LB Redbridge Local Plan Transport Evidence Supplementary Technical Note

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London Borough of Redbridge	LB Redbridge Transport Evidence	22/06/2017	60528141
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1.1. Introduction

AECOM has been commissioned by the London Borough of Redbridge (LBR) to provide transport planning advice in respect of their Local Plan (2015 to 2030) Evidence Base.

AECOM previously produced a high level Transport Evidence Report (TER) dated March 2017, to assess the impact of the Local Plan (LP) allocation sites on the transport network within the Borough. This note intends to build upon this, by identifying the junctions and links that are likely to experience the greatest vehicular impact from the proposed LP allocation sites, the proportional impact of the LP allocation sites at these junctions and links and to help inform LBR of potential mitigation measures that may be required.

This note is presented in two main sections:

- Transport for London (TfL) East London Highway Assignment Model (ELHAM) Review; and
- Review of the Proportional Impact of Local Plan Sites.

The first section is an LBR-centric review of the Transport for London (TfL) East London Highway Assignment Model (ELHAM). Data has been extracted from the model to understand whether the forecast net increase in traffic (at the 7 junctions and 3 links identified in the TER) will have a significant impact in terms of delays and queuing. The ELHAM contains traffic forecasts to 2031 which help to consider the forecast performance of junctions and links, including those that are expected to experience capacity constraints by the end of the LP period in 2030.

Section 1.3 comments on potential mitigation measures that could be considered at junctions and links where capacity issues are identified in the forecast year.

Section 1.4 considers the vehicular impact of individual allocation sites at the junctions and links predicted to experience the largest increases in traffic flows in 2030 as identified in the TER. This will help inform, at a later stage, which of the sites should consider operational performance and potential mitigation in further detail. The TER and information contained within the supporting spreadsheet model could therefore also help inform LBR of which sites should be targeted for proportional contributions towards improvements, thereby assisting with the delivery and implementation of the Local Plan at the appropriate stage.

1.2. ELHAM Model Review

TfL's Highway Assignment Models (HAMs) are strategic models, which focus on specific regions of London. The East London HAM (ELHAM) is one of five sub-regional highway assignment models. Data has been extracted from ELHAM (version 3.6) for the purposes of this assessment for the AM and PM peak hours (08:00-09:00 and 17:00-18:00 respectively) for the forecast year (2031).

The data extracted for the above time periods and years includes the following:

- Volume over capacity (V/C): a Ratio of the total volume of traffic over the available capacity of a junction arm or link;
- Delay in seconds per Passenger Car Unit (PCU): Gives an indication of driver delay at each junction (per arm) or link; and
- Queues in PCUs: Queue data is only available for links and not junctions.

Extraction of this data from ELHAM will provide an understanding of any existing and forecast capacity issues at junctions and links, identified in the TER, to experience the largest net increase in traffic by 2030 as a result of allocation site traffic. Initially, the capacity and delay data for the junctions and links forecast to experience a 20-30% increase in traffic as identified in the TER by 2030 have been analysed. This is to determine whether these junctions and links are likely to have available capacity to accommodate additional traffic or whether mitigation measures to increase capacity may need to be considered.

The TER is based on a forecast year of 2030 in line with the end of the LP period. It is acknowledged that the ELHAM model contains forecasts for 2031. However, considering that there is only one year's difference between the two forecast years, it is considered that the 2031 ELHAM data will be able to provide a good understanding of potential capacity issues at the end of the Local Plan period.

ELHAM Data

The TER identified 22 key junctions and 7 key links within the borough based on the core growth areas and following liaison with LBR. Of these, 7 junctions and 3 links were forecast to experience a 20-30% net increase in traffic arising from LP site allocations.

In order to understand the significance of the forecast net increases in the TER in more detail, in the context of forecast capacity and delay in 2031, the ELHAM was reviewed to draw out the junctions and links that are expected to be operating over capacity by 2031. **Table 1** indicates whether or not the ten junctions and links, identified in the TER as having the highest net increases in traffic (the 'top 10' with over a 20% increase), are forecast to be over-capacity by 2031 in ELHAM.

Table 1: Capacity of Top 10 Junctions and Links (ELHAM)

Ref	Junctions	More than 1 arm near/above capacity?	
		AM	PM
J2	Ilford Lane / Winston Way	**Yes**	
J3	A123 Cranbrook Road / High Street / Chapel Road / Winston Way / Roden Street / A118 Ilford Hill	Data not available	
J5	Winston Way / Griggs Approach	**Yes**	No
J6	High Road / A1083 Green Lane / Winston Way	Data not available	
J7	High Road / Cameron Road	No	
J8	A118 High Road / Barley Lane	**Yes**	
J13	A12 Eastern Avenue / Barley Lane / Hainault Road	**Yes**	
Ref	**Links**		
L1	A118 High Road, Ilford	**Yes**	
L4	Billet Road	No	
L7	Barley Lane south of Grensham Drive (south of ex-hospital access)	No	

For the junctions listed, the table shows where one or more arms of a junction is expected to be over-capacity by 2031. For all junctions, arms with a volume over capacity ratio of 1.0 or more are considered to be over-capacity. For non-signalised junctions, arms with a volume over capacity ratio of between 0.85 and 1.0 are considered to be nearing capacity. For signalised junctions, arms with a volume over capacity ratio of between 0.90 and 1.0 are considered to be over capacity.

The junctions and links have been highlighted with a red, amber green (RAG) rating to indicate their capacity as follows:

- Red: V/C ratio of 1.0 or more (over-capacity);
- Amber: V/C ratio of between 0.85/0.90 and 1.0 depending on the junction type (nearing capacity); and
- Green: V/C ratio of less than 08.5/0.90 depending on the junction type (within capacity).

In addition to the 'top 10' junctions and links identified in the TER, data was also extracted from ELHAM for the remaining junctions and links (i.e. those identified in the TER as having under a 20% net increase in traffic). **Table 2** indicates whether the remaining junctions are forecast to be over-capacity by 2031 in ELHAM.

Table 2: Capacity of Remaining Junctions and Links (ELHAM)

Ref	Junctions	More than 1 arm near/above capacity?	
		AM	PM
J1	Ilford Hill / Romford Road / A406 Slip Roads	Data not available	
J4	Ley Street / Griggs Approach	**Yes**	No
J9	High Road / Wangey Road / Station Road (including Chadwell Heath Lane)	Data not available	
J10	Gants Hill Roundabout (A12 Eastern Avenue / A1400 Woodford Avenue / A123 Cranbrook Road)	Data not available	
J11	A12 Eastern Avenue / Horns Road / Ley Street	**Yes**	
J12	A12 Eastern Avenue / Aldborough Road	Data not available	
J14	A123 Cranbrook Road / Tanners Lane	No	**Yes**
J15	Fullwell Cross Roundabout (Forest Road / Craven Gardens / A123 High Street / Fullwell Avenue / Fencepiece Road)	**Yes**	
J16	A1199 High Road / B168 George Lane	No	**Yes**
J17	A12 / A406 (Redbridge Roundabout)	Data not available	
J18	Fairlop Road / Clayhall Avenue / Freemantle Road / Looe Gardens	No	
J19	Freemantle Road / High Street / Baron Gardens	**Yes**	
J20	A1400 Woodford Avenue / Longwood Gardens / Beehive Lane / Redbridge Lane East	No	
J21	A1400 Woodford Avenue / Clayhall Avenue	**Yes**	
J22	Charlie Browns Roundabout (Chigwell Road / A1400 Woodford Avenue / Southend Road)	**Yes**	
Ref	**Links**		
L2	Aldborough Road South	No	
L3	A12 near Barley Lane	No	
L5	Fencepiece Road	No	
L6	A1400 Woodford Avenue	**Yes**	

Appendix A of this note provides a list of all ELHAM data extracts for each junction and link included in the TER.

Appendix B provides a summary of junctions and links that are expected to be over capacity by 2031. For the junctions, only arms that are expected to be over-capacity have been shown. This table will assist LBR in targeting potential mitigation measures where the need is greatest. Types of potential mitigation measures are discussed in Section 1.3.

As indicated in the table above, at the time of writing, data for Junction 3 (A123 Cranbrook Road/ High Street/ Chapel Road/ Winston Way/ A118 Ilford Hill) and Junction 6 (High Road/ A1083 Green Lane/ Winston Way could not be extracted from the model.

The junctions and links likely to experience the highest net increase in traffic as identified in the TER and those that are likely to experience capacity issues in 2031 (prior to any development traffic being considered) have been analysed further in the next section.

ELHAM Data Analysis

This section categorises junctions and links according to their potential (high, medium or low) for mitigation to be required by 2030 in order for additional development traffic to be accommodated. This is aimed at providing an understanding of where mitigation measures should be focussed when sites come forward for development.

Appendix C presents the junction categories on a map of the borough.

It is acknowledged that, in some cases, data from the ELHAM model indicates that some junctions and links are forecast to remain within capacity by 2031, however they have been categorised as 'medium' due to the level of development traffic expected to impact the junction by the end of the LP period, as identified in the TER.

Potential mitigation measures are discussed in Section 1.3 It is important to note that this comprises only a high level review of available capacity and likely development impact at this stage and it is recognised that detailed junction capacity assessments, specific to the development sites, would need to be undertaken at the planning application stage.

Furthermore, other important issues relating to transport such as safety implications of new development would need to be considered in a full transport assessment and are not covered in this note.

'High' Potential for Mitigation Requirement

Table 3: Junctions with a 'high' potential for mitigation requirements by 2030

Ref	Junction / Link Name
J2	Ilford Ln / Winston Way
J5	Winston Way / Griggs Approach
J8	A118 High Rd / Barley Ln
J13	A12 Eastern Ave / Barley Ln / Hainault Rd
J6	High Rd / A1083 Green Ln / Winston Way
J3	A123 Cranbrook Rd / High St / Chapel Road / Winston Way / Roden St / A118 Ilford Hill
L1	A118 High Rd, Ilford

The junctions listed in Table 3 have been identified as having a high potential for requiring mitigation. These junctions are all forecast to be over capacity by 2031 based upon the ELHAM data extracted. In addition, the TER predicted a greater than 20% net increase in traffic arising from the LP allocation sites.

Junctions 2, 5, 8 and 13 been identified as having a high potential for requiring mitigation. These junctions are all forecast to have one or more arms operating over capacity by 2031 based upon the ELHAM data extracted. In addition, the TER predicted a net increase of over 20% in traffic arising from the LP allocation sites.

Junctions 3 and 6 been identified as having a high potential for requiring mitigation. The TER forecast a net increase of over 20% in traffic arising from the LP allocation sites at these junctions. As the ELHAM data for these junctions is unavailable, it is uncertain whether at least one junction arm is predicted to operate near to or over capacity by 2031 and further analysis will therefore be required in due course.

Link 1 has been identified as having a high potential for requiring mitigation. This link is forecast to be over capacity by 2031 based upon the ELHAM data extracted. In addition, the TER predicted a net addition in traffic arising from the LP allocation sites of over 20% at this link.

'Medium' Potential for Mitigation Requirement

Table 4: Junctions with a 'medium' potential for mitigation requirements by 2030

Ref	Junction / Link Name
J4	Ley St / Griggs Approach
J11	A12 Eastern Ave / Horns Rd / Ley St
J9	High Rd / Wangey Rd / Station Rd (including Chadwell Heath Lane)
J10	Gants Hill Roundabout (A12 Eastern Ave / A1400 Woodford Ave / A123 Cranbrook Rd)
J12	A12 Eastern Ave / Aldborough Rd
J1	Ilford Hill / Romford Rd / A406 Slip Roads
J14	A123 Cranbrook Rd / Tanners Ln
J15	Fullwell Cross Rbt (Forest Rd / Craven Gdns / A123 High St / Fullwell Ave / Fencepiece Rd)
J16	A1199 High Rd / B168 George Ln
J19	Freemantle Rd / High St / Baron Gdns
J21	A1400 Woodford Ave / Clayhall Ave
J22	Charlie Browns Roundabout (Chigwell Rd / A1400 Woodford Ave / Southend Rd)
J17	A12 / A406 (Redbridge Roundabout)
L4	Billet Rd
L7	Barley Ln south of Grensham Dr (south of ex-hospital access)
L6	A1400 Woodford Ave

Junctions 4 and 11 have been identified as having a medium potential for requiring mitigation. These junctions are all forecast to be nearing capacity for at least one junction arm by 2031 based upon the ELHAM data extracted. In addition, the TER predicted a net increase of between 10 and 20% in traffic arising from the LP allocation sites.

Junction 7 has been identified as having a medium potential for requiring mitigation. Although the ELHAM data indicates that the junction is forecast to remain within capacity in 2031, the TER forecast a net increase in traffic arising from the LP allocation sites of greater than 20%.

Junctions 9, 10, 12 and 1 have been identified as having a medium potential for requiring mitigation. The TER predicted a net increase of between 10 and 20% in traffic arising from the LP allocation sites. As the ELHAM data for these junctions is unavailable, it is uncertain whether at least one junction arm is predicted to operate nearing capacity by 2031 at these junctions.

Junctions 14, 15, 16, 19, 21 and 22 have been identified as having a medium potential for requiring mitigation. These junctions are all forecast to be nearing capacity for at least one junction arm by 2031 based upon the ELHAM data extracted. In addition the TER predicted a less than 10% net increase in traffic arising from the LP allocation sites.

Junction 17 has been identified as having a medium potential for requiring mitigation. The TER forecast a less than 10% net increase in traffic arising from the LP allocation sites. As the ELHAM data for this junction is unavailable, it is uncertain whether at least one junction arm is predicted to operate near to or over capacity by 2031 at this junction. In the event that no arms are predicted to be near to or over capacity at Junction 17, the junction may be considered to be of lower potential for requiring mitigation from a capacity perspective.

Links 4 and 7 have been identified as having a medium potential for requiring mitigation. Both of these links are forecast to be under capacity by 2031 based upon the ELHAM data extracted, however, the TER predicted a net addition in traffic arising from the LP allocation sites of over 20%.

Link 6 has been identified as having a medium potential for requiring mitigation. Although the TER predicted a net increase in traffic arising from the LP allocation sites of below 10%, the ELHAM data indicates that the link will operate nearing capacity by 2031 in both the AM and PM peak hours.

'Low' Potential for Mitigation Requirement

The Links and Junctions identified as having low potential for mitigation have been categorised as such based upon ELHAM data that indicates that they will operate within capacity by 2031 and the TER forecast of a less than 10% net increase in traffic arising from the LP allocation sites. The following Junctions and Links fall within this category:

- Junction 18 (Fairlop Road / Clayhall Avenue / Freemantle Road / Looe Gardens);
- Junction 20 (A1400 Woodford Avenue / Longwood Gardens / Beehive Lane / Redbridge Lane East);
- Link 2 (Aldborough Road South);
- Link 4 (A12 near Barley Lane); and
- Link 5 (Fencepiece Road).

It should be noted that the potential requirements for mitigation have only been appraised on the basis of forecast capacity performance, based upon data extracted from the ELHAM model. In due course, it will be necessary for Transport Assessments to consider other potential impacts, for example, on pedestrian movement, safety etc which may generate a separate need for mitigation and / or improvements.

1.3. Potential Mitigation

Section 1.2 has helped to determine whether existing infrastructure is likely to be able to accommodate the additional forecast demand by categorising existing junctions and links as having a high, medium or low chance of requiring mitigation by 2030, from a capacity perspective.

The TER has already presented some initial considerations for mitigation measures that could be considered where a significant impact has been identified, for example where significant delay or capacity issues have been identified and where the net increase in traffic arising from LP developments is expected to be significant, it may be appropriate for mitigation measures to be considered. These could include both 'soft' and 'hard' interventions and indeed, may include a mix of measures, rather than any one in isolation. Some examples of potential mitigation measures, as described in the TER, are reproduced below:

'Soft' Measures

- Accessibility improvements (to facilitate increased movement by sustainable transport modes such as walking, cycling and public transport)
- Provision of complimentary land uses to reduce the need for off-site travel, particularly at peak times
- Travel planning (including for example, promotion of sustainable travel, provision of lockers and changing facilities, high quality cycle parking, cycle hire / pool bikes, car clubs, electric charging points etc)
- Restriction of car parking provision (on site) and / or better management of off-site provision (CPZ / exemption for new residents to apply for permits)

'Hard' Measures

- Site access strategy and parking layout
- Bus priority measures
- Provision of new / additional sustainable transport infrastructure (wayfinding, cycle routes, bus stops, real time information, additional services and capacity etc)
- Review of existing highway configuration to provide additional capacity (road widening, junction design and operation for example, signalisation)

In particular reference to the final 'hard' measure listed in relation to capacity enhancements, based on the junctions and links that have a high or medium potential for requiring mitigation measures by 2030, **Table 5** provides a high level review of the types of 'hard' measures that may be considered, based on the junction type.

Table 5: Potential 'Hard' Measures based on junction/link type

Ref	Junction / Link Name	Junction/Link Type	Potential Mitigation Measures
J2	Ilford Ln / Winston Way	3 arm non-signal controlled rbt	Signalisation, network co-ordination
J5	Winston Way / Griggs App	4 arm non-signal controlled rbt	Signalisation
J8	A118 High Rd / Barley Ln	Signal controlled cross roads	Optimisation of signals
J13	A12 / Barley Ln / Hainault Rd	Signal controlled cross roads	Optimisation of signals* (in coordination with TfL)
J6	High Rd / A1083 Green Ln / Winston Way	4 arm signal controlled gyratory	Optimisation of signals; network co-ordination
J3	A123 Cranbrook Rd / High St / Chapel Road / Winston Way / Roden St / A118 Ilford Hill	6 arm signal controlled gyratory	Optimisation of signals; network co-ordination
L1	A118 High Rd, Ilford	Single carriageway link	Avoid having direct site access on link where possible
J4	Ley St / Griggs App	3 arm non-signal controlled rbt	Signalisation
J11	A12 / Horns Rd / Ley St	Signal controlled cross roads	Optimisation of signals (in coordination with TfL)
J9	High Rd / Wangey Rd / Chadwell Heath Lane	3 arm signal controlled junction	Optimisation of signals
J10	Gants Hill Roundabout	5 arm signal controlled rbt	Optimisation of signals** (in coordination with TfL)
J12	A12 / Aldborough Rd	Signal controlled cross roads	Optimisation of signals (in coordination with TfL)
J1	Ilford Hill / Romford Rd / A406 Slip Roads	3 arm signal controlled junction	Optimisation of signals (in coordination with TfL)
J14	A123 Cranbrook Rd / Tanners Ln	3 arm signal controlled junction	Optimisation of signals
J15	Fullwell Cross Rbt	4 arm non-signal controlled rbt	Signalisation
J16	A1199 High Rd / B168 George Ln	3 arm signal controlled junction	Signalisation
J19	Freemantle Rd / High St / Baron Gdns	Signal controlled cross roads	Optimisation of signals
J21	A1400 Woodford Ave / Clayhall Ave	3 arm signal controlled junction	Optimisation of signals
J22	Charlie Browns Roundabout	4 arm non-signal controlled rbt	Signalisation (in coordination with TfL)
J17	Redbridge Roundabout	5 arm signal controlled grade separated rbt	Optimisation of signals (in coordination with TfL)
L4	Billet Rd	Single carriageway link	Local road junctions at either end of this link may require additional capacity
L7	Barley Ln	Single carriageway link	Lane widening where highway boundary allows, avoid having direct site access on link where possible
L6	A1400 Woodford Ave	Dual carriageway link	Avoid having direct site access on link where possible

*Note: This junction has recently been upgraded by TfL

**Note: This junction underwent major upgrade works, completed in 2010

1.4. Proportional Impact of Local Plan Allocation Sites

This section of the note intends to provide further information to supplement the highway network impact results presented in Section 5 of the TER by establishing the vehicular impact of individual allocation sites at the junctions and links predicted to experience the largest increases in traffic flows in 2030.

The objective of this exercise is to allow LBR to understand which of the allocation sites will be the main contributors to the impacts identified at junctions and links in the TER. LBR will therefore be able to focus future application assessment work upon these matters, so that targeted mitigation can be designed and funded.

As part of the examination process, LBR has made a number of amendments to the site allocations, mostly to the site references and in some cases to the number of units. The site reference changes do not affect the TER or its findings. The proposed site allocations, in total, has reduced from 18,936 (including 2,700 from windfall sites, as presented in the TER) to 18,774 (based on the amendments made since submission by LBR). In overall terms, the TER assessment is therefore robust. Looking at sites on an individual basis, all changes are of a low order (ie. +/-50 units) with the exception of the '20 Clements Lane' site which has reduced by 215 units. As a result and following discussions with LBR, this review is based upon the Appendix 1 version examined as part of the TER, and the information presented herein is therefore consistent with and can be read in conjunction with the TER.

Methodology

The spreadsheet model, which formed the basis of the car driver impact assessment in the TER, has been used in this assessment. **Figure 1** explains the methodology adopted to determine the proportional impact of allocation sites at junctions and links.

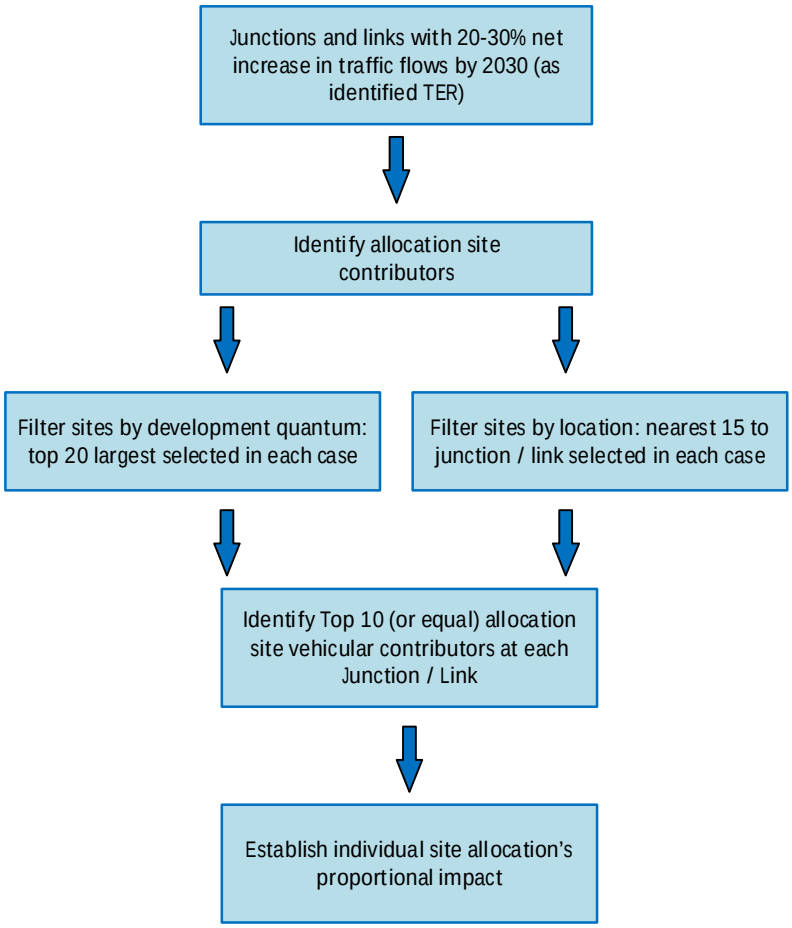


Figure 1: AECOM Allocation Site and Developer Contribution Methodology

As the TER explains, the spreadsheet model contains two future year scenarios, namely the '2030 Do Minimum' (background traffic growth respective of and in addition to committed development traffic) and '2030 Do Something' (as '2030 Do Minimum' plus traffic arising from proposed LP development sites).

The 10 junctions and links that are predicted to experience the highest net increases in traffic by 2030, previously identified in Table 5-12 of the TER, have been reproduced below.

Table 6: LBR '2030 Do Something' Junctions and Links predicted to experience highest net increase in traffic flow.

Junction / Link Ref	Junction / Link Location	% Net Increase between the 2030 Do Minimum and 2030 Do Something scenarios	
		AM	PM
J2	Ilford Lane / Winston Way	23.7%	16.4%
J3	A123 Cranbrook Road / High Street / Chapel Road / Winston Way / Roden Street / A118 Ilford Hill	20.8%	14.1%
J5	Winston Way / Griggs Approach / Riches Road	24.4%	16.3%
J6	High Road / A1083 Green Lane / Winston Way	23.5%	16.9%
J7	High Road / Cameron Road	29.9%	25.8%
J8	A118 High Road / Barley Lane	28.3%	22.8%
J13	A12 Eastern Avenue / Barley Lane / Hainault Road	22.2%	14.3%
L1	A118 High Road, Ilford	34.1%	18.4%
L4	Billet Road	24.5%	18.6%
L7	Barley Lane (South of Grensham Drive)	29.2%	43.4%

Screening of individual sites was carried out based upon their size (the 20 sites with the largest number of proposed equivalent residential units) and the sites nearest to the specific junction or link (nearest 15 sites). This analysis uses the AM Peak hour trip generation contained within the spreadsheet model, as the AM peak presents the worst case scenario in terms of vehicular trip generation which corresponds with when the greatest net increases in traffic are expected to occur with the exception of Link 7 (Barley Lane). For Link 7, the PM peak has been appraised as the net increase in traffic on this link is expected to be higher than in the AM peak.

From the initial analysis of approximately 35 sites per junction and link, the ten sites with the highest vehicular traffic impact at each junction and link were identified. The level of impact of each allocation site was then calculated based upon the proportion of trips.

A key benefit of this approach is to identify the proportional impact of allocation sites on the above junctions and links which could help LBR assign contributions towards mitigation in the future. As the methodology accounts for borough wide impacts, it allows scope for larger developments to proportionally fund mitigation at more distant junctions or links in line with its vehicular impact at these locations.

At this stage in the LP process, the findings of this note are not definitive as the specific development details associated with the site allocations may change. Furthermore, the method assumes that all allocations will be developed within the same period (i.e by the end of the Local Plan period in 2030). Whereas, in practice the sites will be developed at varying rates (in line with the LP phasing approach outlined). The purpose of this note, however, is to provide an indication of which sites are likely to have the most significant impacts at the junctions and links identified in Table 6 which could help LBR assign contributions towards mitigation in the future.

Results

This section documents the results of the proportional impact assessment. As previously mentioned, this review has been based upon the version of Appendix 1 referred to in the TER.

In the following tables, the 'Net Increase (TER)' percentage is the net increase in flow between the '2030 Do Minimum' and '2030 Do Something' scenarios as presented in Table 5 of this note. Junctions and Links are listed in order of the greatest overall vehicular impact arising from all Local Plan allocation sites. The 'Top 10 sites' listed are the 10 sites with the highest vehicular impact at each of the junctions or links. The 'Site Number' is the allocation site number as listed in Appendix 1 of the LP. The proportional impact % represents the AM peak in most cases with the exception of Link 7 where the PM peak has been assessed as the worst case.

Junctions

Junction 7: High Road / Cameron Road

Table 7: Top 10 Allocation Sites Vehicular Impact at the High Road / Cameron Road Junction

Net Increase in flow (TER): 29.9%	Top 10 Sites									
	Site Number									
	68	70	69	45	47	75	72	74	1	79
Proportional Impact %	30.0%	12.1%	11.0%	9.4%	7.8%	7.8%	5.9%	5.9%	5.0%	5.0%

Table 7 demonstrates that Site 68 ('Land at Ford Sports Ground / Seven Kings Park') contributes the largest proportion (approximately 30%) of vehicular traffic impacting the High Road / Cameron Road junction. The other 9 sites each contribute approximately 5 to 12% of the vehicular impact.

Junction 8: A118 High Road / Barley Lane

Table 8: Top 10 Allocation Sites Vehicular Impact at the A118 High Road / Barley Lane Junction

Net increase in flow (TER): 28.3%	Top 10 Sites									
	Site Number									
	68	69	45	72	70	1	71	47	75	74
Proportional Impact %	44.1%	13.6%	8.3%	7.2%	6.4%	4.5%	4.5%	4.1%	4.1%	3.2%

Table 8 demonstrates that Site 68 ('Land at Ford Sports Ground / Seven Kings Park') contributes the largest proportion (approximately 44%) of vehicular traffic impacting the High Road / Barley Lane junction.

Site 69 ('822 (Tesco) High Road, Goodmayes') contributes approximately 14% of the vehicular impact, with none of the other 8 sites contributing more than approximately 8% of vehicular impact of the Top 10 sites.

Junction 5: Winston Way / Griggs Approach / Riches Road

Table 9: Top 10 Allocation Sites Vehicular Impact at the Winston Way / Griggs Approach / Riches Road Junction

Net increase in flow (TER): 24.4%	Top 10 Sites									
	Site Number									
	68	45	69	1	72	38	9	5	36	70
Proportional Impact %	37.9%	12.6%	9.2%	7.8%	5.0%	6.3%	5.9%	5.7%	4.8%	4.8%

Table 9 demonstrates that Site 68 ('Land at Ford Sports Ground / Seven Kings Park') contributes the largest proportion (approximately 38%) of vehicular traffic impacting the Winston Way / Griggs Approach / Riches Road junction. The 9 other sites contribute no more than approximately 13% of the vehicular impact of the Top 10 sites.

Junction 2: Ilford Lane / Winston Way

Table 10: Top 10 Allocation Sites Vehicular Impact at the Ilford Lane / Winston Way Junction

Net Increase in flow (TER): 23.7%	Top 10 Sites									
	Site Number									
	68	69	25	10	1	9	45	38	5	36
Proportional Impact %	24.8%	10.0%	9.8%	9.3%	8.4%	8.4%	8.0%	7.7%	6.8%	6.8%

Table 10 demonstrates that Site 68 ('Land at Ford Sports Ground / Seven Kings Park') contributes the largest proportion (approximately 25%) of vehicular traffic impacting the Ilford Lane / Winston Way junction. The other 9 sites contribute between approximately 7 and 10% of the vehicular impact from the Top 10 sites.

Junction 6: High Road / A1083 Green Lane / Winston Way

Table 11: Top 10 (or equal) Allocation Sites Vehicular Impact at the High Road / A1083 Green Lane / Winston Way Junction

Net Increase in flow (TER): 23.5%	Top 10 Sites									
	Site Number									
	68	45	69	1	70	72	3	4	9	38
Proportional Impact %	43.5%	21.7%	8.9%	5.7%	4.7%	4.7%	2.8%	2.6%	2.6%	2.6%

Table 11 demonstrates that Sites 68 ('Land at Ford Sports Ground / Seven Kings Park') and 45 ('Redbridge Enterprise and Ilford Retail Park') contribute the largest proportions of vehicular traffic impacting the High Road / A1083 Green Lane / Winston Way junction at approximately 44% and 22% respectively. The other 8 sites each contribute less than approximately 10% of the vehicular impact of the Top 10 sites.

Junction 13: A12 Eastern Avenue / Barley Lane / Hainault Road

Table 12: Top 10 Allocation Sites Vehicular Impact at the A12 Eastern Avenue / Barley Lane Junction

Net Increase in flow (TER): 22.2%	Top 10 Sites									
	Site Number									
	100	46	68	134	69	1	45	72	180	124
Proportional Impact %	29.9%	27.7%	10.1%	8.8%	6.4%	4.2%	3.4%	3.4%	3.4%	2.9%

Table 12 demonstrates that Sites 100 ('Area of Open Land at Billet Road and Surrounding Area, RM6 5RX') and 46 ('Land in and around King George/Goodmayes Hospitals') contribute the largest proportions of vehicular traffic impacting the A12 Eastern Avenue / Barley Lane junction at approximately 30% and 28% respectively. The other 8 sites each contribute less than approximately 10% of the vehicular impact of the Top 10 sites.

Junction 3: A123 Cranbrook Road / High Street / Chapel Road / Winston Way / Roden Street / A118 Ilford Hill

Table 13: Top 10 (or equal) Allocation Sites Vehicular Impact at the A123 Cranbrook Road / High Street / Chapel Road / Winston Way / Roden Street / A118 Ilford Hill Junction

Net Increase in flow (TER): 20.8%	Top 10 Sites										
	Site Number										
	1	68	3	25	10	69	45	9	36	70	72
Proportional Impact %	22.2%	17.8%	11.2%	9.5%	9.2%	7.0%	5.8%	5.4%	4.4%	3.7%	3.7%

Table 13 demonstrates that Site 1 ('Sainsbury's, Roden Street, Ilford) contributes the largest proportion (approximately 22%) of vehicular traffic impacting the A123 Cranbrook Road / High Street / Chapel Road / Winston Way / Roden Street / A118 Ilford Hill junction, followed by Site 68 ('Land at Ford Sports Ground / Seven Kings Park') at approximately 18%. The other 8 sites contribute between approximately 3% and 11% of the vehicular impact of the Top 10 sites.

Links

Link 7: Barley Lane (South of Grensham Drive)

As previously mentioned, as the Barley Lane link was predicted to be impacted most greatly in the PM peak, AECOM have reviewed the developer contributions based upon the vehicular addition in the PM peak, as opposed to the AM peak utilised for all of the other links and junctions examined as part of this review.

Table 14: Top 10 Allocation Sites Vehicular Impact at the Barley Lane (South of Grensham Drive) Link

Net Increase in flow (TER): 43.4%	Top 10 Sites									
	Site Number									
	46	68	69	72	81	45	70	100	181	134
Proportional Impact %	49.2%	16.7%	10.4%	5.7%	4.7%	4.1%	4.1%	2.8%	1.6%	0.6%

Table 14 demonstrates that Site 46 ('Land in and around King George/Goodmayes Hospitals') contributes the largest proportion (approximately 49%) of vehicular traffic impacting the Barley Lane (South of Grensham Drive) link. Sites 68 ('Land at Ford Sports Ground / Seven Kings Park') and 69 ('822 (Tesco) High Road, Goodmayes') contribute approximately 17% and 10% respectively. The other 7 sites each contribute less than 6% of the vehicular impact of the Top 10 sites.

Link 1: A118 High Road, Ilford

Table 15: Top 10 (or equal) Allocation Sites Vehicular Impact at the A118 High Road, Ilford Link

Net Increase in flow (TER): 34.1%	Top 10 Sites									
	Site Number									
	69	68	72	1	71	4	45	70	76	3
Proportional Impact %	23.5%	19.4%	12.6%	8.5%	7.7%	7.3%	6.9%	4.9%	4.9%	4.5%

Table 15 demonstrates that sites 69 ('822 (Tesco) High Road, Goodmayes') and 68 ('Land at Ford Sports Ground / Seven Kings Park') contribute the largest proportions of vehicular traffic impacting the A118 High Road Ilford Link, at approximately 24% and 19% respectively. The other 8 sites contribute between approximately 4% and 13% of vehicular impact of the Top 10 sites.

Link 4: Billet Road

The TER identified that Link 4 (Billet Road) is predicted to experience an increase of traffic flows of approximately 24.5%. Uniquely from the scenarios tested as part of this review, only one site provided additional flows to the link; Site 100 ('Area of Open Land at Billet Road and Surrounding Area, RM6 5RX').

1.5. Conclusion

This note has been prepared to supplement the Transport Evidence Report produced on behalf of LB Redbridge to inform the Local Plan (2015-2030). The objectives of this note have been to:

- Understand in further detail the significance of the vehicular impacts identified in terms of the forecast capacity at junctions and links in 2031;
- Assess the proportional impact of the LP allocation sites at the junctions and links expected to experience the highest net impact in traffic; and
- Consider potential mitigation measures that may be required at the key locations identified.

TfL's ELHAM model has been used to derive capacity performance data for the junctions and links located within Redbridge that were analysed in the TER. The data has been cross-referenced against those locations where the proposed site allocations are expected to have the greatest impacts, which can help LBR target further assessment of the specific impacts at the locations where capacity is expected to be an issue.

The spreadsheet model developed in support of the TER has also been re-visited, to derive additional data concerning the proportional impact of the proposed site allocations at the main junctions and links where traffic impact is expected to be at its greatest.

In combination, this information therefore provides LBR with a detailed understanding of the locations where mitigation is most likely to be required and which of the site allocations are expected to be the main contributors to the impacts arising through the Local Plan.

This information allows LBR to target future assessments, which will need to be undertaken as part of any future planning applications both in terms of their scale and scope as well as in regard to any cumulative effects which may need to be considered. Additionally, it also provides LBR with an understanding of potential funding contributors towards potential mitigation at the key identified locations.

Appendix A

Arm	2031 AM		2031 PM	
	Delay (s)	Volume / Capacity (%)	Delay (s)	Volume / Capacity (%)
Junction 1: Ilford Hill / Romford Rd / A406 Slip Roads				
No Data Available				
Junction 2: Ilford Ln / Winston Way				
Winston Way N - Winston Way E	5.57	0.65	15.72	0.98
Winston Way N - Ilford Lane	5.57	0.32	15.72	0.95
Winston Way E - Winston Way N	374.57	1.12	74.07	1.01
Winston Way E - Ilford Lane	374.57	1.12	74.07	1.01
Ilford Lane - Winston Way N	140.41	1.02	17.92	0.89
Ilford Lane - Winston Way E	140.41	1.02	17.92	0.87
Junction 3: A123 Cranbrook Rd / High St / Chapel Road / Winston Way / Roden St / A118 Ilford Hill				
No Data Available				
Junction 4: Ley St / Griggs Approach				
Ley Street W - Ley Street E	6.36	0.09	7.08	0.14
Ley Street W - Griggs Approach	7.03	0.17	7.75	0.31
Ley Street E - Ley Street W	32.38	0.77	8.62	0.18
Ley Street E - Griggs Approach	31.71	0.93	7.96	0.47
Griggs Approach - Ley Street W	7.81	0.28	7.20	0.16
Griggs Approach - Ley Street E	8.48	0.49	7.87	0.49
Junction 5: Winston Way / Griggs Approach				
Riches Road - Griggs Apporach	9.02	0.08	9.21	0.04
Riches Road - Winston Way E	10.52	0.16	10.71	0.09
Riches Road - Winston Way W	12.02	0.13	12.21	0.09
Griggs Approach - Winston Way E	25.40	0.68	13.14	0.46
Griggs Approach - Winston Way W	26.90	0.87	14.64	0.62
Griggs Approach - Riches Road	28.40	0.00	16.14	0.03
Winston Way E - Winston Way W	8.08	0.70	6.68	0.58
Winston Way E - Riches Road	9.58	0.13	8.18	0.07
Winston Way E - Griggs Approach	11.08	0.45	9.68	0.19
Winston Way W - Riches Road	6.59	0.04	8.06	0.17
Winston Way W - Griggs Apporach	8.09	0.24	9.56	0.50
Winston Way W - Winston Way E	9.59	0.47	11.06	0.71
Junction 6: High Rd / A1083 Green Ln / Winston Way				
No Data Available				
Junction 7: High Rd / Cameron Rd				
Cameron Road - High Road E	7.75	0.44	6.97	0.25
Cameron Road - High Road W	8.42	0.53	7.64	0.52
High Road W - Cameron Road	12.41	0.00	7.74	0.00
High Road W - High Road E	13.08	0.76	8.40	0.50
High Road E - High Road W	7.59	0.30	8.44	0.61
High Road E - Cameron Road	8.25	0.63	9.11	0.53
Junction 8: A118 High Rd / Barley Ln				
High Road W - Barley Lane	109.94	1.00	148.89	1.02
High Road W - High Road E	109.94	1.00	148.89	1.02
High Road W - Goodmayes Road	242.08	0.97	188.94	0.89
Barley Lane - High Road E	50.96	0.40	37.26	0.16
Barley Lane - Goodmayes Road	368.48	1.08	147.64	1.01
Barley Lane - High Road W	601.26	1.15	277.48	1.02
High Road E - Goodmayes Road	474.86	1.13	114.35	1.00
High Road E - High Road W	474.86	1.13	114.35	1.00
High Road E - Barley Lane	120.02	0.66	90.50	0.39
Goodmayes Road - High Road W	575.03	1.13	131.79	1.01
Goodmayes Road - Barley Lane	575.03	1.13	131.79	1.01
Goodmayes Road - High Road E	465.43	1.09	221.39	0.99
Junction 9: High Rd / Wangey Rd / Station Rd (including Chadwell Heath Lane)				
No Data Available				
Junction 10: Gants Hill Roundabout (A12 Eastern Ave / A1400 Woodford Ave / A123 Cranbrook Road)				
No Data Available				
Junction 11: A12 Eastern Ave / Horns Rd / Ley St				
Eastern Avenue W - Horns Road	78.44	0.59	135.53	0.81
Eastern Avenue W - Eastern Avenue E	82.00	0.98	286.21	1.04
Eastern Avenue W - Ley Street	106.20	0.97	150.10	1.01
Horns Road - Eastern Avenue E	58.81	0.80	110.88	1.00
Horns Road - Ley Street	58.75	0.86	110.88	1.00
Eastern Avenue E - Ley Street	42.12	0.25	39.56	0.55
Eastern Avenue E - Eastern Avenue W	292.95	1.06	120.68	1.01
Eastern Avenue E - Horns Road	248.97	1.06	53.50	0.70
Ley Street - Eastern Avenue W	244.47	1.06	84.69	0.92
Ley Street - Horns Road	244.47	1.06	84.52	0.94
Ley Street - Eastern Avenue E	406.44	1.05	327.54	1.05
Junction 12: A12 Eastern Ave / Aldborough Rd				
No Data Available				
Junction 13: A12 Eastern Ave / Barley Ln / Hainault Rd				
Eastern Avenue W - Hainault Road	10.91	0.32	16.59	0.64
Eastern Avenue W - Eastern Avenue E	29.76	0.74	41.66	0.93
Eastern Avenue W - Barley Lane	141.64	1.01	193.84	1.04
Hainault Road - Eastern Avenue E	12.25	0.56	16.43	0.55
Hainault Road - Barley Lane	533.81	1.10	443.12	1.05
Hainault Road - Eastern Avenue W	113.24	0.64	109.10	0.62
Eastern Avenue E - Barley Lane	22.98	0.93	51.42	1.01
Eastern Avenue E - Eastern Avenue W	36.96	0.87	26.34	0.69
Eastern Avenue E - Hainault Road	162.35	1.01	130.80	1.00
Barley Lane - Eastern Avenue W	11.31	0.18	9.57	0.26
Barley Lane - Hainault Road	371.39	1.04	334.73	1.04
Barley Lane - Eastern Avenue E	581.02	1.08	420.94	1.04
Junction 14: A123 Cranbrook Rd / Tanners Ln				
Cranbrook Road - Tanners Lane	77.17	0.75	82.61	0.56
Cranbrook Road - High Street	44.39	0.89	26.96	0.62
High Street - Tanners Lane	23.43	0.04	23.70	0.04
High Street - Cranbrook Road	35.94	0.70	59.57	0.92
Tanners Lane - Cranbrook Road	43.44	0.43	41.74	0.48
Tanners Lane - High Street	39.10	0.15	36.26	0.15
Junction 15: Fullwell Cross Rbt (Forest Rd / Craven Gdns / A123 High St / Fullwell Ave / Fencepiece Rd)				
Craven Gardens - High Street	10.56	0.00	11.80	0.00
Craven Gardens - Fullwell Avenue	11.76	0.03	13.00	0.03
Craven Gardens - Fencepiece Road	12.96	0.33	14.20	0.41
Craven Gardens - Forest Road	14.16	0.09	15.40	0.18
High Street - Fullwell Avenue	13.66	0.10	67.73	1.01
High Street - Fencepiece Road	14.86	0.75	68.93	1.01
High Street - Forest Road	16.06	0.57	70.13	1.01
High Street - Craven Gardens	17.26	0.00	71.33	0.00
Fullwell Avenue - Fencepiece Road	7.97	0.04	12.31	0.13
Fullwell Avenue - Forest Road	9.17	0.17	13.51	0.60
Fullwell Avenue - Craven Gardens	10.37	0.09	14.71	0.15
Fullwell Avenue - High Street	11.57	0.04	15.91	0.17
Fencepiece Road - Forest Road	7.38	0.44	8.45	0.51
Fencepiece Road - Craven Gardens	8.58	0.49	9.65	0.48
Fencepiece Road - High Street	9.78	0.43	10.85	0.46

Arm	2031 AM		2031 PM	
	Delay (s)	Volume / Capacity (%)	Delay (s)	Volume / Capacity (%)
Fencepiece Road - Fullwell Avenue	10.98	0.02	12.05	0.02
Forest Road - Craven Gardens	218.03	1.08	13.90	0.59
Forest Road - High Street	219.23	1.08	15.10	0.70
Forest Road - Fullwell Avenue	220.43	1.08	16.30	0.28
Forest Road - Fencepiece Road	221.63	1.08	17.50	0.78
Junction 16: A1199 High Rd / B168 George Ln				
High Road S - High Road N	8.52	0.42	9.15	0.49
High Road S - George Lane	19.24	0.73	15.54	0.36
High Road N - George Lane	10.24	0.53	21.96	0.63
High Road N - High Road S	13.40	0.71	134.16	1.02
George Lane - High Road S	17.93	0.30	26.51	0.68
George Lane - High Road N	18.12	0.50	27.32	0.79
Junction 17: A12 / A406 (Redbridge Roundabout)				
No Data Available				
Junction 18: Fairlop Rd / Clayhall Ave / Freemantle Rd / Looe Gdns				
Clayhall Avenue - Freemantle Road	7.73	0.45	7.66	0.42
Clayhall Avenue - Looe Gardens	9.06	0.02	8.99	0.10
Freemantle Road - Looe Gardens	8.66	0.30	9.42	0.38
Freemantle Road - Clayhall Avenue	9.99	0.55	10.76	0.60
Looe Gardens - Clayhall Avenue	7.87	0.20	7.48	0.10
Looe Gardens - Freemantle Road	9.20	0.33	8.81	0.28
Junction 19: Freemantle Rd / High St / Baron Gdns				
Freemantle Road - High Street N	34.55	0.72	41.23	0.83
Freemantle Road - Baron Gardens	39.02	0.67	35.75	0.65
Freemantle Road - High Street S	49.25	0.51	45.58	0.51
High Street N - Baron Gardens	599.48	1.16	190.00	1.01
High Street N - High Street S	599.48	1.16	190.01	1.01
High Street N - Freemantle Road	649.38	1.17	199.46	1.01
Baron Gardens - High Street S	111.04	0.79	33.49	0.01
Baron Gardens - Freemantle Road	106.01	0.99	33.49	0.64
Baron Gardens - High Street N	111.60	0.00	39.64	0.00
High Street S - Freemantle Road	32.38	0.74	33.88	0.65
High Street S - High Street N	31.76	0.78	33.39	0.78
High Street S - Baron Gardens	44.40	0.15	47.15	0.09
Junction 20: A1400 Woodford Ave / Longwood Gdns / Beehive Ln / Redbridge Lane East				
Woodford Avenue N - Longwood Gardens	8.68	0.06	8.59	0.06
Woodford Avenue N - Woodford Avenue S	9.68	0.62	9.59	0.56
Woodford Avenue N - Beehive Lane	10.68	0.32	10.59	0.34
Woodford Avenue N - Redbridge Lane East	11.68	0.26	11.59	0.21
Longwood Gardens - Woodford Avenue S	13.26	0.04	9.84	0.03
Longwood Gardens - Beehive Lane	14.26	0.34	10.84	0.15
Longwood Gardens - Redbridge Lane East	15.26	0.36	11.84	0.22
Longwood Gardens - Woodford Avenue N	16.26	0.53	12.84	0.29
Woodford Avenue S - Beehive Lane	7.93	0.00	7.27	0.00
Woodford Avenue S - Redbridge Lane East	8.93	0.06	8.27	0.07
Woodford Avenue S - Woodford Avenue N	9.93	0.52	9.27	0.46
Woodford Avenue S - Longwood Gardens	10.93	0.08	10.27	0.05
Beehive Lane - Redbridge Lane East	16.72	0.08	19.44	0.13
Beehive Lane - Woodford Avenue N	17.72	0.66	20.44	0.74
Beehive Lane - Longwood Gardens	18.72	0.50	21.44	0.74
Beehive Lane - Woodford Avenue S	19.72	0.13	22.44	0.50
Redbridge Lane East - Woodford Avenue N	17.07	0.31	19.34	0.36
Redbridge Lane East - Longwood Gardens	18.07	0.56	20.34	0.59
Redbridge Lane East - Woodford Avenue S	19.07	0.58	21.34	0.71
Redbridge Lane East - Beehive Lane	20.07	0.16	22.34	0.33
Junction 21: A1400 Woodford Ave / Clayhall Ave				
Woodford Avenue N - Clayhall Avenue	93.31	1.00	103.10	0.99
Woodford Avenue N - Woodford Avenue S	34.79	0.90	85.41	1.00
Clayhall Avenue - Woodford Avenue S	28.29	0.21	25.47	0.22
Clayhall Avenue - Woodford Avenue N	106.81	0.99	76.53	0.96
Woodford Avenue S - Woodford Avenue N	30.66	0.86	40.64	0.87
Woodford Avenue S - Clayhall Avenue	62.38	0.71	54.14	0.73
Junction 22: Charlie Browns Roundabout (Chigwell Rd / A1400 Woodford Ave / Southend Rd)				
Southend Road W - Chigwell Road S	96.53	1.04	85.28	1.02
Chigwell Road S - Southend Road W	255.75	1.06	315.07	0.00
Southend Road W - M11 N	4.93	0.82	72.80	1.02
M11 N - Southend Road W	195.56	1.06	195.42	1.06
Southend Road W - Southend Road E	96.53	1.04	85.28	1.02
Southend Road E - Southend Road W	25.15	0.99	16.48	0.95
Southend Road W - Chigwell Road N	96.53	1.04	85.28	1.02
Chigwell Road N - Southend Road W	205.32	1.09	210.11	1.04
Southend Road W - M11 S	0.00	0.77	0.00	0.70
M11 S - Southend Road W	0.00	0.64	0.00	0.67
Chigwell Road S - Chigwell Road N	255.75	1.06	315.07	1.10
Chigwell Road N - Chigwell Road S	205.32	1.09	210.11	1.04
Chigwell Road S - Southend Road E	255.75	1.06	315.07	1.10
Southend Road E - Chigwell Road S	25.15	0.97	16.48	0.64
Chigwell Road N - Southend Road E	205.32	1.09	210.11	1.04
Southend Road E - Chigwell Road N	25.15	0.98	16.48	0.85
M11 S - M11 N	0.00	0.80	0.00	1.00
M11 N - M11 S	187.50	1.07	132.28	1.04
Link 1: A118 High Rd, Ilford				
A118 High Road	5.99	0.46	5.55	0.41
A118 High Road	452.10	1.02	113.11	0.93
Link 2: Aldborough Rd South				
Aldborough Road South	16.39	0.78	17.63	0.81
Aldborough Road South	6.54	0.45	5.84	0.40
Link 3: A12 near Barley Ln				
A12 near Barley Lane	59.16	0.71	67.32	0.89
A12 near Barley Lane	0.00	0.23	0.00	0.22
Link 4: Billet Rd				
Billet Road	0.00	0.08	0.00	0.21
Billet Road	13.56	0.72	9.21	0.31
Link 5: Fencepiece Rd				
Fencepiece Road	5.12	0.40	5.89	0.49
Fencepiece Road	2.54	0.47	1.90	0.37
Link 6: A1400 Woodford Ave				
A1400 Woodford Avenue	54.95	0.93	91.06	1.00
A1400 Woodford Avenue	0.92	0.46	0.85	0.41
Link 7: Barley Ln south of Grensham Dr (south of ex-hospital access)				
Barley Lane south of Gresham Drive	0.77	0.17	0.74	0.13
Barley Lane south of Gresham Drive	1.38	0.33	1.31	0.30

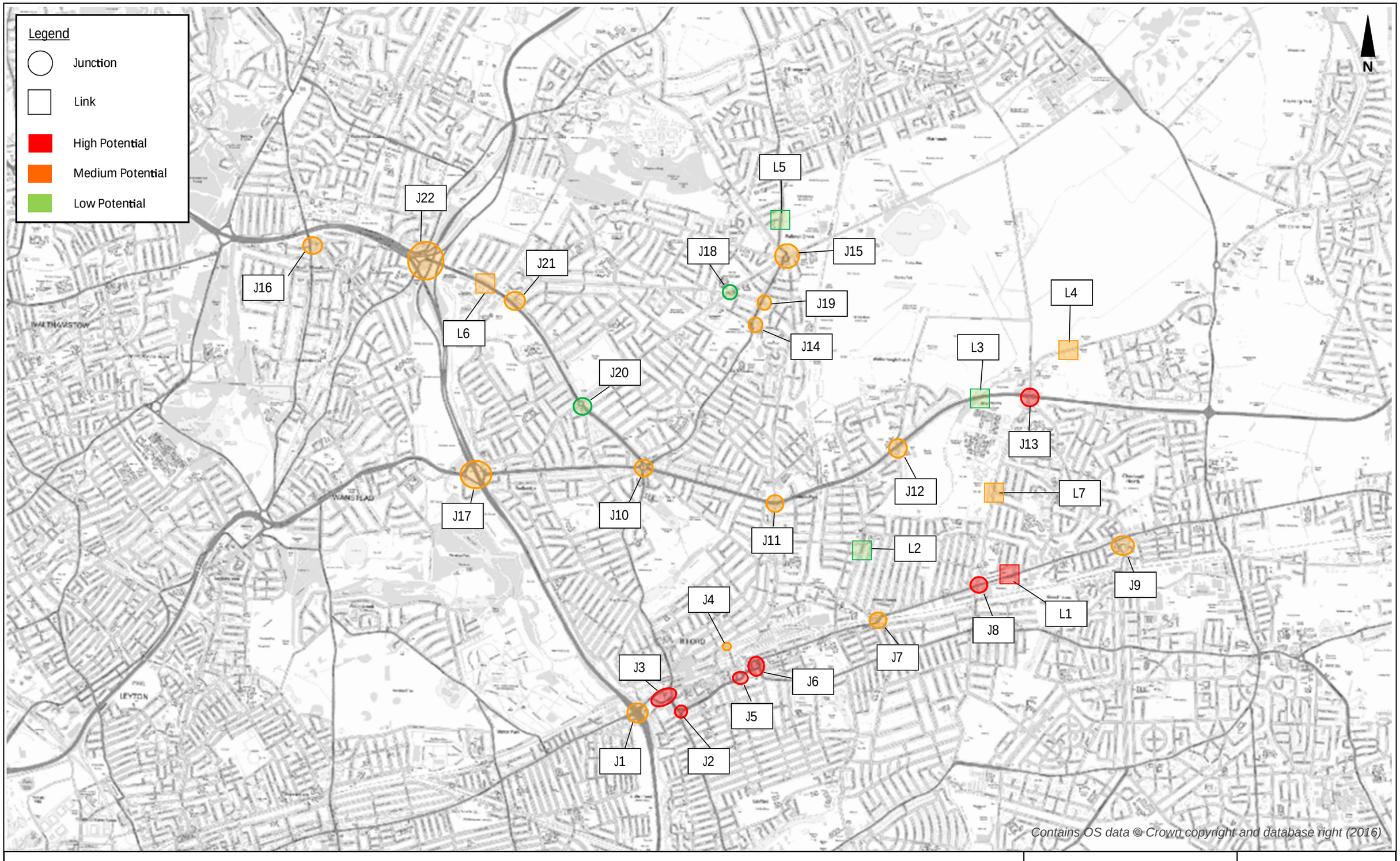
Appendix B

Arm	2031 AM		2031 PM	
	Delay (s)	Volume / Capacity (%)	Delay (s)	Volume / Capacity (%)
Junction 2: Ilford Ln / Winston Way [N/S]				
Winston Way E - Winston Way N	374.57	1.12	74.07	1.01
Winston Way E - Ilford Lane	374.57	1.12	74.07	1.01
Ilford Lane - Winston Way N	140.41	1.02	17.92	0.89
Ilford Lane - Winston Way E	140.41	1.02	17.92	0.87
Junction 4: Ley St / Griggs Approach [NS]				
Ley Street E - Griggs Approach	31.71	0.93	7.96	0.47
Junction 5: Winston Way / Griggs Approach [NS]				
Griggs Approach - Winston Way W	26.90	0.87	14.64	0.62
Junction 8: A118 High Rd / Barley Ln				
High Road W - Barley Lane	109.94	1.00	148.89	1.02
High Road W - High Road E	109.94	1.00	148.89	1.02
High Road W - Goodmayes Road	242.08	0.97	188.94	0.89
Barley Lane - Goodmayes Road	368.48	1.08	147.64	1.01
Barley Lane - High Road W	601.26	1.15	277.48	1.02
High Road E - Goodmayes Road	474.86	1.13	114.35	1.00
High Road E - High Road W	474.86	1.13	114.35	1.00
Goodmayes Road - High Road W	575.03	1.13	131.79	1.01
Goodmayes Road - Barley Lane	575.03	1.13	131.79	1.01
Goodmayes Road - High Road E	465.43	1.09	221.39	0.99
Junction 11: A12 Eastern Ave / Horns Rd / Ley St				
Eastern Avenue W - Eastern Avenue E	82.00	0.98	286.21	1.04
Eastern Avenue W - Ley Street	106.20	0.97	150.10	1.01
Horns Road - Eastern Avenue E	58.81	0.80	110.88	1.00
Horns Road - Ley Street	58.75	0.86	110.88	1.00
Eastern Avenue E - Eastern Avenue W	292.95	1.06	120.68	1.01
Eastern Avenue E - Horns Road	248.97	1.06	53.50	0.70
Ley Street - Eastern Avenue W	244.47	1.06	84.69	0.92
Ley Street - Horns Road	244.47	1.06	84.52	0.94
Ley Street - Eastern Avenue E	406.44	1.05	327.54	1.05
Junction 13: A12 Eastern Ave / Barley Ln / Hainault Rd				
Eastern Avenue W - Eastern Avenue E	29.76	0.74	41.66	0.93
Eastern Avenue W - Barley Lane	141.64	1.01	193.84	1.04
Hainault Road - Barley Lane	533.81	1.10	443.12	1.05
Eastern Avenue E - Barley Lane	22.98	0.93	51.42	1.01
Eastern Avenue E - Hainault Road	162.35	1.01	130.80	1.00
Barley Lane - Hainault Road	371.39	1.04	334.73	1.04
Barley Lane - Eastern Avenue E	581.02	1.08	420.94	1.04
Junction 14: A123 Cranbrook Rd / Tanners Ln				
High Street - Cranbrook Road	35.94	0.70	59.57	0.92
Junction 15: Fullwell Cross Rbt (Forest Rd / Craven Gdns / A123 High St / Fullwell Ave / Fencepiece Rd) [NS]				
High Street - Fullwell Avenue	13.66	0.10	67.73	1.01
High Street - Fencepiece Road	14.86	0.75	68.93	1.01
High Street - Forest Road	16.06	0.57	70.13	1.01
Forest Road - Craven Gardens	218.03	1.08	13.90	0.59
Forest Road - High Street	219.23	1.08	15.10	0.70
Forest Road - Fullwell Avenue	220.43	1.08	16.30	0.28
Forest Road - Fencepiece Road	221.63	1.08	17.50	0.78
Junction 16: A1199 High Rd / B168 George Ln				
High Road N - High Road S	13.40	0.71	134.16	1.02
Junction 19: Freemantle Rd / High St / Baron Gdns				
High Street N - Baron Gardens	599.48	1.16	190.00	1.01
High Street N - High Street S	599.48	1.16	190.01	1.01
High Street N - Freemantle Road	649.38	1.17	199.46	1.01
Baron Gardens - Freemantle Road	106.01	0.99	33.49	0.64
Junction 21: A1400 Woodford Ave / Clayhall Ave				
Woodford Avenue N - Clayhall Avenue	93.31	1.00	103.10	0.99
Woodford Avenue N - Woodford Avenue S	34.79	0.90	85.41	1.00
Clayhall Avenue - Woodford Avenue N	106.81	0.99	76.53	0.96
Junction 22: Charlie Browns Roundabout (Chigwell Rd / A1400 Woodford Ave / Southend Rd) [NS]				
Southend Road W - Chigwell Road S	96.53	1.04	85.28	1.02
Chigwell Road S - Southend Road W	255.75	1.06	315.07	0.00
Southend Road W - M11 N	4.93	0.82	72.80	1.02
M11 N - Southend Road W	195.56	1.06	195.42	1.06
Southend Road W - Southend Road E	96.53	1.04	85.28	1.02
Southend Road E - Southend Road W	25.15	0.99	16.48	0.95
Southend Road W - Chigwell Road N	96.53	1.04	85.28	1.02
Chigwell Road N - Southend Road W	205.32	1.09	210.11	1.04
Chigwell Road S - Chigwell Road N	255.75	1.06	315.07	1.10
Chigwell Road N - Chigwell Road S	205.32	1.09	210.11	1.04
Chigwell Road S - Southend Road E	255.75	1.06	315.07	1.10
Southend Road E - Chigwell Road S	25.15	0.97	16.48	0.64
Chigwell Road N - Southend Road E	205.32	1.09	210.11	1.04
Southend Road E - Chigwell Road N	25.15	0.98	16.48	0.85
M11 S - M11 N	0.00	0.80	0.00	1.00
M11 N - M11 S	187.50	1.07	132.28	1.04
Link 1: A118 High Rd, Ilford				
A118 High Road	452.10	1.02	113.11	0.93
Link 6: A1400 Woodford Ave				
A1400 Woodford Avenue	54.95	0.93	91.06	1.00

[N/S] = Non Signalised

v/c >1.00 Signal & Non Signal Controlled	Over Capacity
v/c >0.85 <1.00 Non Signal Controlled; >0.90 < 1.00 Signal Controlled	Nearing Capacity
v/c <0.85 Non Signal Controlled; <0.90 Signal Controlled	Within Capacity

Appendix C



Mitigation Potential Category - Junctions and Links

Appendix C

AECOM