainault Road: 'Moderate' Impact ('Low' V/C and 'Major' % Increase) in both the AM and PM Peaks;
- Billet Road: 'Moderate' AM and 'Major' PM Peak Impact ('Low' V/C and 'Major' % Increase AM Peak, 'Moderate' V/C and 'Major' % Impact PM Peak); and
- B177 Barley Lane: 'Minor' AM and 'Moderate' PM Peak Impact ('Low' V/C and 'Moderate' % Increase AM Peak, 'Low' V/C and 'Major' % Increase PM Peak).

Table 6-7 presents a visual summary of the Impact Significance across the studied roads.

Table 6-7 Impact Summary: Significance

Location	V/C		% Increase		Overall Impact	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Hainault Road						
Billet Road						
B177 Barley Lane						

Reflecting the spatial scope of the assessment, it is reasonable to consider that whilst the links assessed in this High Level TS are forecast to largely accommodate traffic forecasts in each development scenario, the following junctions would need to be reviewed to ascertain whether mitigation will be required:

- Hainault Road / A12 Eastern Avenue;
- Hainault Road / Billet Road; and

- Billet Road / A112 Whalebone Lane North.

The junctions highlighted above have been identified as those most likely to require further review due to their geographic proximity to the Opportunity Site, and their use by vehicles routing to the higher order road network. These junctions do not constitute an exhaustive list; it is possible that additional junctions will warrant further assessment to ascertain the impact of any potential development at the Opportunity Site.

It is important to note that, other than Billet Road, the roads assessed remain within both practical and theoretical capacity. These roads are however primarily residential, therefore, without mitigation, some potential loss of amenity and increased severance for residents may be anticipated based upon the volume of traffic flow increases. It has been identified that there is likely to be a moderate to major impact on Billet Road; however the majority of development traffic is predicted to travel west on Billet Road to reach the A12, whilst some residences front Billet Road to the west of the site, it is predominantly a carrier of through traffic and is therefore less sensitive as a receptor, and it is still forecast to remain within theoretical capacity.

Further, the A12, Billet Road, and the B117 Barley Lane serve bus routes which would potentially be impacted by the volume of increase in private vehicle traffic flows in terms of increased bus journey times and reduced journey time reliability.

The A12 was not assessed as part of this study, as agreed during scoping; however, due to its high traffic flow and the proportion of development-generated trips forecast to utilise the A12, further study of the impact of any quantum of development upon the A12 and the opportunity for a Left-In/Left-Out access junction on the A12to take a proportion of the traffic off the local road network is suggested.

Within the vicinity of the site, the A1112 Whalebone Lane North and the B177 Barley Lane make existing provision for cycle infrastructure on-road which may potentially be impacted by the volume of increase in private vehicle traffic flows in terms of road safety, perceived danger, and cyclist amenity.

6.5. Impact Overview

From the impact assessments undertaken for the site it is evident that, once a more detailed masterplan and quantum of potential development is established, there will be a need to carry out more detailed multi-modal trip generation and assignment, link and junction capacity analysis and modelling, and public transport patronage impact assessments, once the development scenarios and access points for the site have been progressed to a more refined planning and detailed design stage.

This further assessment work will be required to better understand impacts and likely mitigation requirements.

7. Conclusions and Recommendations

Atkins Transportation (Atkins) has been appointed by The London Borough of Redbridge (LBR) to provide transport planning consultancy services to support a review and feasibility study of a site's potential Local Plan Allocation.

A key part of the draft Local Plan is the need for some 16,845 new homes to be completed over the 15 year plan period to 2030 (1,123 new homes per annum). An Opportunity Site has been identified by LBR's Planning and Regeneration department – Billet Road – located between the A12 to the south and Billet Road to the north.

As the Local Plan is a strategic document it does not set out in detail specific development requirements for the Opportunity Site. However, given the significance of the Opportunity Site, an assessment of the site has been prepared by the Council's Planning & Regeneration Service to establish the likely level of development. This assessment shows that the site could yield between 1,100 and 1,600 new homes, with supporting infrastructure also provided.

7.1. Multi Modal (Sustainable Transport) Access

Reflecting the sub-urban setting there are a range of local amenities and services within an acceptable walking and cycling distance of the site.

The existing surrounding pedestrian footways are, in general, in a good state of repair with footways of a suitable width supported by informal and formal signalised crossings. However, there is intermittent extant provision of dropped kerbs and tactile material. Improvements to dropped kerbs and tactile material should be explored to ensure accessibility of the site for all pedestrians.

The site is well located for pedestrian access. Whilst access to rail stations falls just within, and access to LUL Stations just outside of a considered walking distance, a number of bus stops are in close proximity to the site. Pedestrian accessibility to the wider area is reasonable, with numerous local amenities and facilities including medical, schools, and shops within an acceptable (south) distance; within a considered distance (south / south-east) are medical, schools, shops and banks. Many surrounding services, amenities and other settlement areas can safely be accessed by cycle from the site within a 0-15 minute journey time.

When assessed against existing and future PTAL (incorporating Crossrail) the site has a low PTAL value, however this is reflective of the edge of London location, and a review of public transport networks reveals bus stops within an acceptable walking distance and rail stations within an acceptable cycling distance of the centroid of the site. It is also important to highlight that the WebCAT tool cannot take account of potential improvements (for pedestrians or public transport access) for sites that have not yet been allocated or consented for development – it is therefore likely that the PTAL Future Year values for the site would improve should the site be improved and improvement initiatives are implemented.

It is therefore considered that with suitable provision of infrastructure to access the site, and some improvement to pedestrian infrastructure provision, that the proposed site offers the opportunity to deliver development that is sustainable in transport terms in accordance with NPPF.

7.2. Impact Assessment

The assessment has identified that in Plan Year 2030, irrespective of yield development, the site is likely to have a Moderate to Major impact on Billet Road, a Moderate Impact upon Hainault Road, and a Minor to Moderate Impact on the B177 Barley Lane.

Whilst the majority of the roads (with the exception of Billet Road) in the immediate vicinity of the site remain within both practical and theoretical capacity, these roads are primarily residential and that therefore, without mitigation, some potential loss of amenity and increased severance for residents may be anticipated based upon the volume of traffic flow increases. It has been identified that there is likely to be a moderate to major impact on Billet Road; however the majority of development traffic is predicted to travel west on Billet Road to reach the A12, whilst some residences front Billet Road to the west of the site, it is predominantly a carrier of

through traffic and is therefore less sensitive as a receptor, and it is still forecast to remain within theoretical capacity.

Further, the A12, Billet Road, and the B177 Barley Lane cater for bus routes which would potentially be impacted by the volume of increase in private vehicle traffic flows on these roads in terms of bus service delay and increased journey times.

Whilst the A12 has been considered as part of the Study Area, the vehicular impact of the development yield scenario on the A12 Eastern Avenue was not assessed as part of this study as agreed during scoping as it forms part of the higher order road network. However, due to its high traffic flow and the proportion of development-generated trips forecast to utilise the A12 and direct access opportunities, further study of the impact of any quantum of development upon the A12 is suggested.

7.3. Potential Access Points

The key vehicular access opportunities have been identified on Billet Road. It is likely that improvement to the existing access point, as well as land acquisition – both adjacent to extant access points, and to facilitate the creation of new vehicular access points– will be required in order to facilitate the necessary number of safe vehicular, pedestrian, and cycle access points into the site.

There are also opportunities to the south via the A12 for pedestrians and cyclists and/or vehicles, and as the design and quantum of development at the site evolves further study will be required to examine the optimum location and access points to the site.

7.4. Potential Mitigation

Reflecting the spatial scope of assessment, it is reasonable to consider that whilst the links assessed in this High Level TS can largely accommodate traffic forecasts in each development scenario, the following junctions would need to be reviewed to ascertain whether mitigation will be required:

- Hainault Road / A12 Eastern Avenue;
- Hainault Road / Billet Road; and
- Billet Road / A112 Whalebone Lane North.

Pedestrian accessibility would benefit from improved pedestrian crossing infrastructure at the junction of Billet Road and Hainault Road. There is current provision of a traffic island, however no dropped kerbs or tactile material is present at this location (Section 2.2).

Bus service accessibility could be improved through the provision of south-north crossing facilities on Billet Road to enable pedestrians to more safely access eastbound services which stop at bus stops that are currently segregated due to lack of footways on the north side of Billet Road and a lack of existing north-south pedestrian crossing infrastructure.

The Hainault House bus stop on the northern side of Billet Road could be improved through the provision of a shelter and seating for passengers.

Whilst the 85th percentile speeds recorded were within the posted speed limit on Hainault Road, Billet Road saw 85th percentile vehicle speeds between 3 and 17% above the posted limit. Billet Road may therefore benefit from the implementation of traffic calming measures.

It is also suggested that, in order to reduce stress from development-generated trips on Billet Road, that a left-in left-out access to the site from the A12 be explored during more detailed planning stages for the site.

7.5. Recommendations

This Transport Study has been drawn together as a ‘High Level TS’ from which the likely impacts of the scheme, and suitability of existing infrastructure, have been considered.

The planning process can be used to ensure the introduction a range of travel demand management measures that can supress the volume of single occupancy vehicles generated by the development. The assessment in

this report has assumed an un-restrained approach to car park provision, however the implementation of parking provision at or below policy requirements and a 'lining and signage' road marking strategy across the development to limit availability of on-street parking would inherently reduce the vehicle trip forecasts. Further reductions in single occupancy car trips can be achieved through a range of measure including those that can be delivered and monitored through Residential Travel Plans imposed as a planning condition, and including provision of car club spaces, car sharing and enticements to use alternative active travel modes and public transport.

With the site 'unlocked,' accessibility to local services and public transport on foot and bicycle will be enhanced. It is noted that the future capacity of the Central Line would need to be reviewed as part of any development. As part of the transport strategy the opportunity to improve public transport including penetration by bus – that could improve the PTAL rating of the site – subject to sufficient yields justifying diversion, or provision of a new service, should be considered for discussion with bus operators.

It is recommended that to take any development scenario to planning, a detailed modelling exercise will be required to consider the impact of development proposals in terms of highway network capacity with localised junction capacity assessments covering an agreed spatial extent to arrive at necessary interventions to mitigate the traffic impact of development. The assessment would need to refine background traffic growth forecasts and agreed trip rates to reflect the confirmed land use schedules and transport / access strategy once developed.

The impact of the development yields on the A12 Eastern Avenue was not assessed as part of this study, as agreed during scoping. However, due to its high traffic flow and the proportion of development-generated trips forecast to utilise the A12, further study of the impact of any quantum of development upon the A12 and the opportunity for a Left-In/Left-Out access junction on the A12 that would take a proportion of the traffic off the local road network is suggested.

Appendices

Appendix A. Traffic Survey Data

Appendix B. TRICS Sites

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