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FINAL REPORT

SYSTRA

PARKING AND FREIGHT STUDY

FINAL REPORT

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1. GLOSSARY

CLOHAM – Central London HAM model. One of 5 TfL Highway Assignment Models (HAM) covering different areas of London's Highway network. This model is developed using SATURN software (see below). Use of this model was agreed with Transport for London.

ENEVAL – programme to calculate link and junction based emissions from a set of speed flow relationships from highway assignment models.

LBTH – London Borough of Tower Hamlets

NPPF – National Planning Policy Framework. The Central Government guidance document on planning policy requirements.

PCUs – Passenger Car Unit. Vehicle unit used in the SATURN highway assignment software. One car equals one PCU whilst an HGV is around 2 PCUs.

PTAL – Public Transport Accessibility Level. A measure which scores locations by distance and frequency of public transport services.

Railplan – TfL's Public Transport Assignment Model.

SATURN - Computer program that calculates transport assignment on road networks. It is developed by the University of Leeds and Atkins.

SHLAA – Strategic Housing Land Availability Assessment.

SQL – Structured Query Language used for managing datasets.

TfL – Transport for London

TRICs – Trip generation analysis database for UK and Ireland.

VCR – Volume Capacity Ratio.

WebCAT – TfL's tool for providing information on London's transport system to the professional planning community.

2. EXECUTIVE SUMMARY

2.1 Overview

2.1.1 In 2017 JMP Consultants Ltd (Now SYSTRA) developed an Evidence Base and Strategic Transport Assessment to support the London Borough of Tower Hamlets' (LBTH) emerging Local Plan. Following the submission of this work SYSTRA have been commissioned to undertake an additional parking and freight research for the borough. This research project is split out into four themes:

- Theme 1: The impact of off-street residential car parking on congestion and air quality;
- Theme 2: Accessibility mapping to identify car parking need;
- Theme 3: The impact of residential car parking on viability; and
- Theme 4: The impact of home deliveries.

2.1.2 This report provides a summary of all the analysis undertaken for each of the four 'themes', presenting the outputs and conclusions with a specific focus on looking at the impact of applying revised parking provision standards to new developments to ensure that the additional growth proposed in the Local Plan does not have an unduly detrimental impact on the safe and efficient operation of the highway network and local air quality.

2.2 The Local Plan

2.2.1 The LBTH is projected to accommodate significant growth in new homes and jobs. The current London Plan has a housing target for the LBTH of 58,965. The developing Local Plan incorporates a minimum housing growth capacity figure of 49,954 between 2016 – 2031, with much of the growth focussed around the Isle of Dogs. There is also significant growth planned around the parts of the borough including the City Fringe and parts of the Lower Lea Valley.

2.2.2 As part of the Local Plan process the LBTH is examining the potential impact of this housing growth upon the transport network and considering the range of potential mitigation measures. A key policy tool for managing the impact of growth upon the local and strategic highway network has been identified as off-street car parking standards.

2.2.3 The latest proposed car parking standards for the LBTH will apply more stringent standards than the London Plan and the current LBTH standards, contained in the Managing Development DPD. This results from the findings of the Strategic Transport Assessment, which concluded that the potential impact of housing growth on vehicle trip generation could have significant detrimental impact on traffic congestion. The analysis concluded that it will be imperative to encourage alternative means of travel to private car trips. Restricting car parking provision will have an important role to play in this process, as well as providing alternative means of travel. There are two options for the proposed standards:

- **Option 1** looks into retaining current standards but sets revised parking standards for the Isle of Dogs, reflecting the density of housing and employment proposed for the Opportunity Area and long-standing congestion on the two road junctions providing access to the Island.
- **Option 2** proposes new standards for the whole of the borough based on evidence from the 2016 Transport Strategy, as well as an internal benchmarking exercise carried out by the LBTH.

2.2.4 This report examines the impact of these proposed parking standards upon highway congestion and air quality, develops mapping tools to identify the wider justification for lower standards in areas with good accessibility by non-car methods of travel, and investigates the potential impact upon viability.

2.2.5 In a separate assessment, there is also a review of survey data on home deliveries to provide an evidence base of the scale of these vehicles movements when considering future development.

2.3 Theme 1 Summary

2.3.1 The findings from Theme 1 of this study have demonstrated that if the LBTH are to support the level of growth set out in the London Plan it will be necessary to implement the Option 2 parking standards to new Local Plan development.

2.3.2 This is to ensure that new development does not contribute to increasing unsustainable levels of traffic congestion and air quality, on what is already forecast to be a congested network. Option 2 is forecast to reduce 2031 Local Plan delays by over a minute at a number of junctions across the LBTH area as well decreasing total vehicular emissions by between 1-3% across the borough.

2.3.3 The implementation of more stringent parking standards is considered to be one of the most impactful policies that can be implemented within the Local Plan, with respect to managing congestion and air quality. It will also be one component of a wider transport strategy to reduce car use and support sustainable modes.

2.4 Theme 2 Summary

2.4.1 A series of accessibility 'heat maps' have been produced that outline the level of walking and cycling accessibility from different parts of the LBTH to the following amenities:

- Education facilities (primary and secondary schools)
- Retail (designated retail locations)
- Employment (designated employment areas)
- Health (Doctors Surgeries and dentists)
- Open Space (Metropolitan Land and Parks)

2.4.2 These have been set aside the TfL accessibility ratings for public transport (PTAL) for the borough and presented within combinations to demonstrate the overall level of accessibility of different parts of the borough.

2.5 Theme 3 Summary

2.5.1 Data suggests that the local context of a development exerts an influence on how people choose to travel. It can be summarised that, where development takes place in an area with multiple public transport modes available, and a high density of commercial and retail services in its immediate vicinity, the number of car trips per day is relatively low, even where sites differ in the amount of car parking they have available. The evidence therefore suggests that, looking specifically at the borough of Tower Hamlets, there are several areas where low-car development is a "natural" fit, such as the Isle of Dogs.

2.5.2 In terms of viability, car parking spaces are considered to have greater "value" to a developer than the alternative uses. The exceptions are likely to be in locations which already have a solid density of other uses, which in itself appears to be a "push" factor toward low car or car free development as the target customer base does not treat car parking availability as a high priority.

2.5.3 Policies relating to affordable housing are a particular issue in London, where requirements are much higher than in other areas of the country. Where a development is not able to increase the sales price of market units to meet this requirement, parking sales can help to make up the difference.

2.6 Theme 4 Summary

2.6.1 The main summary conclusions from the analysis of the data are:

- An average of just over 15 deliveries were observed per development site per day.
- Average delivery time was just under 27 minutes; however, this included a number of instances where individual delivery vehicles effectively parked for long periods of the day.
- On average, between 11% and 18% of deliveries were uncompleted with the driver returning to their vehicle with the delivery. These deliveries were likely to require a return trip.
- On average, 31 other goods vehicles (LGVs and OGVs) per day per site were observed parking or waiting in the vicinity of the developments, even though they were not observed making a delivery. On average, these vehicles were parked for 12 minutes.

3. INTRODUCTION

3.1 Overview

3.1.1 In 2017 JMP Consultants Ltd (Now SYSTRA) developed an Evidence Base and Strategic Transport Assessment to support the London Borough of Tower Hamlets' (LBTH) emerging Local Plan. Following the submission of this work SYSTRA have been commissioned to undertake an additional parking and freight research for the borough. This research project is split out into four themes:

- Theme 1: The impact of off-street residential parking on congestion and air quality;
- Theme 2: Accessibility mapping to identify parking need;
- Theme 3: The impact of residential parking on viability; and
- Theme 4: The impact of home deliveries.

3.1.2 This report provides a summary of all the analysis undertaken for each of the four 'themes', presenting the outputs and conclusions with a specific focus on looking at the impact of applying revised parking provision standards to new developments to ensure that the additional growth proposed in the Local Plan does not have an unduly detrimental impact on the safe and efficient operation of the highway network and local air quality.

3.2 The Local Plan

3.2.1 Local Plans are at the heart of the planning system. The National Planning Policy Framework (NPPF) requires Local Plans to be "justified, effective, consistent with national policy and positively prepared to deliver sustainable development that meets local needs and national priorities" (Planning Practice Guidance, paragraph 001, ref 12-001-20140306).

3.2.2 The LBTH is in the process of developing a new Local Plan to cover a 15-year period from 2016/17 to 2030/31.

Housing Trajectories

3.2.3 The LBTH is projected to accommodate significant growth in new homes and jobs. The current London Plan has a housing target for the LBTH of 58,965. The developing Local Plan incorporates a minimum housing growth capacity figure of 49,954 between 2016 – 2031, with much of the growth focussed around the Isle of Dogs. There is also significant growth planned around the parts of the borough including the City Fringe and parts of the Lower Lea Valley.

3.2.4 The housing trajectory is not anticipated to be linear in nature, with the following 5 year increments:

- Up to 2020/2021 - 20,135 dwellings (40%)
- 2021/2022 to 2025/2026 - 23,572 dwellings (47%)
- 2026/2027 to 2030/2031 - 6,247 dwellings (13%)

3.2.5 It can, therefore, be seen that the distribution is relatively heavily frontloaded, with 87% of the dwellings projected to be delivered by 2026. This places greater emphasis on mitigating against the potential impacts at an early stage.

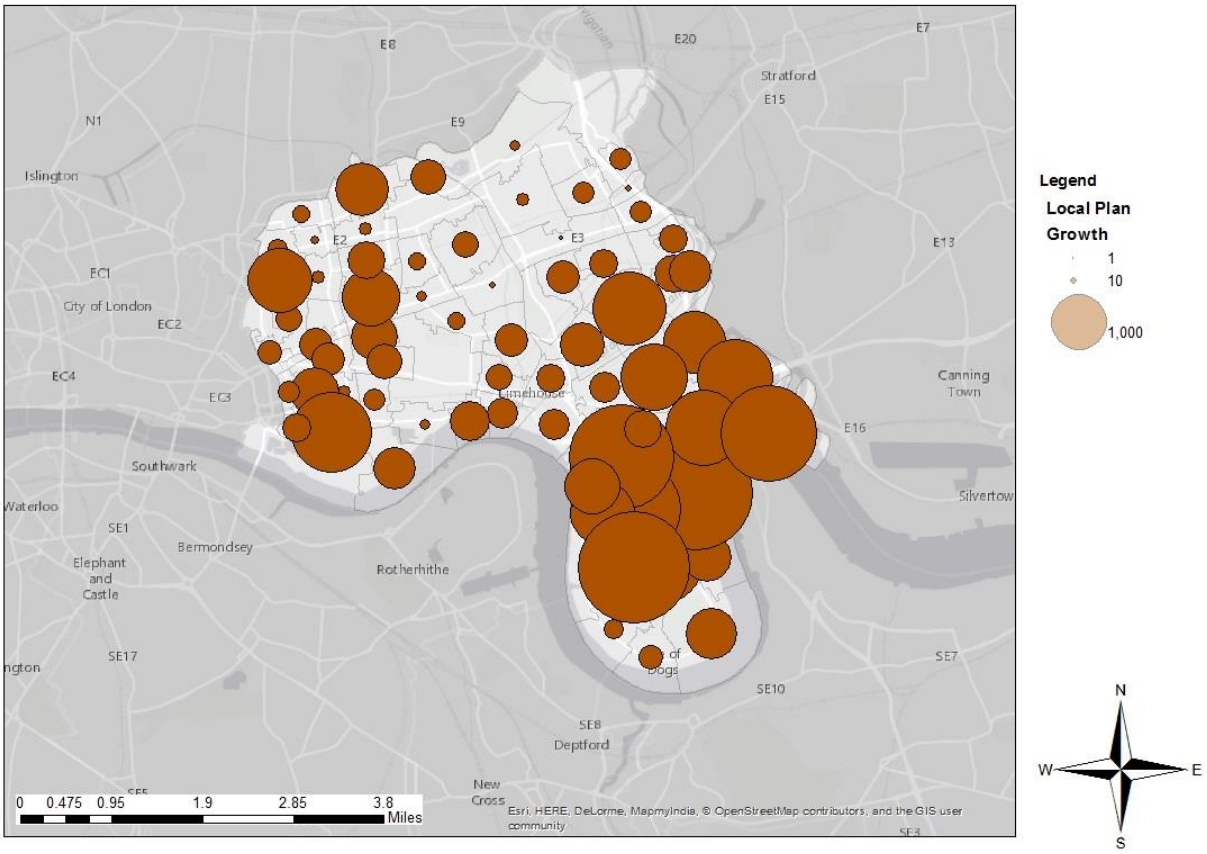


Figure 1. LBTH Local Plan 'Housing' Growth to 2031

3.2.6 The housing trajectory used for this study (and the LBTH Local Plan Evidence Base – Strategic Transport Assessment) is based on the LBTH Assessment of Housing Trajectory 2016, which assessed expected minimum net additional housing delivery (conventional and non-conventional) over a 15-year period. This incorporates planning application data at the time of assessment as well as 2013 SHLAA data for all remaining deliverable sites. It is recognised that this represents a shortfall from the London Plan target and the LBTH will be looking at various ways to address this shortfall. It is therefore likely that further growth will come forward. This will only add to the case that parking provision, and associated vehicle trip generation, will need to be tightly managed in the future.

3.2.7 In August 2017, the LBTH Assessment of Housing Trajectory was updated to support the new Local Plan, reflecting new planning application data (as at August 2017) as well as 2017 SHLAA data received from the GLA. This housing trajectory update includes an additional 1,491 homes on top of the 2016 housing trajectory.

3.2.8 In addition, LBTH have also established a windfall allowance (small sites) of 3,010 homes in accordance with national guidance. Neither these nor the 1,491 homes from the 2017 trajectory have been included within the core analysis but a separate evaluation has been undertaken.

3.2.9 Since it is proposed that this additional growth of 4,501 homes would be applied evenly across the borough, the impacts upon any one specific part of the transport network are anticipated to be relatively small. Nonetheless, this potential increase in housing development will only strengthen the conclusions of this analysis that identify the requirement to minimise the level of private car trips from new developments.

3.3 Parking Standards

Wider Policy Context

3.3.1 Within the context of transport, the **NPPF** identifies the important role that transport polices have in facilitating sustainable development as well as wider sustainability and health objectives. In developing a Local Plan, the Borough should therefore consider solutions which support reductions in greenhouse gas emissions and reduce congestion, including reducing the need to travel, or providing individuals with the option to travel sustainably.

3.3.2 Whilst the Plan should identify viable infrastructure necessary to support development, it should similarly ensure that patterns of development are adopted that facilitate the use of sustainable modes.

3.3.3 The NPPF particularly recognises the role of parking and parking standards in establishing travel behaviours and so when considering local parking standards for residential and non-residential development the Plan should take into account:

- the accessibility of the development;
- the type, mix and use of development;
- the availability of and opportunities for public transport;
- local car ownership levels; and
- an overall need to reduce the use of high-emission vehicles.

3.3.4 The NPPF also requires the Borough to seek to improve the quality of parking in town centres so that it is convenient, safe and secure, including appropriate provision for motorcycles. They should set appropriate parking charges that do not undermine the vitality of town centres. Parking enforcement should be proportionate.

3.3.5 The **London Plan** states that a balance should be struck between new development and preventing excessive car parking provision that can undermine cycling, walking and public transport use. Furthermore car-free developments should be promoted in areas with high levels of public transport accessibility (Policy 6.13, p.267).

Local Plan Policies

3.3.6 Policy D.TR3 in the new Local Plan directly refers to the provision of car parking for new developments. This acknowledges that on-street car parking is under a significant amount of stress across the borough and that both on and off street parking needs to be managed to facilitate sustainable travel patterns and address congestion. Therefore the local plan is seeking that all residential development is required to be permit fee in terms of on-street car parking. All parking associated with a development will be required to be located off-street.

3.3.7 The latest proposed car parking standards for in the Local Plan will apply more stringent standards than the London Plan and the current LBTH standards, contained in the Managing Development DPD. This is as a result of the findings from the Strategic Transport Assessment, which concluded that the potential impact of housing growth on vehicle trips generation could have a detrimental impact on traffic congestion in the borough. The analysis concluded that it will be imperative to encourage alternative means of travel than private car trips. Restricting car parking provision will have an important role to play in this process, as well as providing for the alternative means of travel. Applying more stringent parking standards will assist in this process.

3.3.8 There are two Options for the proposed standards:

- **Option 1** looks into retaining current standards but sets revised parking standards for the Isle of Dogs, reflecting the specific height levels, but also density of housing and employment proposed for the Opportunity Area and long-standing congestion on the two road junctions providing access to the Island.

- **Option 2** proposes new standards for the whole of the borough based on evidence from the 2016 Transport Strategy, as well as an internal benchmarking exercise carried out by the LBTH.

3.3.9 These are set out in the following tables:

Table 1. London Plan Parking Standards[1]

NUMBER OF BEDS	1-2 BED	3 BED	4+ BED
Number of beds	Less than 1 per unit	Up to 1.5 per unit	Up to 2 per unit

Table 2. Current LBTH Residential Parking Standards[2]

LOCATION	LESS THAN 3 BEDROOM UNIT	3 BEDROOM PLUS UNITS
PTAL 5-6	0.1	0.2
PTAL 3-4	0.3	0.4
PTAL 1-2	0.5	1

Table 3. Option 1 Residential Parking Standards

LOCATION	LESS THAN 3 BEDROOM UNIT	3 BEDROOM PLUS UNITS
Isle of Dogs	0	0.1
PTAL 5-6	0.1	0.2
PTAL 3-4	0.3	0.4
PTAL 1-2	0.5	1

Table 4. Option 2 Residential Parking Standards

LOCATION	LESS THAN 3 BEDROOM UNIT	3 BEDROOM PLUS UNITS
Isle of Dogs	0	0.1
PTAL 5-6	0	0.1
PTAL 3-4	0.2	0.3
PTAL 1-2	0.4	0.5

[1] *London Plan 2015*
[2] *LBTH Managing Development DPD, 2013*

3.4 This Report

3.4.1 The remaining sections of this report will set out the analysis undertaken for each of the four 'themes' and presents the conclusions that can be drawn from the data, as follows:

- Section 4: Approach, analysis and conclusion from Theme 1
- Section 5: Methodology and mapping outputs from Theme 2
- Section 6: Discussion, approach and conclusions from Theme 3
- Section 7: Survey scope, summary outputs and conclusions from Theme 4

4. THEME 1 - THE IMPACT OF OFF-STREET RESIDENTIAL PARKING ON CONGESTION AND AIR QUALITY

4.1 Methodology

Overview

4.1.1 In order to assess the impact of the proposed new parking standards on vehicle trip generation, congestion and air quality it is necessary to determine how these new standards will impact on the number of new parking spaces.

4.1.2 This section sets out our methodology for estimating the potential parking space numbers for the Local Plan using Current (Table 2) and Newly Proposed (Table 4) parking standards. This involved five steps:

- Step 1 - Estimate a weighted average (by Tenure breakdown) of the parking standards for each PTAL category for Isle of Dogs and Rest of the Borough;
- Step 2 - Calculate the differences between the various parking standards;
- Step 3 - Determine the proportion of housing stock in each category area;
- Step 4 - Estimate the overall reduction in car parking spaces; and
- Step 5 - Estimating the impact of the reduction in car parking spaces has on trip generation.

Step 1 - Weighted Average of Parking Standards across Borough Area

4.1.3 This step produces a weighted average of the parking standards for each category (Isle of Dogs, Rest of Borough, PTAL bands 5-6, PTAL 3-4, PTAL 1-2) allowing for the LBTH policy mix of bedroom sizes[3], as follows:

- 1 bed = 27.2%
- 2 bed = 44.1%
- 3 bed = 17.5%
- 4 bed = 11.2%

4.1.4 These weighted averages are provided in 0:

[3] *Source: Strategic Housing Market Assessment 2017*

Table 5. Weighted Average for Parking Standards

LOCATION	PTAL	AVERAGE PARKING SPACES PER DWELLING		
		OPTION 2	OPTION 1	CURRENT
Isle of Dogs	PTAL 5-6	0.03	0.03	0.13
	PTAL 3-4	0.03	0.03	0.33
	PTAL 1-2	0.03	0.03	0.64
Rest of Borough	PTAL 5-6	0.03	0.13	0.13
	PTAL 3-4	0.23	0.33	0.33
	PTAL 1-2	0.43	0.64	0.64

Step 2 - Differences in Parking Standards

4.1.5 This step calculates the differences between the various parking standards, in each case looking at the difference between each standard and the Current Standard.

Table 6. Differences in Parking Standards

LOCATION	PTAL	CHANGE IN PARKING STANDARDS PER DWELLING		
		OPTION 2	OPTION 1	CURRENT
Isle of Dogs	PTAL 5-6	-0.10	-0.10	-
	PTAL 3-4	-0.30	-0.30	-
	PTAL 1-2	-0.62	-0.62	-
Rest of Borough	PTAL 5-6	-0.10	0.00	-
	PTAL 3-4	-0.10	0.00	-
	PTAL 1-2	-0.22	0.00	-

Step 3 - Match CLOHAM Zones to PTAL scores

4.1.6 Housing trajectories from 2016-2031 have been provided by the LBTH broken down by each CLOHAM zone. These CLOHAM zones have been assigned a PTAL rating from TfL's WEBCAT tool[4]. This has allowed us to estimate the proportion of new Local Plan housing stock proposed for each PTAL area within Isle of Dogs and the Rest of the Borough. The CLOHAM model zones are relatively small, however, there were a few instances where a zone had more than one PTAL rating. In these instances a professional judgement was made to allocate the CLOHAM zone to the predominant PTAL rating.

Step 4 - Estimated Reduction in Parking Spaces

4.1.7 The next step is to provide the net Local Plan dwelling growth by each zone to the relevant parking standard of spaces per dwelling to get the estimated increase in parking spaces from local plan growth. These are displayed in Table 7 whilst the reduction in parking spaces versus the current standards is provided in Table 8.

Table 7. Estimated Additional Parking Spaces by Parking Standard

LOCATION	PTAL	ADDITIONAL PARKING SPACES		
		OPTION 2	OPTION 1	CURRENT
Isle of Dogs	PTAL 5-6	386	386	1,729
	PTAL 3-4	184	184	2,101
	PTAL 1-2	53	53	1,179

[4] https://tfl.gov.uk/info-for/urban-planning-and-construction/planning-with-webcat/webcat

Rest of Borough	PTAL 5-6	458	2,053	2,053
	PTAL 3-4	2,684	3,857	3,857
	PTAL 1-2	670	1,006	1,006
Total	-	**4,434**	**7,538**	**11,925**

Table 8. Estimated Reduction in Parking Spaces vs Current Standards

LOCATION	PTAL	PARKING SPACES		
		OPTION 2	OPTION 1	CURRENT
Isle of Dogs	PTAL 5-6	-1,343	-1,343	-
	PTAL 3-4	-1,918	-1,918	-
	PTAL 1-2	-1,127	-1,127	-
Rest of Borough	PTAL 5-6	-1,595	-	-
	PTAL 3-4	-1,173	-	-
	PTAL 1-2	-336	-	-
Total	-	**-7,491**	**-4,387**	-

4.1.8 The above tables demonstrate that if the proposed level of housing development is delivered applying current LBTH parking standards then there would be an estimated additional 12,000 parking places with roughly a 40/60 split between the Isle of Dogs and the Rest of the Borough.

4.1.9 Implementing the Option 1 parking standards instead is estimated to result in 4,400 fewer parking spaces when compared against the current standards. This reduction would occur only in the Isle of Dogs. The geographic location of these changes, by CLOHAM zone are displayed in Figure 2.

4.1.10 Implementing the Option 2 parking standards would also result in 4,400 fewer parking spaces in the Isle of Dogs but also another 3,100 fewer spaces across the rest of the Borough – compared to using the Current standards. The extent of the reduction is displayed in Figure 3.

4.1.11 The impact this may have on trip generation and local traffic is discussed in sections 0 and 4.2.

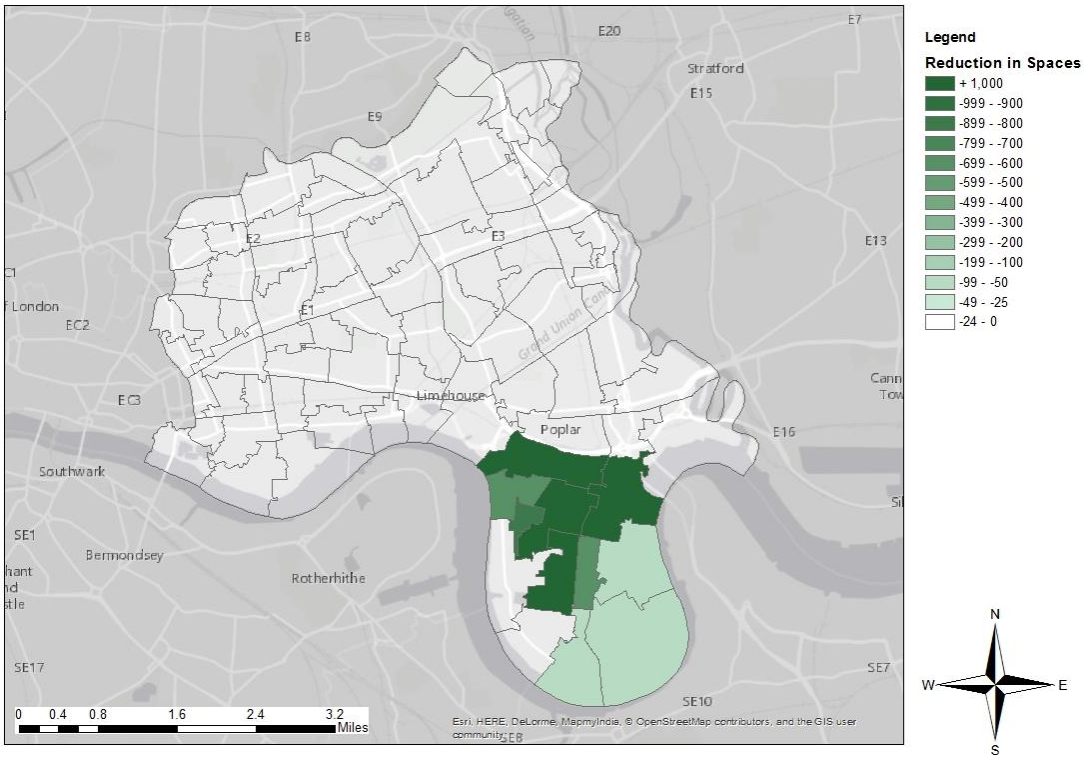


Figure 2. Estimated Reduction in Local Plan Car Parking Spaces if adopting Option 1 Parking Standards

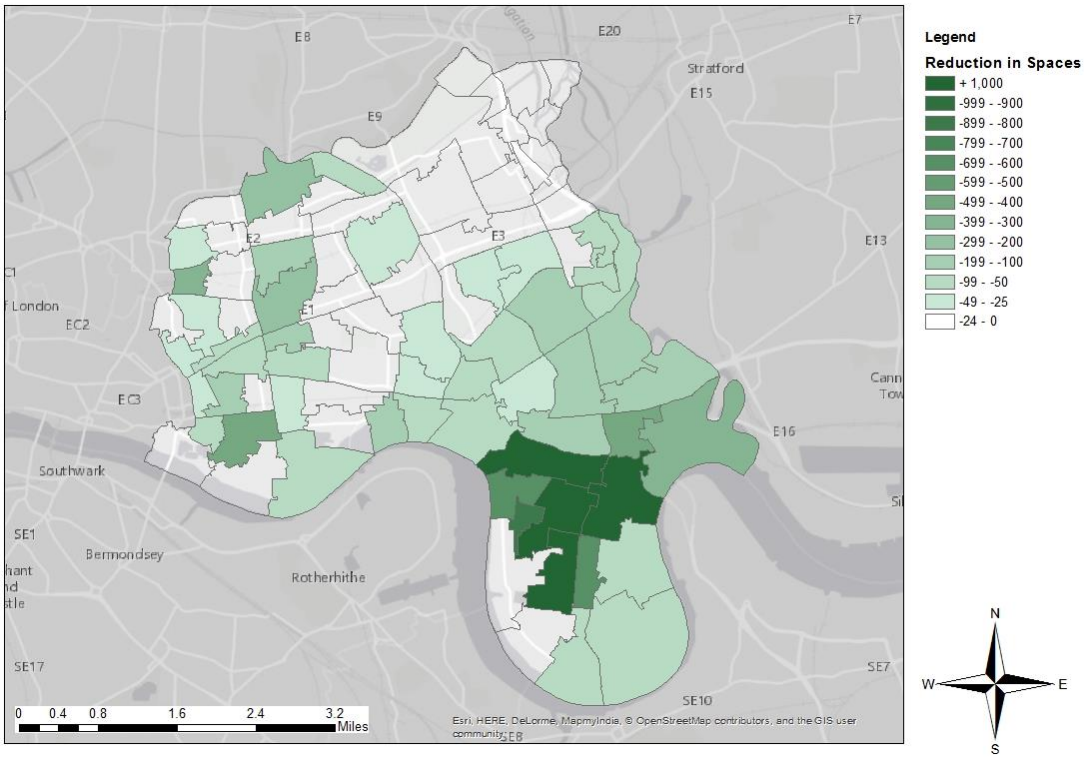


Figure 3. Estimated Reduction in Local Plan Car Parking Spaces if adopting Option 2 Parking Standards

Step 5 - Impact on Trip Generation

4.1.12 A review of the TRICS database for Inner London sites has provided some data on private car trip generation in the AM and PM peaks for sites with high parking allocation and those with low. Our initial analysis has indicated that, on average, every additional parking space results in a higher level of private car trip generation of around 0.25 trips in the AM peak and 0.14 in the PM peak.

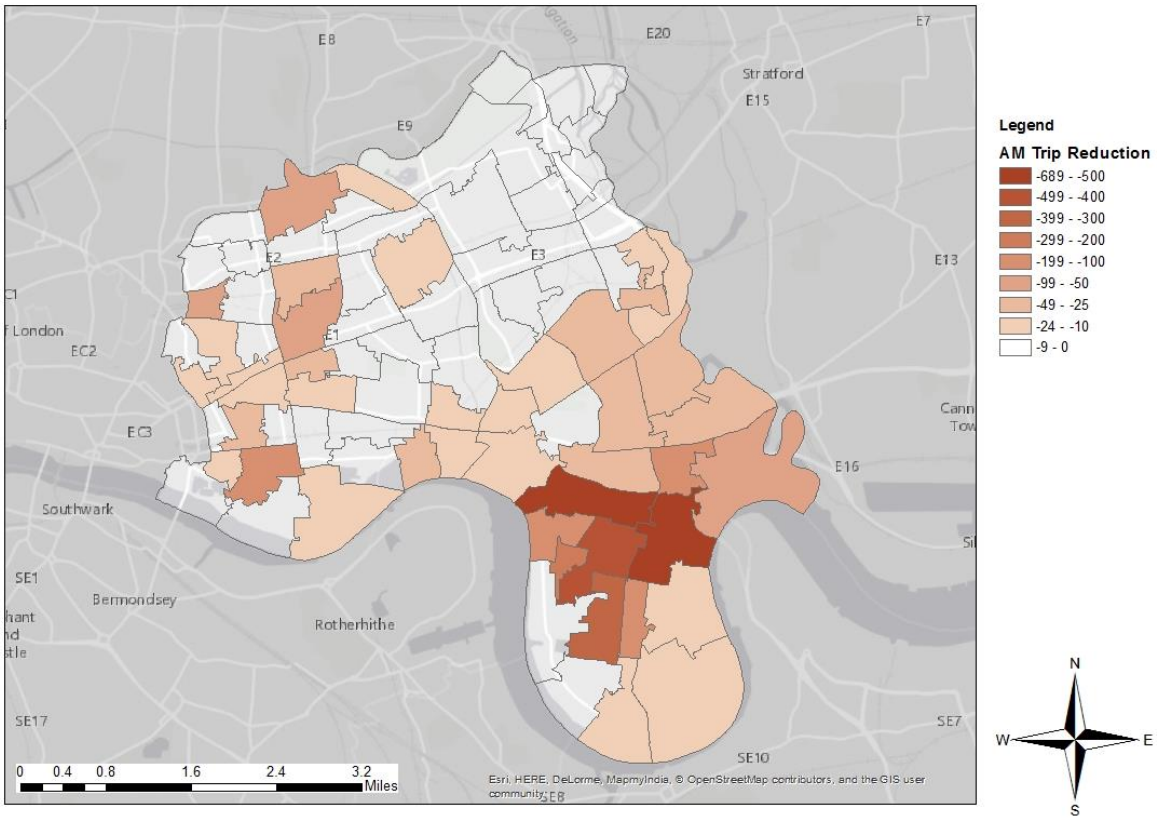
4.1.13 It has been assumed that in the AM origin trips will be impacted and in the PM destination trips will be impacted as this is the general pattern of trip making for residential trips in the AM and PM peaks.

4.1.14 Applying these trips rates to the differences in parking provisions indicates there will be the following changes in demand as a result of the Local Plan growth:

Table 9. Forecasted Trip Reduction

PARKING STANDARD	AM TRIP REDUCTION	% OF LBTH MODEL ORIGINS[5]	PM TRIP REDUCTION	% OF LBTH MODEL DESTINATIONS[6]
Option 1	-1,110	-5%	-610	-3%
Option 2	-1,895	-9%	-1,041	-5%

4.1.15 The estimated impact on trip rates by CLOHAM model zone is displayed below for the AM peak using Proposed Parking Standards. Plots for the PM and also Option 1 Parking Standards are provided in within the full set of results presented as an appendix to this report.



[5] *Taken Local Plan Testing Model Matrix for THBC zones only – modelling work undertaken in 2016*

[6] *Ibid*

Figure 4. Estimated Reduction in Local Plan trips when applying Option 2 Parking Standards to new developments

4.2 CLOHAM Modelling

Overview

4.2.1 In 2017 SYSTRA/JMP undertook CLOHAM and Railplan modelling to assess the impact of the proposed Local Plan growth on the road and public transport networks.

4.2.2 CLOHAM is part TfL's Highway Assignment Models (HAMs) which covers most of the eastern sub-region of London and uses the SATURN software. Use of this model, as opposed to the East London HAM model, was agreed with TfL, as it was deemed to provide a better coverage of both the LBTH and the surrounding areas most impacted upon by the LBTH Local Plan. The model is calibrated to a base of November 2012 with forecast year reference case models are for the years 2021 and 2031. The modelled time periods area as follows:

- AM peak (08:00-09:00);
- Inter peak (10:00-16:00 average hour)
- PM peak (17:00-18:00)

4.2.3 This stage of work takes the Local Plan CLOHAM modelling and amends the model demand for the LBTH zones to reflect the new Proposed Parking standards for new dwellings as discussed in Chapter 2**Error! Reference source not found.**.

4.2.4 For the purposes of the modelling analysis the Option 2 Parking Standards in 2031 have been the focus of the assessment (for the AM and PM peaks) and are reported on for the remainder of this document. The Option 2 Standards represent a more stringent set of controls and so offer the greatest opportunity for reducing the impact of growth on private vehicle trip generation. Modelling this scenario, therefore, represents the 'best case' scenario.

4.2.5 Option 1 Parking Standards were not directly modelled as the outputs from the Option 2 testing indicated that, even with the 'best case' reduction in trips, the levels of congestion and air quality remained relatively high and so the lower Option 1 standards would have a less significant impact.

Matrix Factoring

4.2.6 Step 5 of the Methodology (Section 3.6) produced an estimate on the change in trips (demand) for each CLOHAM zone within LBTH. The CLOHAM Model contains five user classes:

- UC1 Car In Work (business-related travel);
- UC2 Car Out of Work (commuter, leisure or other non-business related trips);
- UC3 Taxi;
- UC4 LGV; and
- UC5 HGV

4.2.7 Considering that this study is looking at the number of new car parking spaces at new residential developments, only the first two user classes were altered. The specific LBTH zone demand from the Local Plan matrix (undertaken in 2017) was then factored accordingly; origins for the AM and destinations for the PM. The factoring was done this way as this is the general pattern of trip making for residential trips in the AM and PM peaks.

4.2.8 The following figures display the impact on demand for UC2 (as this is the largest of the two user classes) for both origins and destinations in the AM peak. Origins are only impacted within Tower Hamlets whilst Destinations are impacted across the borough and beyond for the reasons discussed above (4.2.7). All demand change plots are provided in the Appendix.

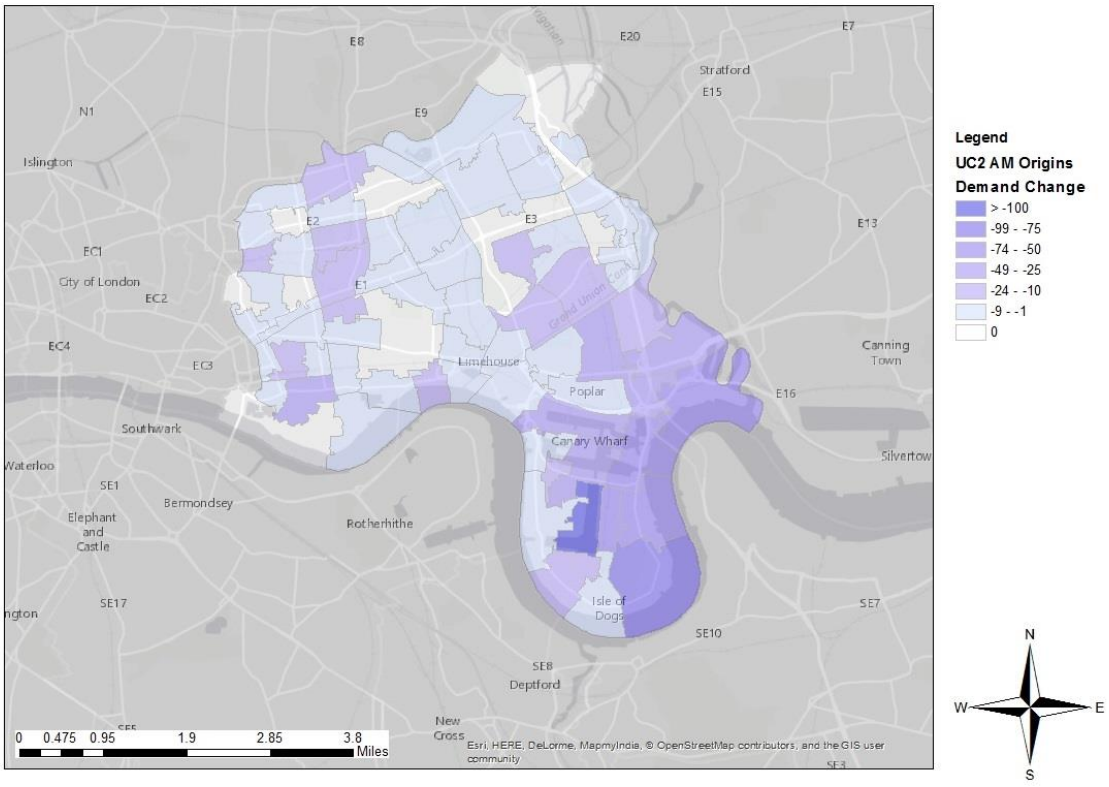


Figure 5. Forecast Impact on User Class 2 Origin Demand – AM Peak

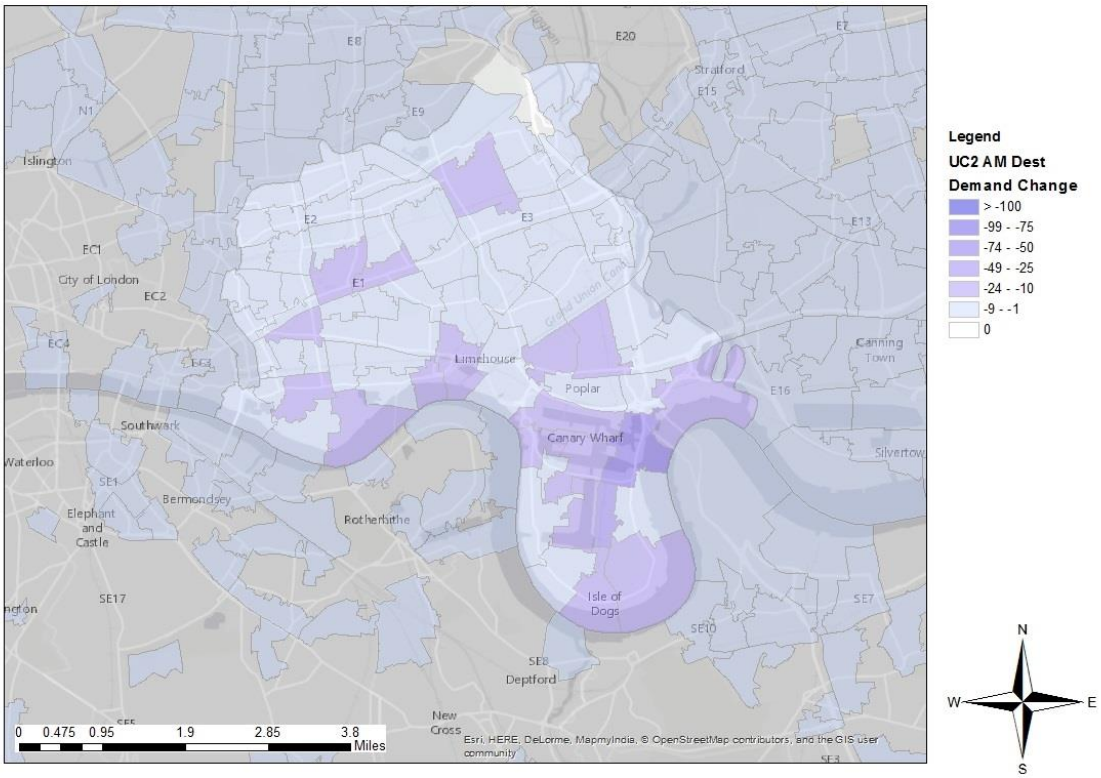


Figure 6. Forecast Impact on User Class 2 Destination Demand – AM Peak

4.2.9 The new *Local Plan – with Proposed Parking Standards* AM and PM matrices were then used to run the assignments of the CLOHAM model. The results from these assignments are discussed in the next chapter.

Model Outputs

4.2.10 This section reviews the forecasted impact of the Local Plan using the proposed parking (option 2) standards versus the current standards in 2031. The impacts reviewed are flow changes on links and subsequent impact on junction delays and link volume / capacity ratios.

Average Speed on Key Links

4.2.11 The average speed (weighted by flows) has been obtained for some the key links within or feeding into Tower Hamlets. This is displayed for the AM peak hour in Table 10.

4.2.12 , A number of links are shown to have improvements in speeds of between 1 to 2% in the AM Peak, and up to 1% in the PM Peak. In the context of a highly congested highway network, both within and beyond the LBTH, these increases are considered to reflect a notable positive change, with larger benefits not necessarily shown as a result of other traffic diverting to use quicker routes that have been created across the network. An example of this is where there are slight increases in average speed, such as for Newham Way (on the section entering / leaving Tower Hamlets) in the AM peak. The model results indicates that more strategic traffic is diverting to routes through the LBTH due to reductions in congestion (resulting from the new standards) but that this causes specific issues on certain access routes into the borough.

Table 10. Weighted Average Speeds (mph) on Key Links

ROAD	LOCAL PLAN AM PEAK	% CHANGE AM PEAK	LOCAL PLAN PM PEAK	% CHANGE PM PEAK
A1205	22	0.0%	22	0.5%
Bethnal Green and Roman Road	19	0.6%	19	0.1%
Commercial Road	19	0.3%	18	0.1%
East India Dock Road	22	0.7%	18	0.8%
Aspen Way	29	1.8%	33	1.0%
Hackney Road	21	0.1%	21	0.4%
Westferry	26	0.4%	28	1.0%
Rotherhithe Tunnel	21	-0.5%	22	0.2%
Lower Lea Crossing	37	0.6%	41	0.8%
Newham Way	38	-1.0%	31	0.0%
Blackwall Tunnel and Northern Approach	33	0.4%	26	0.0%

Green = notable improvement in speed, yellow = minimal change; red = notable reduction in speed

Flow Changes

4.2.13 This sub-section discusses the forecasted change in flows on links when assigning a reduced Local Plan demand matrix as a result of there being fewer additional parking spaces.

4.2.14 Figure 7 shows that in the AM peak there are significant reductions in flows around the Isle of Dogs, as this is where Local Plan growth is greatest and the new parking standards are at their most stringent.

4.2.15 There are also decreases on both the northern and southern Blackwall tunnel approaches along with smaller decreases on North / South movements within the borough. It is also worth noting there appear to be some flow increases and decreases around Greenwich / Westcombe Park which is most likely to be due to re-routing reacting to changes in demand. PM plots are provided in the Appendix.

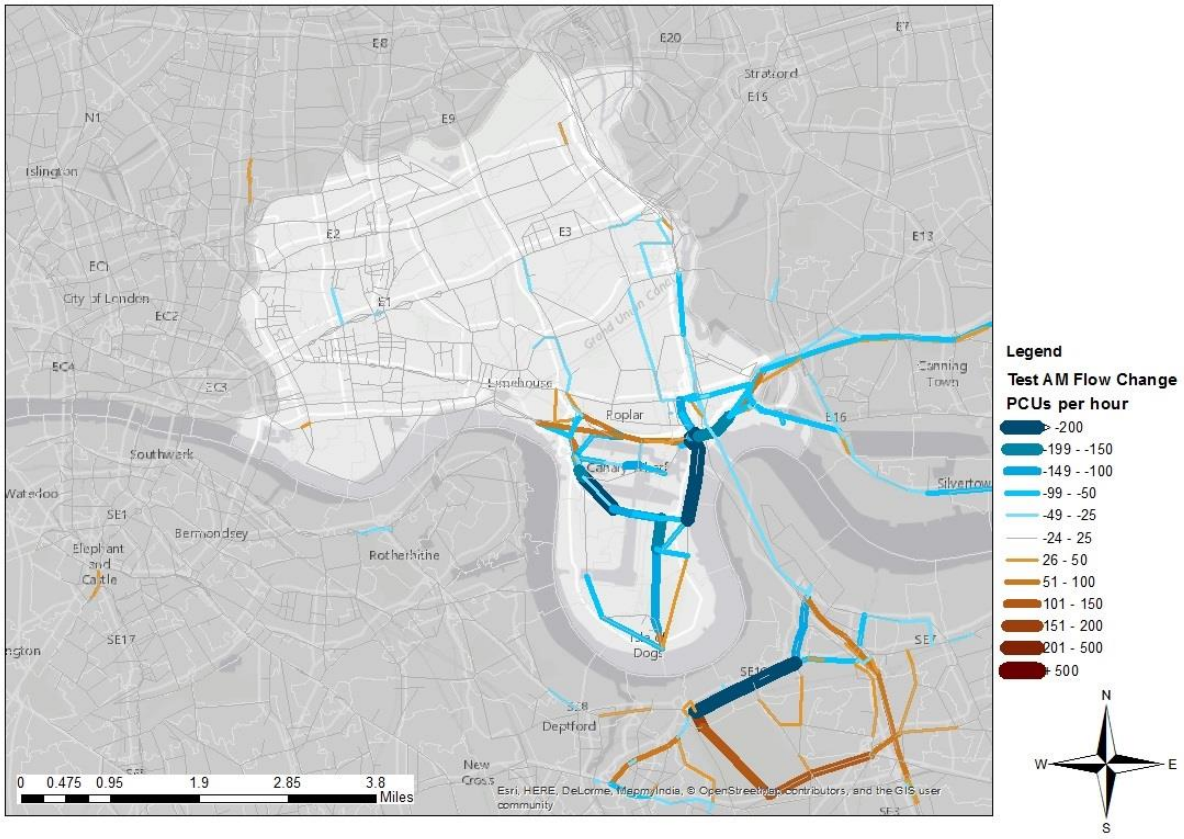


Figure 7. Change in Link Flows 2031 AM peak hour (PCUs per hour)

Junction and Link Delay

4.2.16 This section reviews the forecasted changes in Junction and Link delays as a result of implementing the new Parking Standards for the AM peak (for PM see Appendix).

4.2.17 The main reductions in delay are occurring around the Isle of Dogs but also to the North of the borough around Old Ford and Roman Road (Figure 8). This broadly reflects the change in links flows displayed in the previous figure. There are also reductions around the Old Ford and Roman Road area.

4.2.18 Again, whilst the impact of the revised parking standards is clearly positive across the borough, the scale of reductions in delays are not substantial in themselves. This is again due to the result of both the underlying congested network across the LBTH, as well as congestion in neighbouring boroughs, resulting in some released highway capacity being utilised by other trips diverting through the borough.

4.2.19 So whilst the revised parking standards have a positive impact and necessary, it reiterates the requirements to deliver further sustainable transport measures alongside the changes in parking standards to reduce the impact of future predicted traffic flows across the borough.

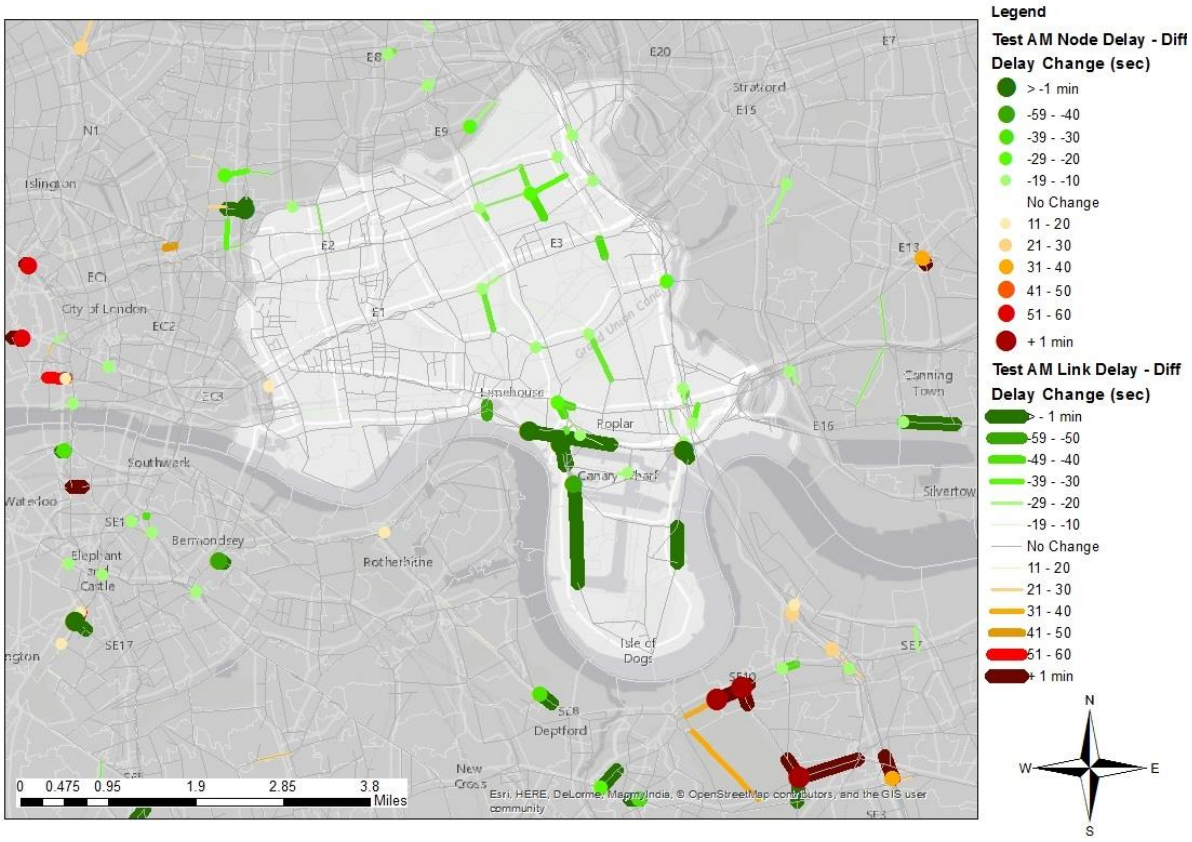


Figure 8. Forecast Change in Junction and Link Delays (seconds) – 2031 AM peak hour

Overall Network Stress

4.2.20 To reiterate the issue of the overall congested network, Figure 9 displays the forecasted level of stress on the road network within Tower Hamlets in 2031 with Local Plan Growth, whilst using the new proposed parking standards. It is clear that despite the changes discussed earlier (Figure 8) the road network remains under significant levels of stress. It is, therefore, important that the revised parking standards are implemented alongside further sustainable transport measures.

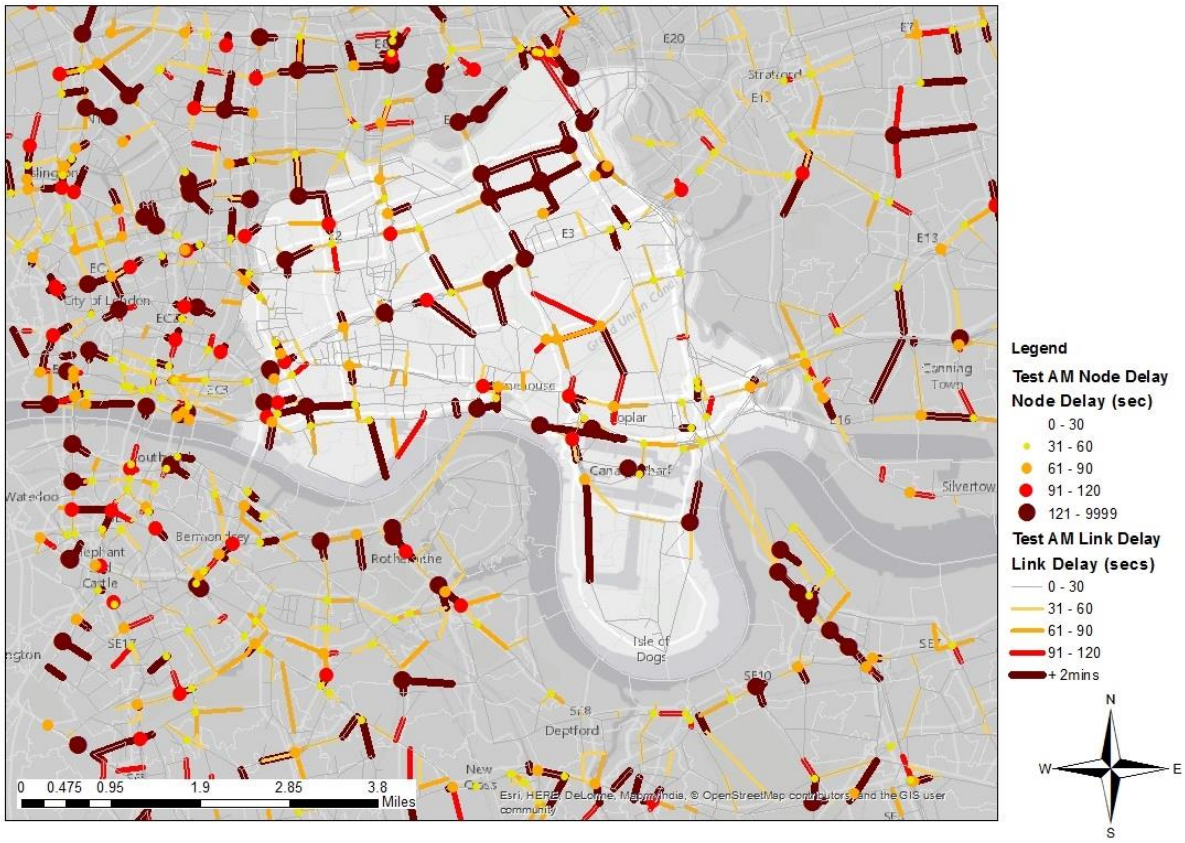


Figure 9. Node and Link Delay for Local Plan using Proposed Parking Standards – 2031 AM Peak hour

4.3 EMISIONS Modelling

ENEVAL

4.3.1 ENEVAL is a program which can be linked to a variety of transport models to calculate both link and junction based emissions base on a set of speed flow relationships. It can be used to calculate link based emissions for Oxides of Nitrogen (including NO2), PM10's and PM2.5's (including those from tyres, breaks and abrasion), Carbon Monoxide, Carbon Dioxide and Hydrocarbons and can also calculate Methane, Benzene and 1 3-Butadiene. This information can be calculated for any number of links, junctions, time periods and user classes and the outputs are stored and summarised in a SQL database.

4.3.2 It is up to date with the with the latest formulations of emissions formulas for each emission type as published on the National Atmospheric Emissions Inventory (http://naei.defra.gov.uk/data/ef-transport), which are the same factors as used in DEFRA's Emissions Factor Toolkit program. It also includes a range of new vehicle types and fuel types including electric and hybrid vehicles.

4.3.3 Outputs from the CLOHAM model have been used to calculate yearly emissions for the Local Plan test and the Local Plan with new parking standards in order to estimate the impact the new parking standards might have on air quality.

Results

4.3.4 The following table displays the forecast reduction in emissions for Tower Hamlets.

4.3.5 Across Tower Hamlets the majority of annual emissions drop by between 1-3% with the main decreases occurring within the Isle of Dogs. This is expected as this is where the largest reduction in off-street car parking spaces is occurring. As expected the main changes are occurring around the Isle of Dogs. Plots for all other emission types are provided in the Appendix.

4.3.6 Figure 10 and Figure 11 display the reduction in Carbon Monoxide emissions by CLOHAM zone and link.

Table 11. ENEVAL Forecast Reductions in Annual Emissions

EMISSION	ISLE OF DOGS	REST OF BOROUGH	LBTH
NOX	-3%	-1%	-1%
N02	-4%	-1%	-1%
PM10	-3%	-1%	-1%
PM2.5	-3%	-1%	-1%
HC	-4%	-2%	-2%
Carbon Monoxide	-9%	-3%	-3%
Carbon Dioxide	-6%	-2%	-2%
Benzene	-7%	-2%	-2%
Methane	-7%	-2%	-2%
1-3 Butadiene	-4%	-1%	-1%

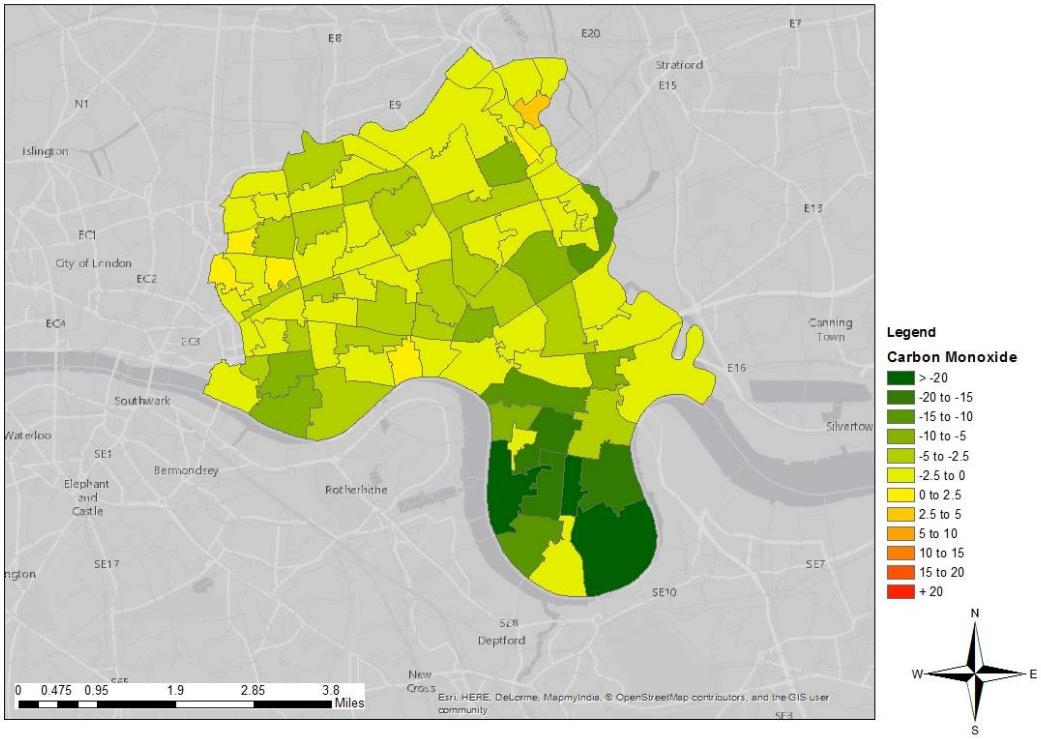


Figure 10. Percentage Change in annual Carbon Monoxide Emissions when applying new parking standards to new Local Plan development – by Zone

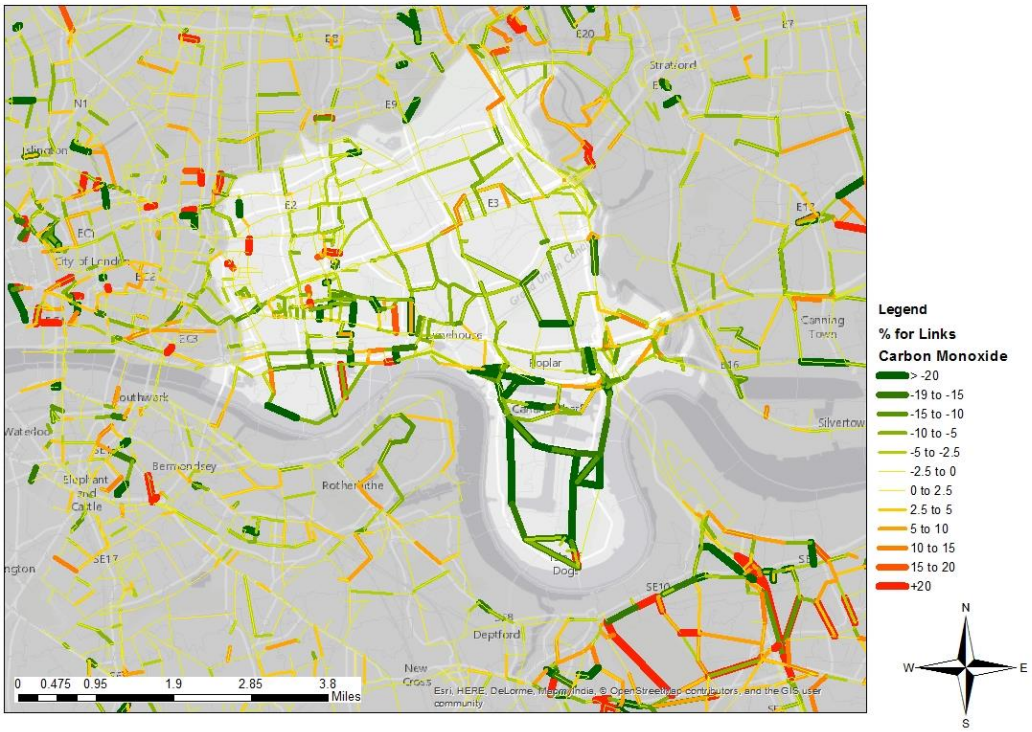


Figure 11. Percentage Change in annual Carbon Monoxide Emissions when applying new parking standards to new Local Plan development – by Link

4.4 Theme 1 - Summary and Conclusions

Summary

4.4.1 The 2016 Local Plan Evidence Base – Strategic Transport Assessment[7] report states:

> *To maintain the current parking standards, or adopt other standards that diverge from the London Plan, the borough is required to provide robust justification for departing from the standards. In many cases, the Mayor of London's Office is primarily concerned about either inappropriately high levels of car parking provision that encourages private car trips, or the potential impact of off-street parking restrictions upon creating on-street parking pressures.*

4.4.2 The analysis for Theme 1 sets out the methodology and results for investigating the impact of using newly proposed and more stringent parking standards for new local plan residential development.

4.4.3 To estimate the reduction in demand, from the Local Plan test, it was necessary to:

- Estimate a weighted average (by tenure type) of the parking standards for each PTAL category for Isle of Dogs and Rest of the Borough;
- Calculate the differences between the various parking standards;
- Determine the proportion of housing stock in each category area;
- Estimate the overall reduction in car parking spaces; and
- Estimating the impact the reduction in car parking spaces has on trip generation.

4.4.4 This reduction in trips was then compared against Local Plan demand for each Tower Hamlets zone to provide a factor for which to reduce demand by. This was then applied to the relevant private car user class matrices reducing AM origin and PM destinations as this reflects the pattern of travel from a residential development.

4.4.5 The reduced Local Plan with Parking Standards demand matrices were then assigned in CLOHAM with link Speeds, flows, delays and junction delays reviewed to understand the impact of applying these new parking standards to Local Plan growth.

4.4.6 Finally the ENEVAL model was used to estimate the impact this would have on air quality.

Conclusions

4.4.7 This section has shown that the road network around Tower Hamlets is forecast to be heavily congested in 2031 even before Local Plan growth aspirations are achieved (**Error! Reference source not found.**Figure 10). This highlights the importance of the BTH implementing a Parking Policy within their local plan, this is D.TR3 Parking and Permit-free.

4.4.8 This piece of work has investigated the impact of implementing new parking standards in order to limit the impact Local Plan growth will have on local traffic congestion and air quality:

- Option 1 proposed to take the current standards whilst providing revised standards within the Isle of Dogs due to specific height levels as well as density of housing and employment proposed for the Opportunity Area.
- Option 2 proposes new standards for the entire borough based on evidence from the 2016 Transport strategy.

4.4.9 The impacts both Options are forecast to have on new parking spaces and trip generation are summarised below:

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[7] *LBTH Local Plan Evidence Base – Strategic Transport Assessment. Strategy Development. JMP (Now SYSTRA) 2016. Paragraph 6.24.*

Table 12. Parking Standard Impacts – Option 1 and 2

IMPACT	LOCAL PLAN	OPTION 1 VS LP	OPTION 2 VS LP
Parking Spaces	11,900	-4,400	-7,500
AM Trip Generation	-	-1,100 (5%)	-600 (3%)
PM Trip Generation	-	-1,900 (9%)	-1,000 (5%)

4.4.10 As Option 2 provided the greatest reduction in additional car parking spaces and therefore trips this was then tested in TfL's CLOHAM model. The main conclusions from implementing the Option 2 parking standards are as follows:

- 7,500 fewer Car Parking Spaces added to the borough as a result of Local Plan development;
- This equates to 1,800 and 1,000 fewer peak hour trips in the AM and PM peak hours;
- Significant flow and delay reductions are expected around the Isle of Dogs with more modest reductions across the rest of the borough;
- 1 to 3% reduction in annual emissions across the borough with the largest increase being 9% in Carbon Monoxide emissions within the Isle of Dogs; and
- Small increases to average speeds on the borough's main roads;

4.4.11 In conclusion, the findings from Theme 1 of this study have demonstrated that if the LBTH are to support the level of growth set out in the London Plan it will be necessary to implement the Option 2 parking standards to new Local Plan development.

4.4.12 This is to ensure that new development does not result in unsustainable levels of traffic congestion and air quality, on what is already forecast to be a congested network. Option 2 is forecast to successfully reduce 2031 Local Plan delays by over a minute at a number of junctions across the LBTH area as well decreasing all vehicular emissions by between 1-3% across the borough.

4.4.13 The implementation of more stringent parking standards is considered to be one of the most impactful policies that can be implemented within the Local Plan, with respect to managing congestion and air quality. It will also be one component of a wider transport strategy to reduce car use and support sustainable modes.

Impact of Higher Housing Growth

4.4.14 As discussed early in Section 2.2, the housing trajectory is lower than the current London Plan housing target for LBTH of 58,965. Recent work has already identified a need for additional housing growth of up to 4,501 new dwellings. This growth would be equally distributed across the borough.

4.4.15 The additional growth will generate additional trips on the transport network, including some additional vehicle trip generation. This will clearly add to the already identified pressures on the highway network, in terms of congestion and air quality although the dispersed nature of the additional residential growth will mean that the impact upon a one specific part of the network is likely to be minimal.

4.4.16 Within the context of the analysis presented within this report, the additional of 4,501 dwellings will result in a deterioration of baseline conditions, albeit limited. Any further increase, towards the London Plan housing target for LBTH of 58,965, will clearly result in further deterioration. Any additional delivery of housing will only add weight to the conclusion that it will be necessary to implement Option 2 Parking Standards for new Local Plan development.

5. THEME 2 – ACCESSIBILITY MAPPING TO IDENTIFY PARKING NEED

5.1 Introduction

5.1.1 The aim of this research theme is to produce an evidence base that can be utilised to establish the degree to which parking provision is a necessity in specific areas within the LBTH, given the borough's already constrained space availability to provide required housing and infrastructure.

5.1.2 The outputs from the 'theme' are a set of maps of the borough detailing overall accessibility to services, amenities and transport. These will be presented as a 'heat map', similar to the TfL's PTAL map that shows the borough in terms of overall accessibility.

5.1.3 The identified accessibility layers are as follows:

1. PTAL ratings;
2. Access to education facilities, including primary and secondary schools;
3. Access to town centres with retail facilities;
4. Access to employment centres - accessibility measured in walking times;
5. Access to health amenity clusters, including doctors and dentist surgeries; and
6. Access to open space amenities, in particular metropolitan land and parks.

5.1.4 There will then be a range of summary layer that brings all six elements together in various combinations.

5.2 Derivation of PTAL Ratings

5.2.1 PTAL mapping provides a specific level of information on public transport accessibility. It assesses connectivity (level of access) to the transport network, combining walk time to the public transport network with service wait times.

5.2.2 The underlying calculations within PTAL rely on defining the following three elements:

- Point of Interest (POI)
- Service Access Points (SAP)
- Equivalent Doorstep Frequency (EDF)

5.2.3 The POI is the location for which you are assessing the level of accessibility e.g. a development site.

5.2.4 The SAPs represent points at which you can access the public transport network, either rail, Underground, DLR, tram or bus.

5.2.5 The EDF is an indicative measure of the frequency of public transport services taking into account how close the SAPs are to the POI. It is calculated by the following steps:

i. Calculation of the walk distance from a POI to each SAP within 640m (bus) or 960m (rail). Any SAPs beyond these distances are excluded from the analysis.

ii. Derivation of 'Walk Time' using walk speed of 80m/min

iii. Frequency of each public transport service (headway) in the AM peak (08:15 to 09:15)

iv. Calculation of average 'Wait Time' for public transport service = half of the headway

v. Calculation of 'Access Time' to SAP = Walk Time + Wait Time

vi. EDF = 30 / Access time

5.2.6 Having calculated the EDF for each SAP each value is then weighted according to the attractiveness of the mode (rail/Underground = 1, bus = 0.5) to provide an 'Accessibility Index'.

5.2.7 The individual Accessibility Index values for each SAP are summed to produce an overall value for the POI. This is then converted in to bands (0 to 6b) permitting the creation of heat maps.

5.2.8 This has been recreated in Figure 12. An indicative example of the calculation process for PTAL are shown below in Table 13.

Table 13. Indicative PTAL Calculations

PTAL					
POI	Point of Interest				
SAP	Service Access Point				
EDF	Equivalent Doorstep Frequency				
			SAP1	**SAP2**	**SAP3**
1	Walk distance from POI to each SAP within 640m (bus), 960m (rail)		300	500	800
2	Walk time using 80m/min		3.75	6.25	10
3	Frequency of each service in AM peak (08:15 to 09:15)		10	20	5
4	Wait time = half headway		5	10	2.5
5	Access Time = Walk Time + Wait Time		8.75	16.25	12.5
6	EDF = 30 / Access Time		3.43	1.85	2.40
7	Weighting to reflect attractiveness of mode		0.5	0.5	1
8	Accessibility Index = EDF * weighting		1.71	0.92	2.40
9	Summation of all Accessibility Index for all routes from POI	5.04			
10	Convert into bands	Band x			

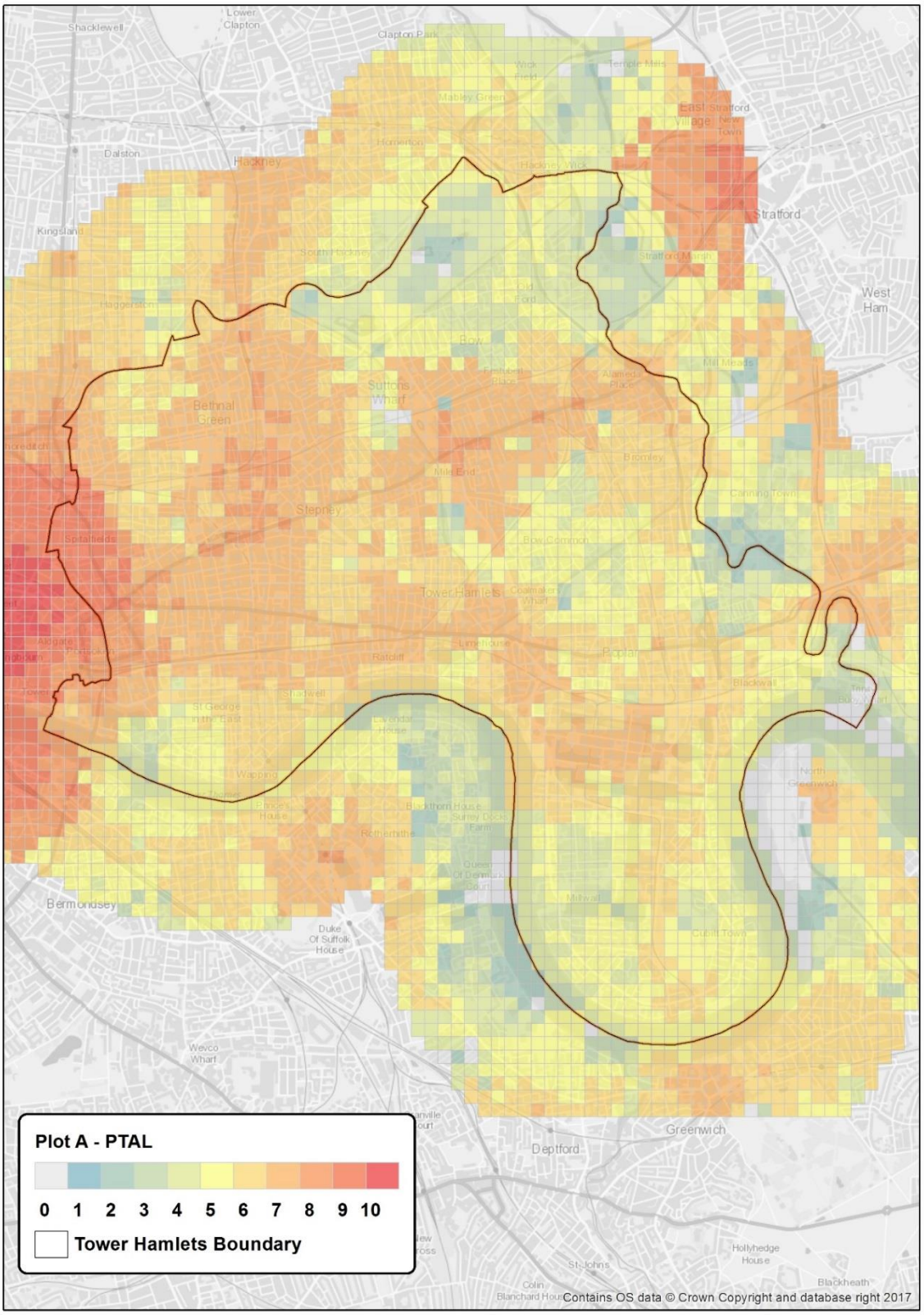


Figure 12. PTAL Map for the LBTH

5.3 Assessment of Access to Education, Retail, Employment, Health, and Open Spaces

Approach

5.3.1 A similar approach to calculating accessibility to specific destination points can be applied when considering only walking and cycling access. In this case, rather than defining a SAP we can instead consider a Destination Access Point (DAP).

5.3.2 In this instance the effective EDF is calculated by the following steps:

i. Calculation of the walk distance from a POI to each DAP within 1km (walk) and 1 to 5km (cycle). Any DAPs beyond these distances are excluded from the analysis.

ii. Classification of whether a DAP is within walk or cycle distance.

iii. Derivation of 'Journey Time' using walk speed of 80m/min and cycle speed 260m/min

iv. Calculation of 'Access Time' to DAP = Walk Time

v. EDF = 30 / Access time

5.3.3 A weighting is then applied to reflect the attractiveness of each of the two mode (walk = 1, cycle = 0.5), reflecting that cycling is not attractive to all.

5.3.4 Additional weightings can also be applied to reflect the relative importance of individual DAPs, if deemed necessary (e.g. a secondary school may be weighted higher than a primary school). Applying the required weightings gives the 'Accessibility Index' for each DAP.

5.3.5 The individual Accessibility Index values for each DAP are summed to produce an overall value for the POI. This can then be converted in to bands.

Outputs

5.3.6 A set of maps have been produced to demonstrate accessibility by walking and cycling to the following points of interest within LBTH:

- Figure 13 - Access to Education Facilities (primary and secondary schools)
- Figure 14 - Access to Retail (designated retail locations)
- Figure 15 - Access to Employment (designated employment areas)
- Figure 16 - Access to Health (Doctors Surgeries and dentists)
- Figure 17 - Access to Open Space (Metropolitan Land and Parks)

5.3.7 It should be reiterated that the data only refers to access to amenities within the LBTH and not neighbouring boroughs.

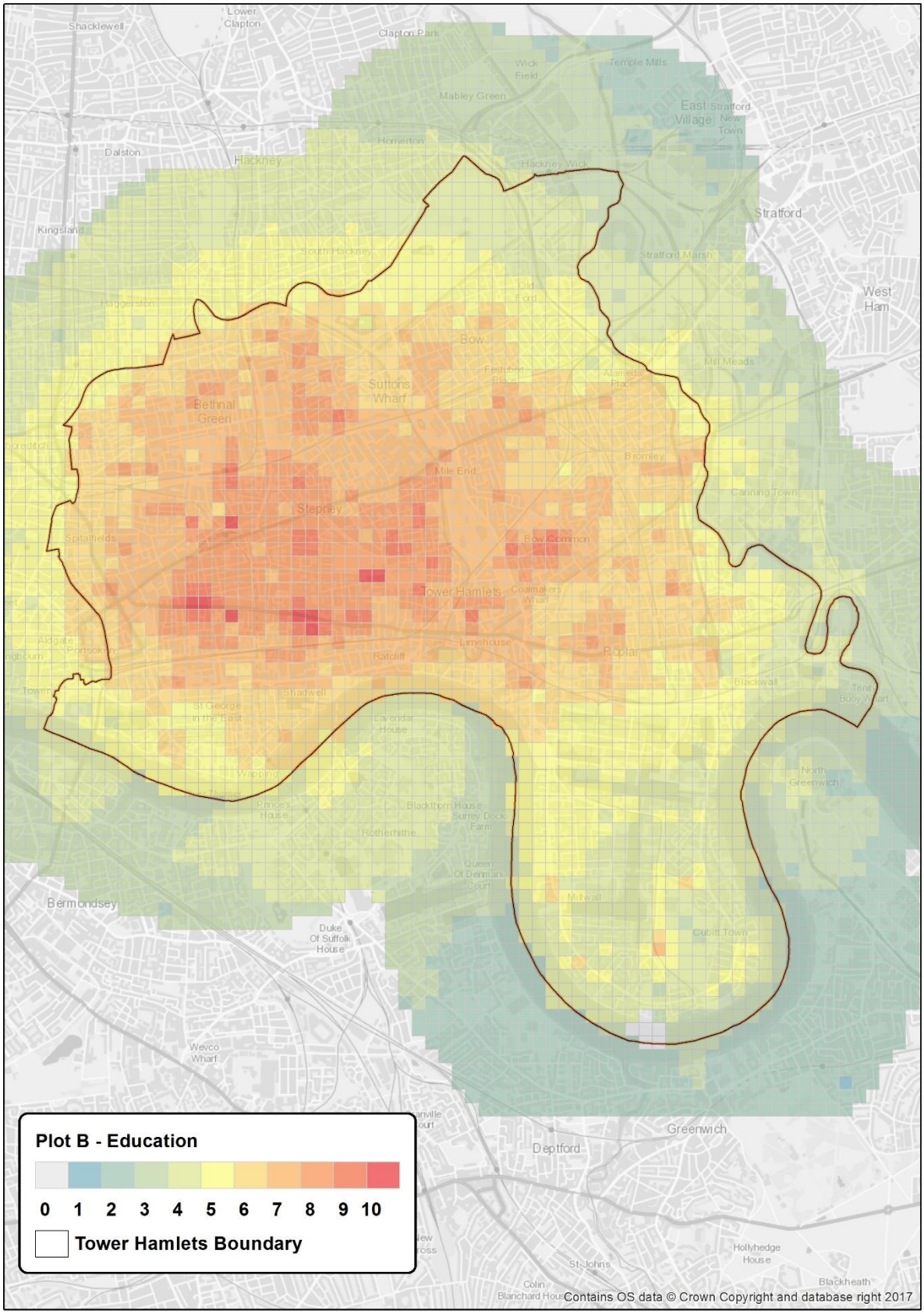


Figure 13. Access to Education across the LBTH

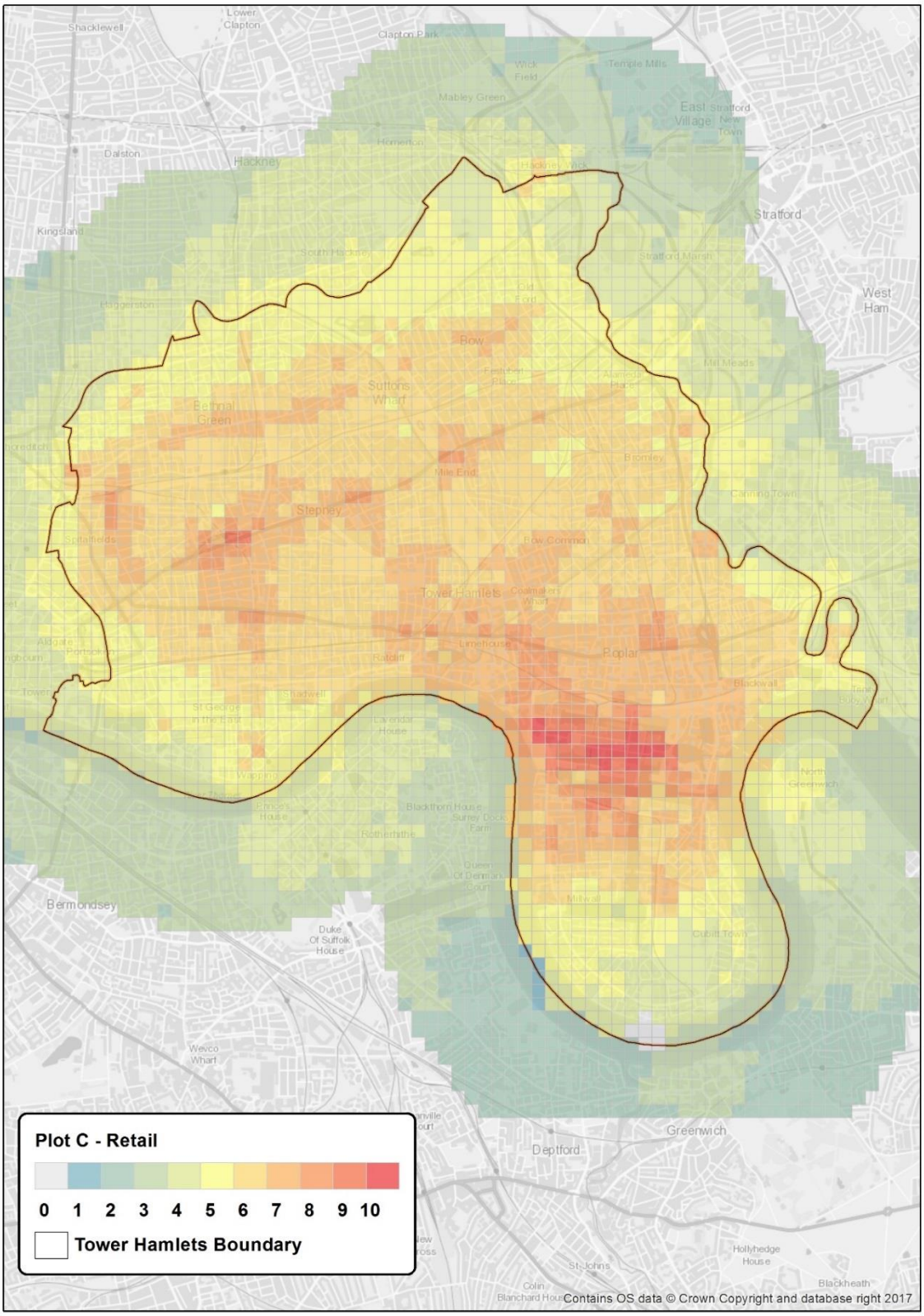


Figure 14. Access to Retail across the LBTH

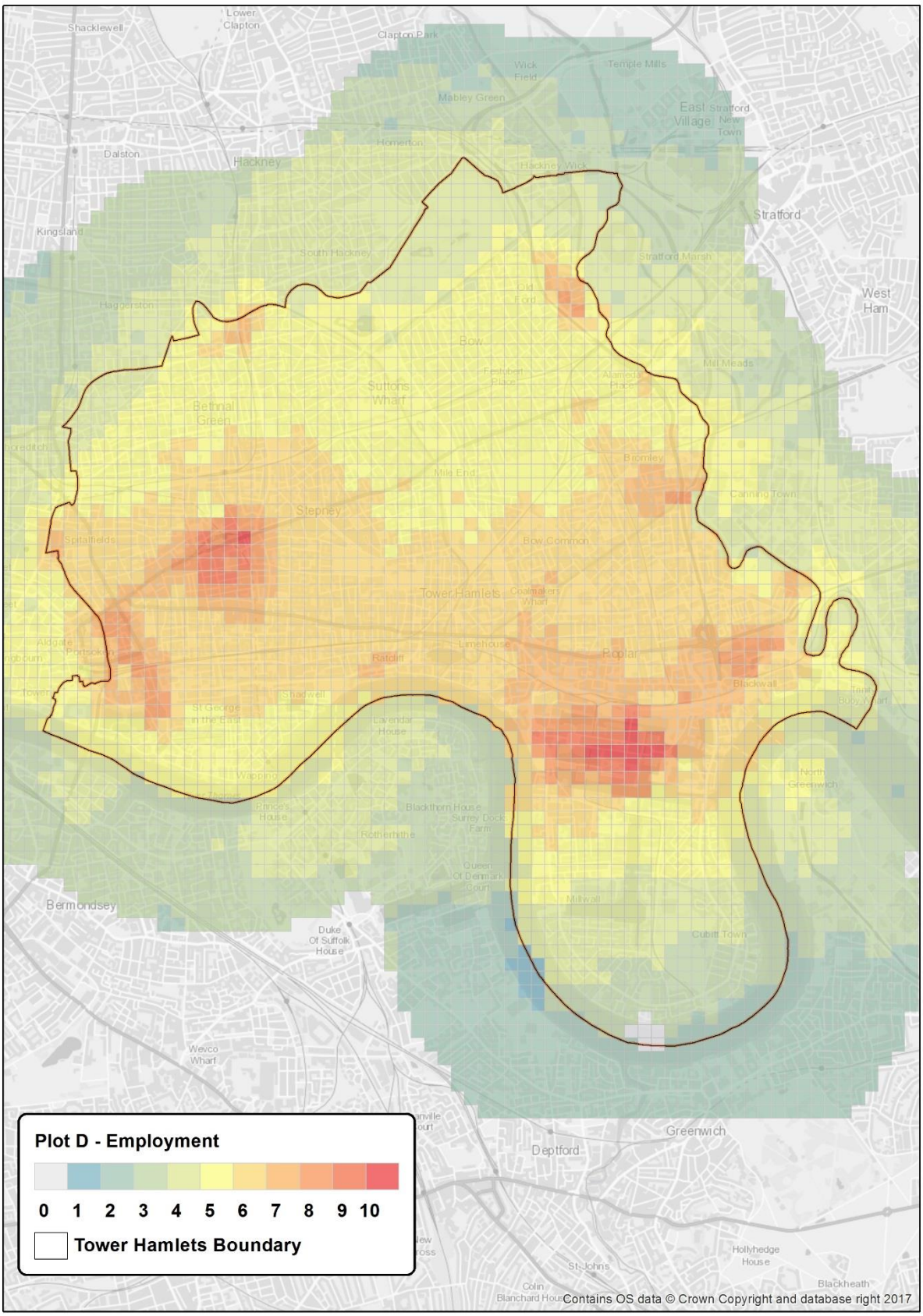


Figure 15. Access to Employment across the LBTH

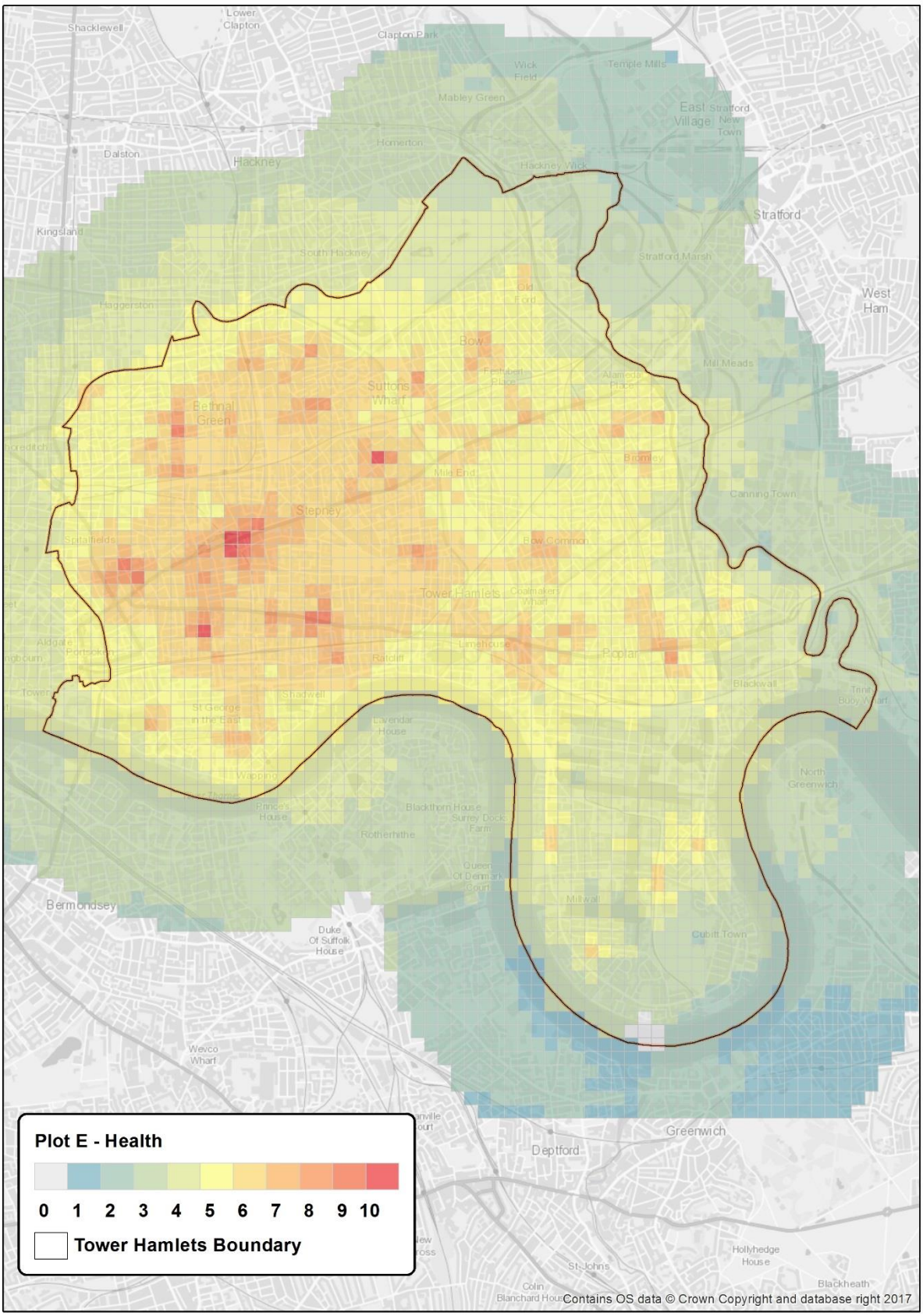


Figure 16. Access to Health across the LBTH

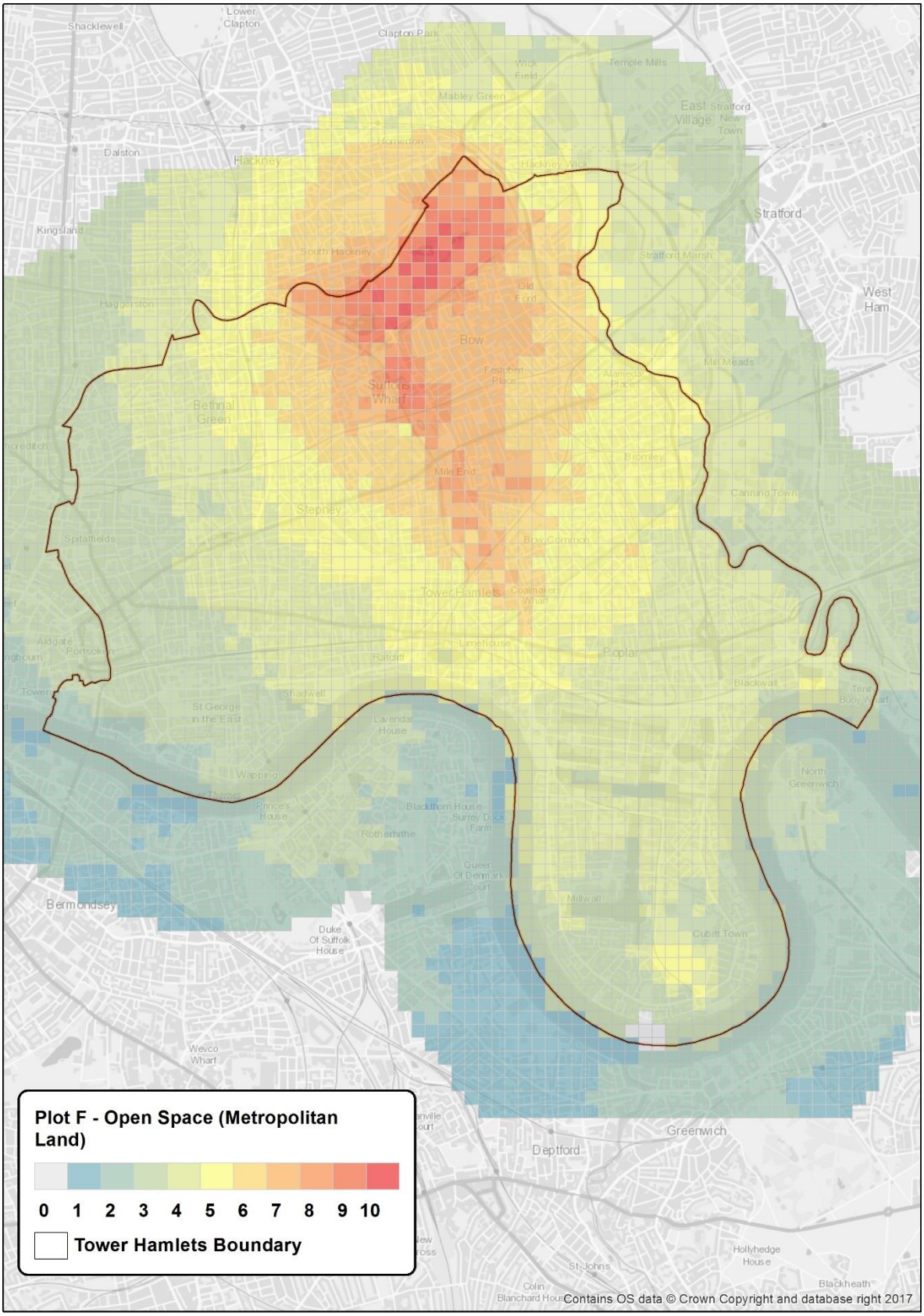


Figure 17. Access to Open Space across the LBTH

5.4 Combined Impacts

5.4.1 A further set of maps have been produced to demonstrate accessibility by walking and cycling to combinations of points of interest within the LBTH, as well as combining with the wider public transport PTAL ratings

5.4.2 The combinations produced are as follows:

- Figure 18 - Access to Education, Retail, and Employment
- Figure 19 - Access to Health and Open Space
- Figure 20 - Access to Education, Retail, Employment, and Health
- Figure 21 - Access to All amenities
- Figure 22 - PTAL and Access to Education, Retail, and Employment
- Figure 23 - PTAL and Access to All amenities

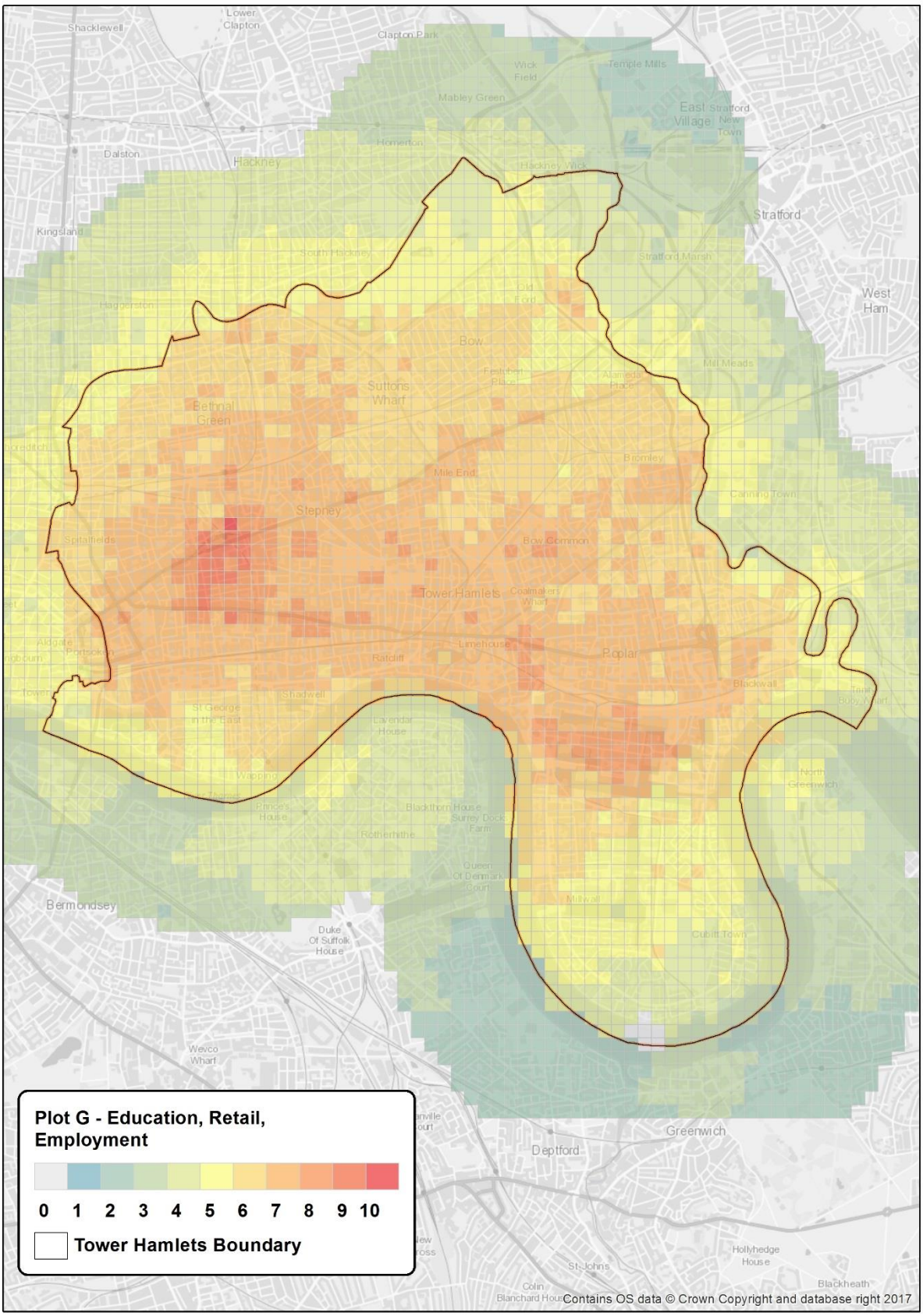


Figure 18. Access to Education, Retail and Employment across the LBTH

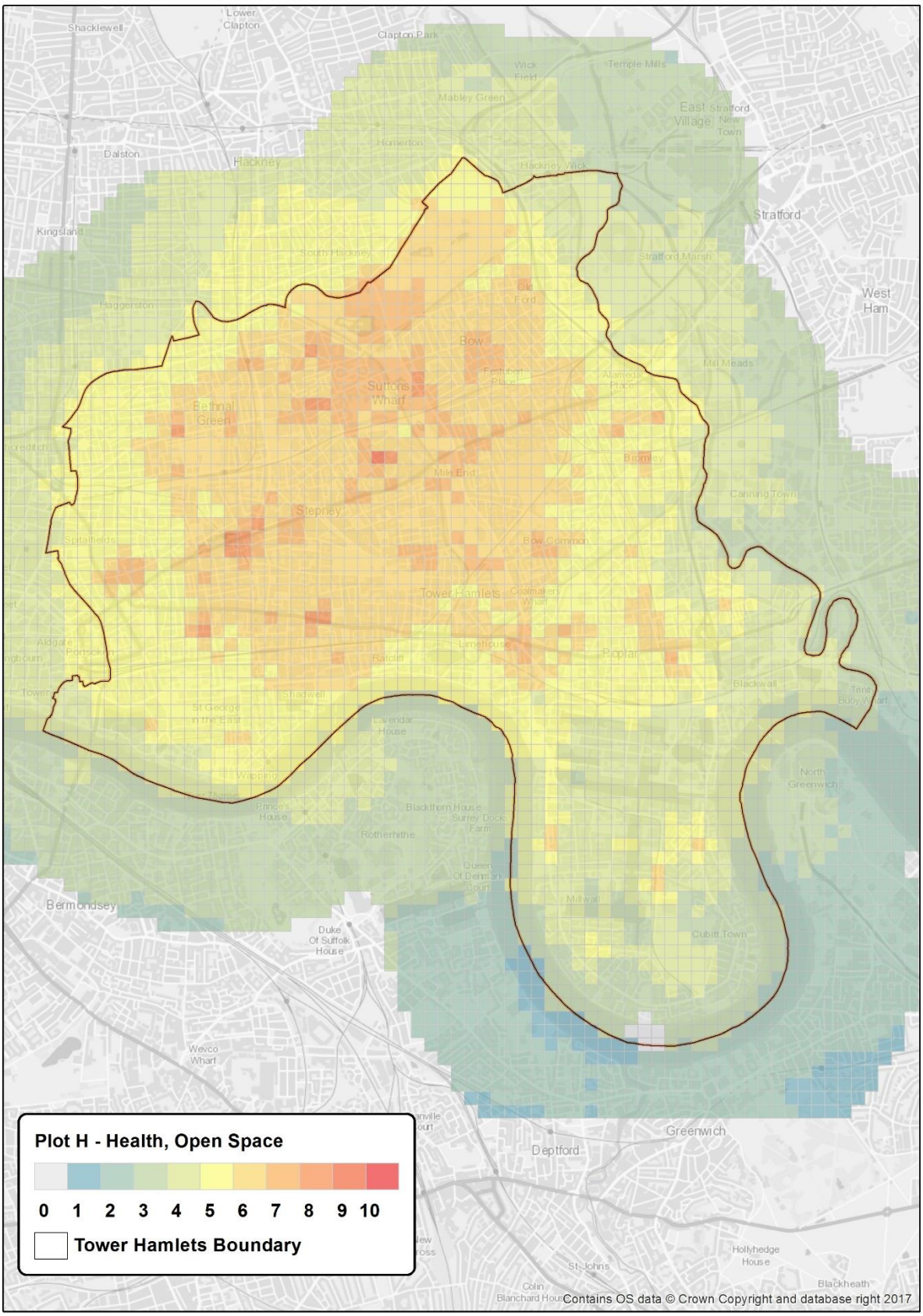


Figure 19. Access to Health and Open Space across the LBTH

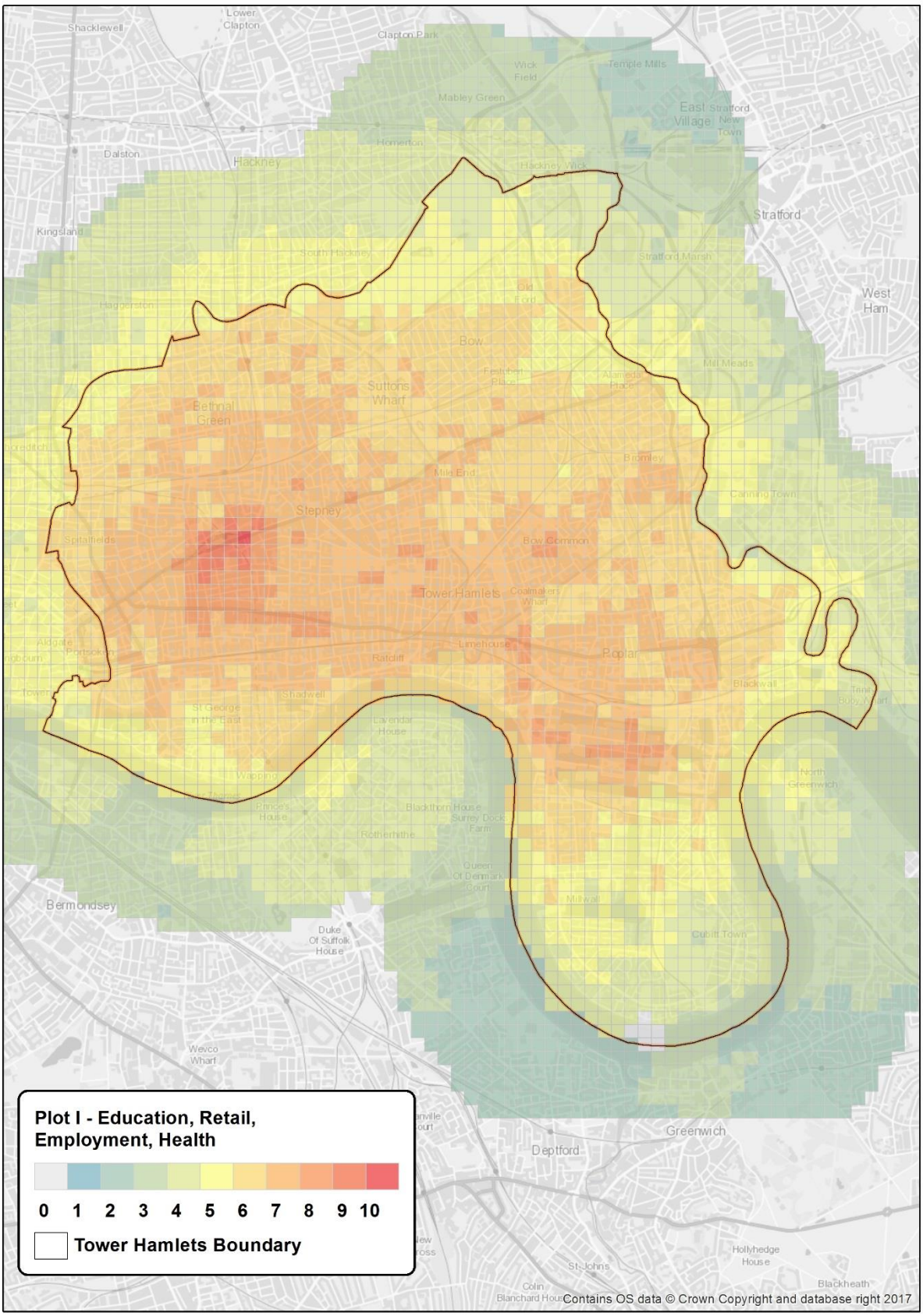


Figure 20. Access to Education, Retail, Employment and Health within the LBTH

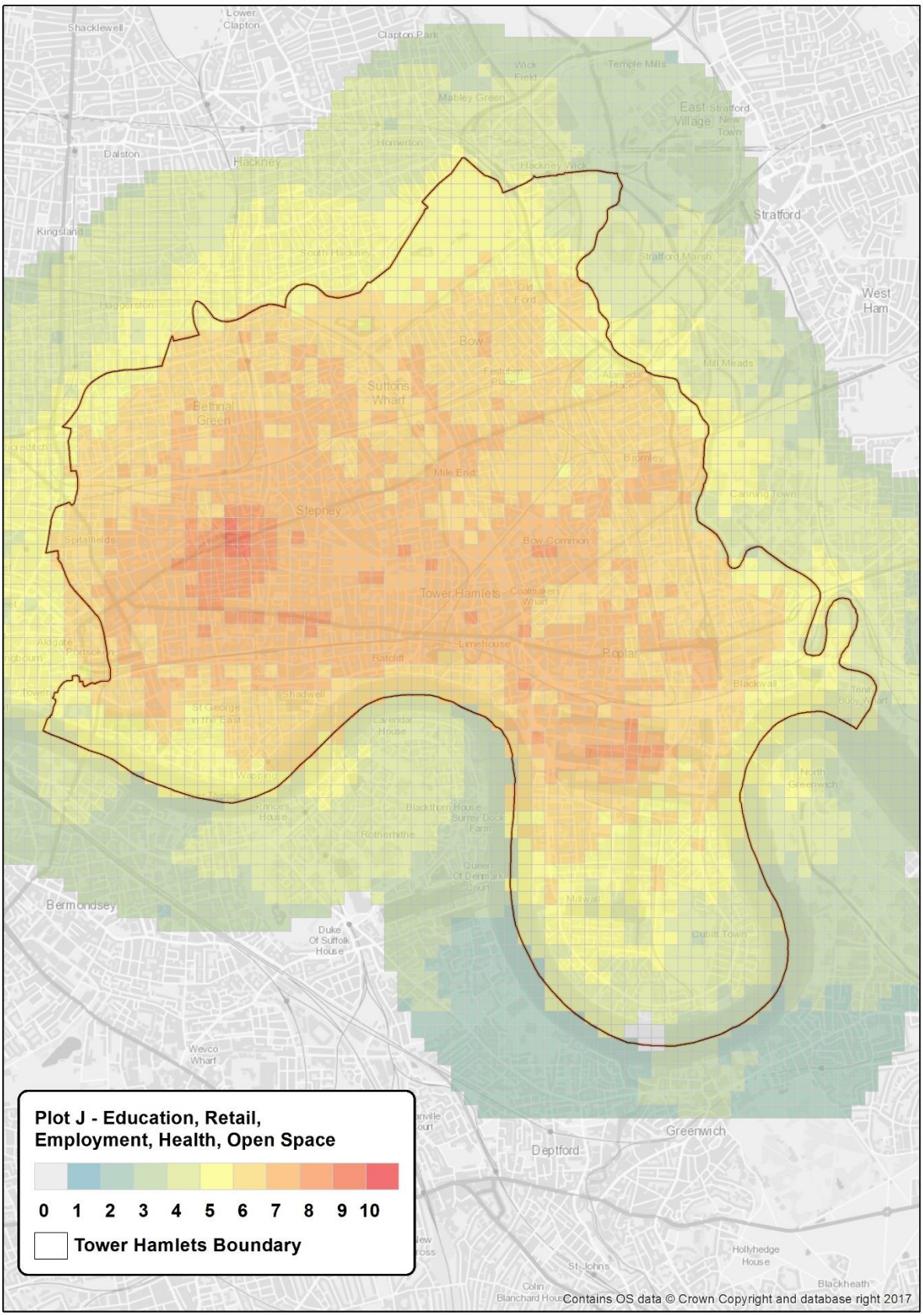


Figure 21. Combined Accessibility – Access to All Designated Amenities within the LBTH

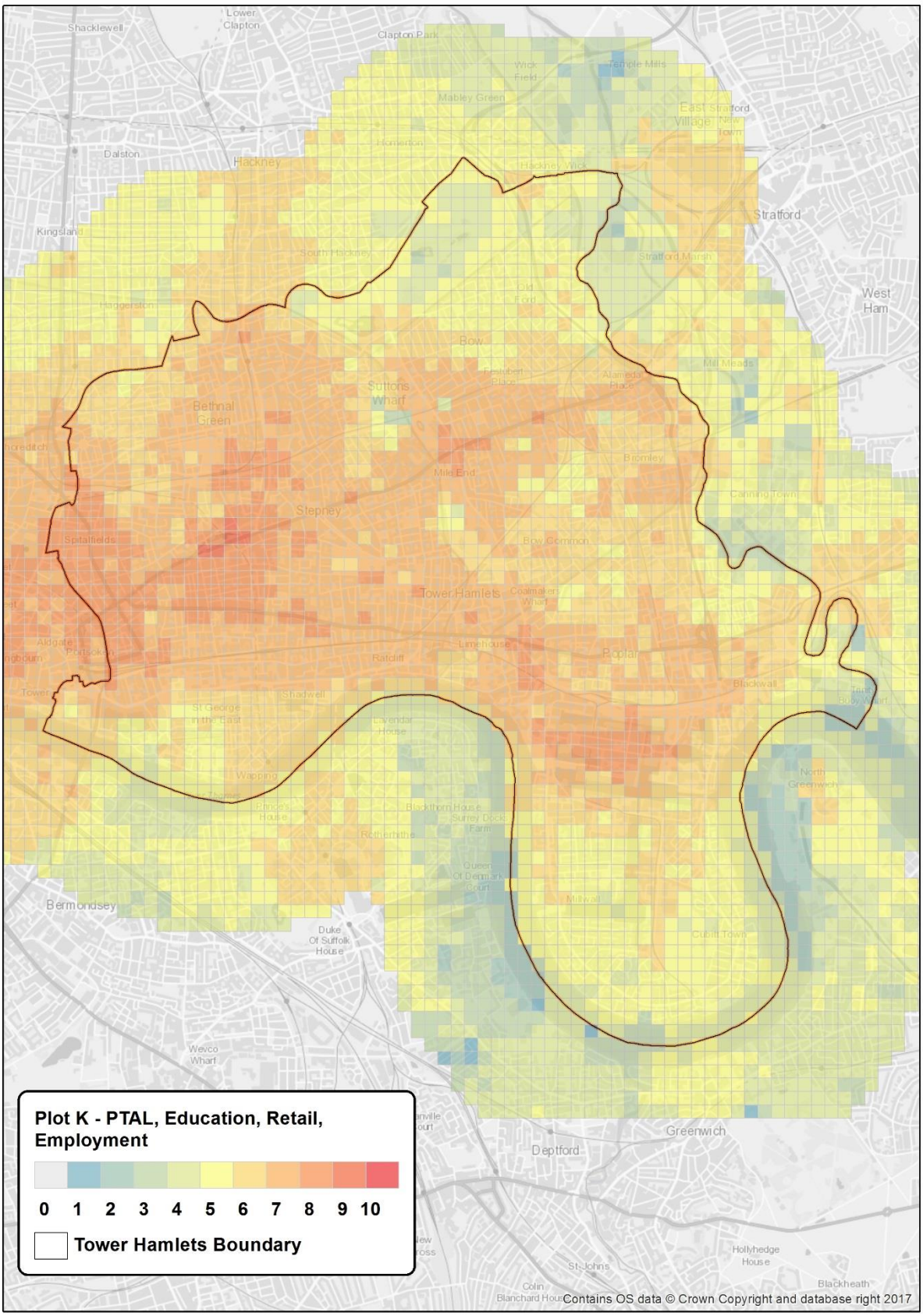


Figure 22. Combined Accessibility – PTAL and Access to Education, Retail and Employment within the LBTH

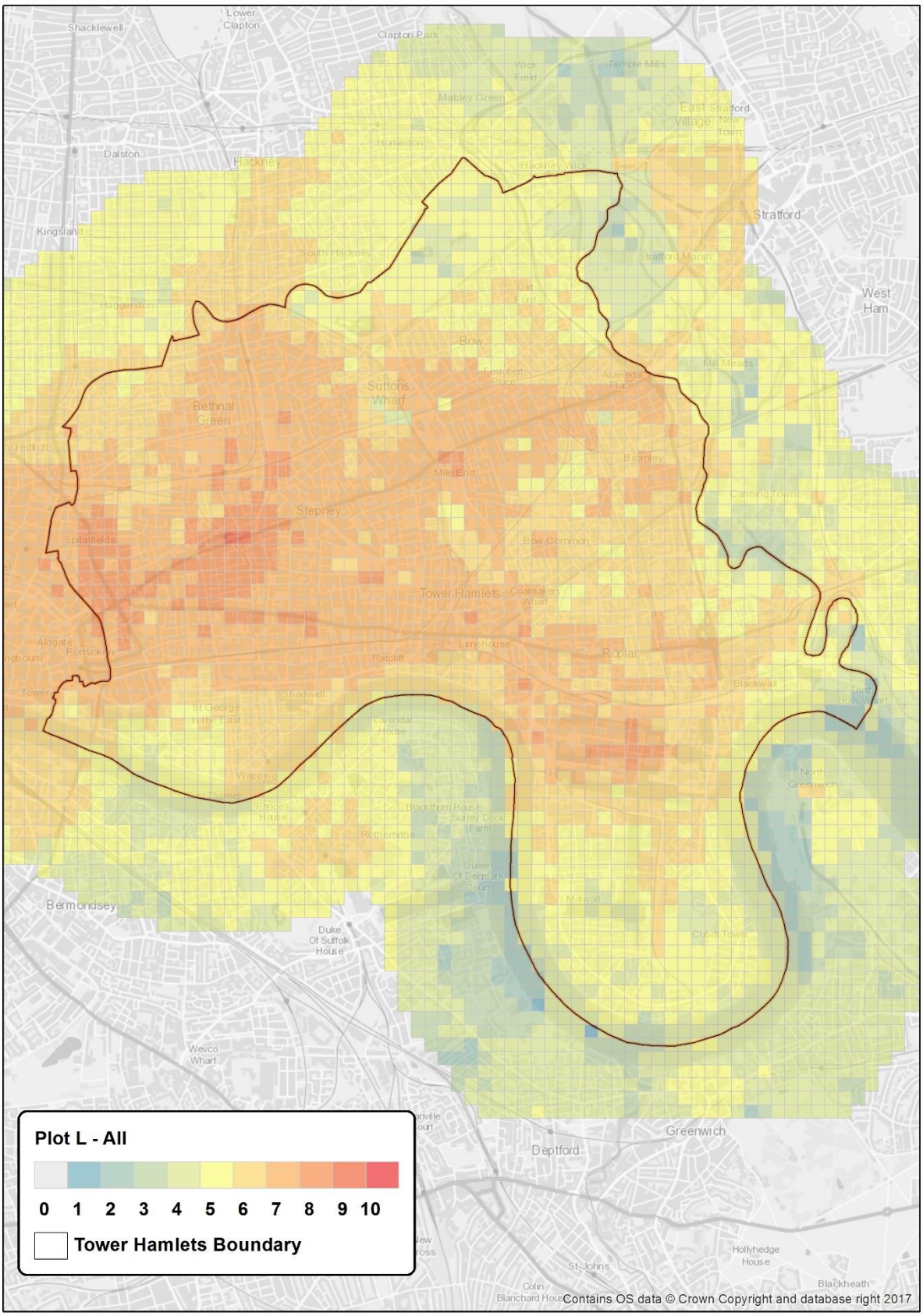


Figure 23. Combined Accessibility – PTAL and All Designated Amenities within the LBTH

6. THE IMPACT OF RESIDENTIAL PARKING ON VIABILITY

6.1 Overview

6.1.1 Theme 3 relates to the impact of residential parking provision on scheme viability. The brief provided by the LBTH identifies four questions which LBTH are seeking to answer, in order to develop new parking policies which will be applied to new development within the borough. These questions are:

- Does off-street car parking rank higher In economic viability, or would the provision of more amenity space (i.e. open space, community facilities, shops, etc.) be more valuable in terms of economic viability?
- Does the provision of off-street parking infrastructure (such as providing appropriate space through basements, ramps, parking management systems and operational necessities, etc.). as well as the labour required, cost more or less than the additional income generated by providing car parking?
- If zero off-street car parking was implemented, to what extent would this affect the economic viability of a development?
- If zero off-street parking was implemented, would this mean space could be directed toward other, more equitable, amenities that would improve the economic viability of the development? It may be worth considering well-being in these areas, if so this should be clearly identified.

6.1.2 Each of these questions is addressed in this technical note. In order to place each question into a fuller context, commentary is provided from a “developer” perspective, using previous project experience from work undertaken by SYSTRA in Tower Hamlets and other London boroughs. Reference is also made to objective data on parking provision, PTALs and vehicle trip rates through an exercise conducted using the TRICS© database. This exercise seeks to test the desired policy outcomes against the “actual” relationships between these variables, as this is considered to be the most likely starting point for challenges to the general policy direction being discussed.

6.1.3 It should be noted that the detail of viability calculations is treated as highly confidential, and is typically only shared between the scheme’s appointed cost consultants, the developer themselves. Council officers may also be given access to certain information under appropriate confidentiality arrangements. SYSTRA is not therefore in a position to provide detailed quantitative analysis of scheme elements. However, developers do advise when requests from highway officers (or others) cause issues with viability and the process of scheme development also reveals information about the relative importance placed on different uses within a scheme. SYSTRA has therefore drawn on this experience in order to respond to the questions posed in the Theme 3 brief.

6.2 Car parking and its role In scheme viability

Overview of Viability and Transport

6.2.1 The assessment of the viability of any development is, at its most basic, a comparison of the costs of bringing a development forward and its eventual total sales price.

6.2.2 There are a very large number of variables on the cost side. In comparison, there are far fewer elements on the revenue side. For residential or residential-led development, it will be the sales values of the residential units which will exert the biggest influence on the overall outcome of the assessment.

6.2.3 In terms of car parking, the provision (or lack) of parking contributes both directly (through sales of spaces) and indirectly (through perception of the development to buyers and the type and range of buyers who are therefore potential customers). The "weighting" of the importance of these direct and indirect effects varies significantly depending on the residential mix and the characteristics of the area where the development will take place.

6.2.4 Therefore, it is important to recognise that the "value" of a parking space to a developer cannot be measured purely in terms of its sale or rental value; the impacts on viability are tied to other factors, some of which are in the developer's control, and some of which are not. This is discussed further in subsequent sections of the report.

6.2.5 However, in general terms, it is possible to compare parking provision to other uses which could potentially occupy that space, and assess how this would affect a typical viability calculation.

Relative value of car parking in comparison to alternative uses

6.2.6 It is important to note that it is assumed for the purposes of this calculation that the theoretical development space being considered is at ground level, as undercroft and basement parking areas have very few alternative uses. (The economics of basement provision are considered in the next section).

6.2.7 The "value" of each use is also defined only as the monetary value which feeds in to the viability calculations being performed by a developer. Other benefits or costs, which do not generate a direct financial impact to the calculation, are considered subsequently.

6.2.8 Ground-level space can be used for a variety of purposes. In the case of a residential development, the most likely alternatives are additional residential units, retail space, office or similar commercial space, community uses, and open space. Each of these is considered in comparison to off-street parking below.

6.2.9 Additional residential units clearly add value to a scheme. The actual "net benefit" will depend on the type and size of unit provided; it is also important to consider this benefit as a proportion of the overall scheme. Replacing a small amount of off-street car parking (perhaps 3 or 4 spaces) with an additional dwelling in a small scheme (10 units or less) is likely to be desirable, as the sales values of the additional units will far exceed those of the equivalent parking spaces, and this is often reflected in the number of "car free" schemes of this type which are brought forward. In comparison, taking out ground floor parking of perhaps 12 to 15 spaces, to provide 3 or 4 additional units within a larger scheme of a flatted block, would result in a much smaller gain. At this level, other factors, such as the market to which the properties will be addressed, will exert a significant influence on whether the gain from the extra dwellings outweighs the benefits of being able to promote a scheme with parking available.

6.2.10 Retail and office space at ground floor level is frequently proposed in mixed use schemes. Retail and office tenants have specific requirements, and prior to the "first draft" of a scheme being prepared, developers will take advice from specialists as to what types of unit are likely to achieve in terms of market demand and resulting

revenues. Developers will be seeking reliable returns from the provision for such space, which tends to mean targeting established companies; in turn, these companies are usually seeking high-footfall plots in areas where there are already established businesses and a "core" of demand. Importantly, with the exception of the very largest developments, the provision of the new residential units does not make the attached retail or office space desirable in its own right. This means that, for a large number of residential developments, the market assessment does not support provision of this type of space as the risks associated with delayed letting, or the space remaining empty, are too great in comparison with the more certain benefit associated with the equivalent parking provision. In addition, with specific reference to transport issues, even where the commercial case is good developers are often discouraged from providing this type of space where it is not also possible to provide off-street servicing, as this frequently leads to criticism from highways officers and extra delay within the planning system. The number of empty ground-floor units within new and recent residential developments which can be viewed during a journey through almost any part of London demonstrates both the problems facing "bricks and mortar" commercial property and the specific challenges of making these spaces pay their way.

6.2.11 Community uses face similar challenges to those for retail and office, with the added issue that the rental values for this type of space are much lower, and therefore purely in terms of the viability calculations, they will always be a "worse" choice than the car parking alternative.

6.2.12 Finally, open space provision has almost no monetary value to a scheme within a viability calculation. Larger schemes will already be providing open space to meet policy requirements, and the benefit (monetary or otherwise) of very small open spaces on smaller schemes is either negligible, or in fact negative as it invariably requires an increase in service charges to address maintenance issues.

6.2.13 In summary, therefore, for ground-level uses, in a majority of cases it is expected that car parking space will make a bigger positive contribution to the overall revenues for a residential-led scheme than the available alternatives. This correlates with the schemes which are actually brought forward for planning; a variety of scenarios are tested and the version which is presented should be that which is policy-compliant and delivers the best return to the developer.

6.2.14 This analysis does however exclude consideration of the "non-financial" benefits of these alternative uses. From a council perspective, these benefits are likely to be significant, particularly where they contribute to wider policy goals for an area, such as regeneration or creating a more vibrant and active environment for residents. It is also incorrect to say that these alternatives have no value to developers, or indeed to future residents. The provision of green space or a local shop will undoubtedly make a development more attractive, even if in quantitative terms this value is difficult to monetise. It is also important to recognise the "value" to developers of policy compliance; an over-arching principle of the planning system is that developers who bring forward proposals which fit well with applicable policy should receive support from local authorities to enable them to navigate the planning process smoothly and without delay. In practice, the many variables of a scheme usually mean that negotiation is required on some issues, and most applications are determined on the basis of the "balance" of what a particular scheme offers. SYSTRA's experience to date is that the provision of alternative uses to car parking is generally viewed as a "neutral" factor in a scheme, rather than having overall weight in favour of a development; and, in certain cases (such as retail) there may be negative impacts (in officers' eyes) associated with other implications of those alternatives. In short, the considerable policy benefits of potential alternatives to car parking do not currently translate into a "positive" for the developer within the planning process.

6.2.15 The issue of policy compliance is worth examining further, as the process of complying with different areas of council policy often leads to tensions in a scheme, and this specifically includes issues where parking is stated to be "necessary" in viability terms.

Policy Interactions and Viability

6.2.16 The provision (or otherwise) or car parking is a fundamental element of borough transport policy. However, it is also closely connected to policies regarding physical accessibility, "lifetime" homes, and for social rented properties, the right of tenants to have access to car parking when moving between locations.

6.2.17 Of these, the recent introduction of the new "part M" building regulations has brought with it more stringent requirements for a proportion of homes in new developments to be capable of being adapted for those in wheelchairs or with similarly severe mobility constraints. At present, it is a requirement (underpinned by the London Plan) for 10% of all new dwellings to be adaptable to the required standards. In addition, new developments must demonstrate that a car parking space, sized in accordance with the relevant guidelines, can be made available for each dwelling if required. These spaces can be provided on-street and this is feasible for very small developments, but in all other cases, the policy means that off-street provision is essential for compliance with the policy, and this requirement cannot be mitigated through alternatives such as travel planning. Non-compliance is grounds for refusal on any scheme which is referable to the GLA, and the same standard is effectively applied by boroughs by default as they require compliance in full with the building regulations. Since the introduction of Part M, SYSTRA has not worked on any schemes which are not seeking to provide this minimum amount of parking.

6.2.18 Many schemes make this provision within their ground floor footprint. This necessarily reduces the amount of space available for alternative uses, which may in itself rule out provision of retail space (as an example) because the size and configuration of unit desired by the target commercial market is not achievable.

6.2.19 For larger schemes, the decision may be made to create a basement in order to accommodate the necessary parking spaces. The costs of designing in a basement, hiring the equipment and staff, and then digging out and fitting out a basement to provide the necessary number of spaces are a "sunk" cost, in that not building the basement is simply not an option if the scheme is to comply with Part M. Once this is accepted, the additional "cost per space" of making the basement bigger to accommodate more parking is much lower than the original cost per space of the basement; and it makes sense financially for the developer to use the value of these additional spaces to offset the cost of the original provision needed to comply with Part M.

6.2.20 It is noted that the provision of these additional spaces may also support compliance with other policy requirements; sales or rental income from additional spaces may fund Travel Plan implementation, or support provision of a higher proportion of affordable housing units than would otherwise be the case. Where this is being proposed, councils have the ability to request viability information; this is usually provided in confidence to the case officer to protect the commercial interests of the developer. It is noted that, in SYSTRA's experience, highways officers rarely seek direct access to this information via the case officer and may in some cases be unaware that such a request can be made. It is therefore recommended that planning and highways officers should confer, particularly if highways officers believe that provision of parking will negatively affect highway policies, to seek clarification on the exact role that the revenues from additional parking will serve.

6.2.21 It is therefore possible to summarise that, without considering the implications of wider policy, the construction of a new basement purely to accommodate residential parking for sale or rent would be expensive; the costs are likely to outweigh the benefits to viability unless a certain minimum return is achieved, and taking into account London

Plan standards, small and medium-sized schemes may struggle to make this provision cost-effective. However, in reality, other policy requirements mean that developers have to provide a given level of parking for accessibility reasons, which often necessitates basement provision due to ground floor space pressure, and then the financial argument swings in favour of providing additional sales parking to offset this cost. So there are potentially schemes which, without Part M, would come forward as "car free", but are in fact incentivised to create some general parking in order to meet the costs of other policy compliance.

Observations on developer choices and parking proposals

6.2.22 SYSTRA's client base includes a wide variety of developers of residential sites, from those which are entirely "private" to housing associations, and schemes developed directly in partnership with local authorities. Whilst every client is different, there are some general observations which can be offered about how a developer's approach affects their view of parking policy, and how this is then likely to manifest itself in the development proposals which they bring forward.

6.2.23 All developers have two primary aims when preparing a scheme – for it to be compliant with policy, and to deliver the best return. (It should be noted that pressures in terms of cost are just as strong for "public sector" developers, and in many cases more so as the money being invested is taxpayers' money). The way in which each of these aims connects to viability has been considered in section 2.2, but is worth considering further in terms of a developer's decision making process.

6.2.24 Local policies are designed to secure a range of positive outcomes for borough residents. These benefits are usually "collective", and the main goals of parking policy are very much in this category – improvements in air quality, reduction of congestion, and improvements to public health through increased activity all have an effect which is small in terms of a typical individual, but large and highly significant when viewed across the whole population.

6.2.25 Developers are required to comply with policy; however, it is important to re-iterate that the "collective" benefits of a policy are not a significant factor in most developers' thinking. They are not directly represented in a viability calculation, and they will serve as only a peripheral consideration for potential buyers.

6.2.26 Additionally, parking policy in particular tends to run against the views of some existing local residents within the immediate area of a development. SYSTRA's experience from many years of public consultation is that local consultees will often raise the issue of car parking, and will always state that provision is insufficient on low parking or "car free" schemes. This will be well known to highways officers; it is noted here as this kind of consistent feedback will reinforce developer perceptions that parking is desirable.

6.2.27 Nevertheless, many development schemes do come forward which feature very limited parking, or no provision beyond that for essential mobility needs. This is relevant to the key questions on viability as such schemes will have gone through a similar appraisal process. The question therefore can be asked, what characteristics do these types of development have, and how do these relate to the "traditional" criteria which are used to identify locations where low-car development can be supported?

6.2.28 To examine this, SYSTRA has conducted an analytical exercise using data from the TRICS© database. The results of this exercise are summarised in the next section of the report.

6.3 Car parking provision, trip rates and PTAL scores

Methodology

6.3.1 The TRICS exercise has been conducted to examine the available evidence on how car parking provision correlates to vehicle trip rates in residential developments.

6.3.2 The exercise has been undertaken in order to understand what evidence would potentially be available to a developer who may seek to challenge a strong low-car policy. A challenge of this type would be expected to have two component parts – information from the scheme-specific viability calculations, and a technical case relating to the link between restricting parking availability and the actual resulting vehicle trip generation. A transport consultant representing a developer challenging refusal on the basis of an over-provision of parking would potentially seek to advance an argument that provision of additional parking does not directly cause an increase in vehicle trips; this would be based on an argument of "convenience", particularly in areas which have good or excellent PTAL scores. The analysis in this chapter therefore seeks to pre-empt such a challenge and determine whether this argument has any basis in reality.

6.3.3 For the purposes of this exercise, residential flats in the "privately owned" category within TRICS have been selected. This is due to the fact that a majority of residential development in Tower Hamlets will be flats rather than houses, and private dwellings are expected to show the greatest range in parking provision ratios. Sites have also been identified in both Inner and Outer London; the analysis concentrates on the inner London sites, but comparison with Outer London data reveals some useful additional information to place the inner London sites into a wider context.

6.3.4 The TRICS database (Version 7.4.1) was therefore interrogated to identify recent surveys of sites within London which would enable a comparison exercise to be undertaken regarding parking, public transport accessibility (PTAL) and vehicle trip rates.

6.3.5 The following criteria were applied to identify representative sites:

- Landuse: 03 Residential (C) Flats Privately Owned
- Vehicular trip rates
- Sites within Greater London only
- All dwelling sizes (9-530 units)
- Surveys undertaken in 2010 or later

6.3.6 This produced a total of 20 sites which were then analysed to ensure suitable comparisons could be made. One site was discounted due to the survey being undertaken on a Saturday, as the rest were weekday surveyed sites. The PTAL of the site was noted, as well as the parking provision. A ratio of the number of available parking spaces by dwelling was calculated from the available information; this allows sites with different total numbers of dwellings to be more fairly compared. Many of the surveys had recorded the parking provision as the total of all parking areas at the site, however it was necessary to exclude parking specifically reserved for disabled drivers in order to calculate the ratio of more general parking provision. The vehicle trip rates will by necessity include vehicle trips associated with cars using the disabled spaces as well as general trips, but the number of disabled spaces is in most cases only a small proportion of the total and this is not considered to exert a significant impact upon the results.

6.3.7 Due to the variation in travel behaviour across London, each site was listed as either Inner or Outer London based on its borough, and this was defined by the London Councils website8. Vehicle trip rates for the AM and PM peak periods as well as the 12 hour totals (07:00-19:00),were recorded, and this became the third parameter for comparison between the sites. A spreadsheet was created, and the data was filtered and plotted on line graphs to allow trends to be identified.

[8] http://www.londoncouncils.gov.uk/node/1938

6.3.8 The sites, along with a summary of their relevant characteristics as recorded in TRICS, are shown in Table 14.

Table 14. Sites Identified from the TRICS database

Site Ref	Area	Inner/Outer	Dwells	Parking Spaces	Ratio	PTAL[9]
WH-03-C-01	CLAPHAM JUNCTION	Inner	30	36	1.20	7
KN-03-C-03	KENSINGTON	Inner	72	60	0.83	5
EN-03-C-01	ENFIELD	Outer	16	16	1.00	2
KN-03-C-02	SOUTH KENSINGTON	Inner	294	290	0.99	6
HK-03-C-03	FINSBURY PARK	Inner	10	12	1.20	6
HO-03-C-03	BRENTFORD	Outer	150	94	0.63	2
NH-03-C-01	STRATFORD	Outer	12	16	1.33	3
KI-03-C-02	KINGSTON UPON THAMES	Outer	132	149	1.13	6
KN-03-C-01	NOTTING HILL	Inner	16	12	0.75	6
HV-03-C-02	ROMFORD	Outer	530	246	0.46	2
IS-03-C-03	ISLINGTON	Inner	9	8	0.89	6
HO-03-C-02	BRENTFORD	Outer	86	64	0.74	3
BT-03-C-01	PARK ROYAL	Outer	170	202	1.19	3
SK-03-C-01	SOUTHWARK	Inner	53	59	1.11	7
HG-03-C-02	WOOD GREEN	Outer	30	25	0.83	4
BT-03-C-02	WEMBLEY	Outer	472	138	0.29	5
HM-03-C-01	FULHAM	Inner	42	38	0.90	5
IS-03-C-04	ISLINGTON	Inner	157	37	0.24	6
SK-03-C-02	BERMONDSEY	Inner	29	0	0.00	7

[9] *PTALs of 6A were recorded as 6, while PTALs of 6B were recorded as 7 for sorting purposes*

6.3.9 The vehicular trip rates for the AM and PM peak period, as well as a 12-hour period (7am to 7pm) are shown in Table 15. The sites are orders from the lowest vehicle trip rate per dwelling to the highest.

Table 15. Vehicle Trip Rates for the AM, PM and 12-hour periods

Site Reference	Location	Vehicular Trip rates		
		AM	PM	12 Hour (07:00-19:00)
BT-03-C-02	WEMBLEY	0.03	0.043	0.25
SK-03-C-02	BERMONDSEY	0	0	0.344
IS-03-C-04	ISLINGTON	0.02	0.012	0.395
HM-03-C-01	FULHAM	0.02	0.048	0.476
KN-03-C-01	NOTTING HILL	0.13	0.062	0.5
IS-03-C-03	ISLINGTON	0.11	0	0.777
KN-03-C-03	KENSINGTON	0.31	0.125	1.139
SK-03-C-01	SOUTHWARK	0.04	0.113	1.226
BT-03-C-01	PARK ROYAL	0.07	0.123	1.235
HV-03-C-02	ROMFORD	0.12	0.138	1.257
HG-03-C-02	WOOD GREEN	0.03	0.167	1.266
KI-03-C-02	KINGSTON UPON THAMES	0.14	0.181	1.357
KN-03-C-02	SOUTH KENSINGTON	0.23	0.132	1.455
EN-03-C-01	ENFIELD	0.25	0.312	1.625
NH-03-C-01	STRATFORD	0.17	0.083	1.667
HO-03-C-03	BRENTFORD	0.17	0.293	2.166
HO-03-C-02	BRENTFORD	0.08	0.07	2.166
HK-03-C-03	FINSBURY PARK	0.2	0	2.4
WH-03-C-01	CLAPHAM JUNCTION	0.57	0.233	2.434

6.3.10 A series of graphs have been produced using the information from table 2 to allow the sites' PTALs, car parking ratios, and vehicle trip rates to be compared. It is noted that, on the graphs, a PTAL value of 6 corresponds to 6a, and a PTAL value of 7 corresponds to 6b.

Initial findings

6.3.11 The comparison between the sites in inner London demonstrate that there is no apparent direct correlation between higher PTAL scores and lower trip rates. As can be seen in Figure 1, while there appears to be a general increase in trip rates at sites which have a higher parking ratio, the PTAL of the Site does not follow a distinct trend. This point is observed to a greater extent in the PM Peak hour (Figure 2), where the sites with the highest and lowest recorded trip rates both occur at sites with PTAL scores of 6.

6.3.12 A similar situation is found when focusing on parking provision. Sites which have similar parking ratios demonstrate widely different trip rates, particularly in the PM peak period.

Figure 24. Inner London Sites – AM Peak Hour

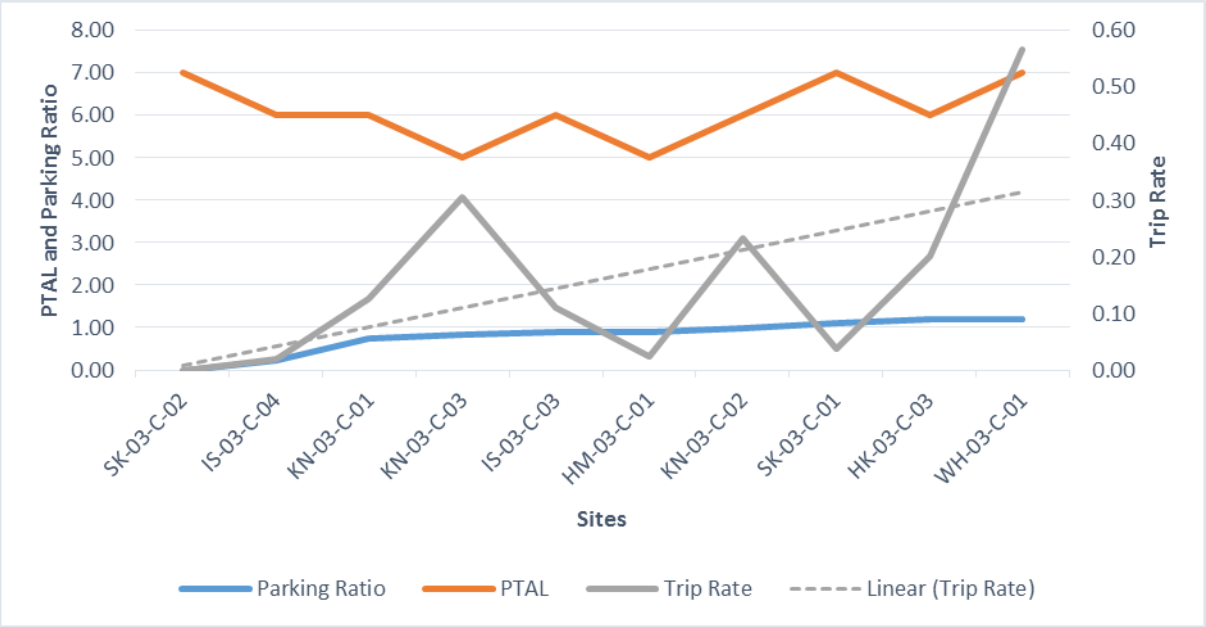


Figure 25. Inner London Sites – PM Peak Hour

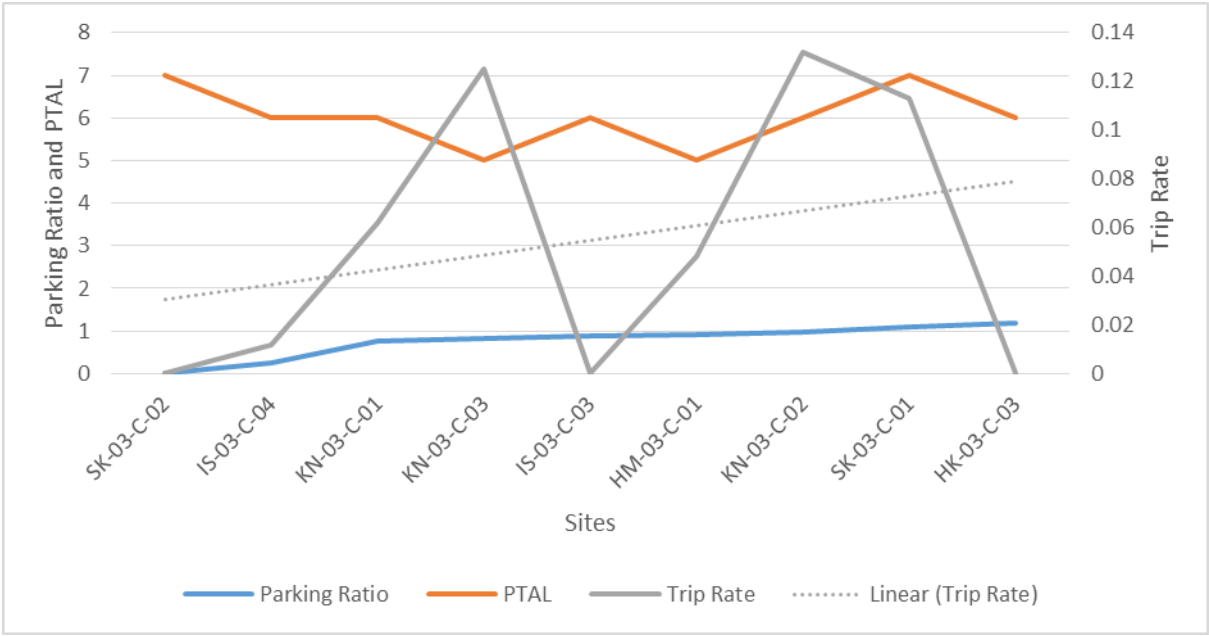
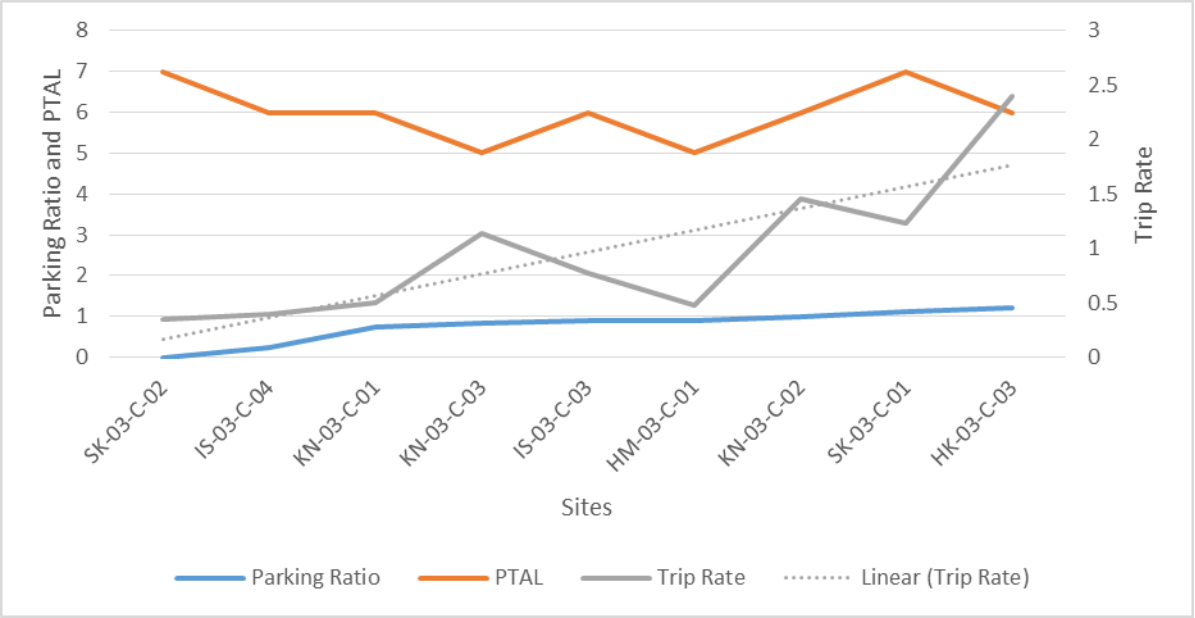


Figure 26. Inner London Sites – 12 Hours



6.3.13 The 12-hour data for the inner London sites shows a general correlation between an increasing parking ratio and an increasing vehicle trip rate. However, this does not hold true completely in the AM or PM peaks, where there is considerable variation, and some sites with relatively high parking ratios have lower vehicle trip rates than comparable sites with less parking. In the peaks, a majority of travel is likely to be associated with work and commuter activity, and this is also when the road networks are busiest. The data for inner London therefore suggests that increasing parking does increase vehicle trip rates, but this effect is suppressed by the impacts of congestion. The fact that the PTAL values do not increase in a linear manner suggests that, beyond a certain threshold of "good" provision, an increase in PTAL does not by itself reduce vehicle trips. This observation is helpful in supporting a widening of low-car policies outside of the highest PTAL areas.

6.3.14 For the sites within London's Outer boroughs, the variation of characteristics between the sites is also high. As Figures **4 and 5** below show, trip generation does not correlate directly with either the PTAL or parking ratio of the sites. This suggests that there are other factors which determine the trip characteristics of the site, and that this variability is not confined purely to inner London sites.

Figure 27. Outer London Sites – AM Peak Hour

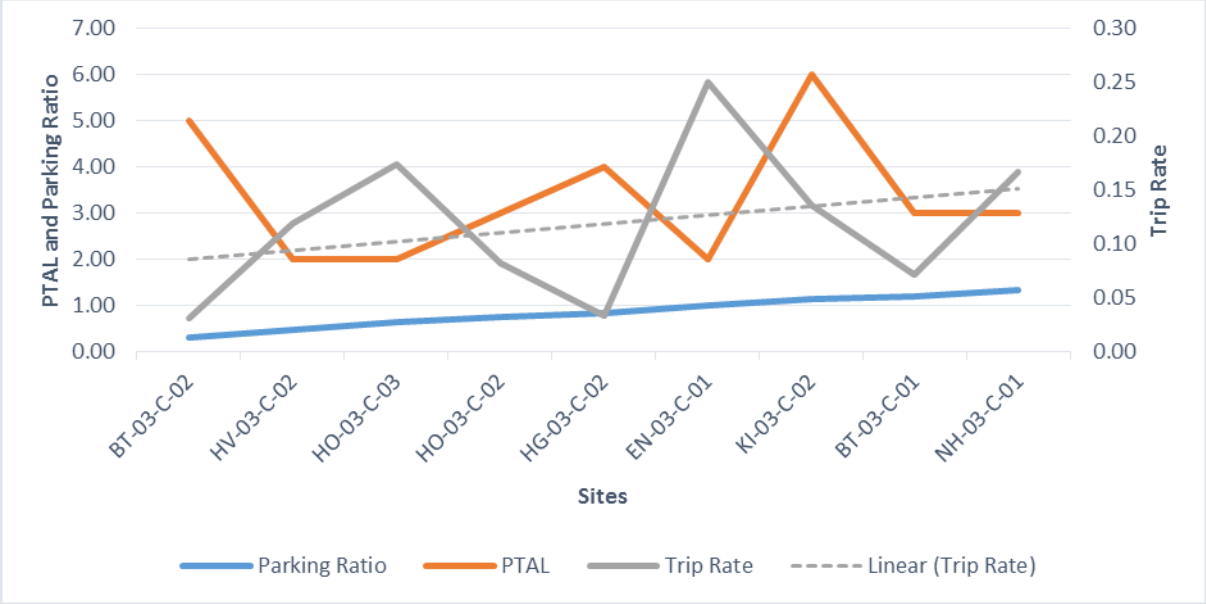


Figure 28. Outer London Sites – PM Peak Hour

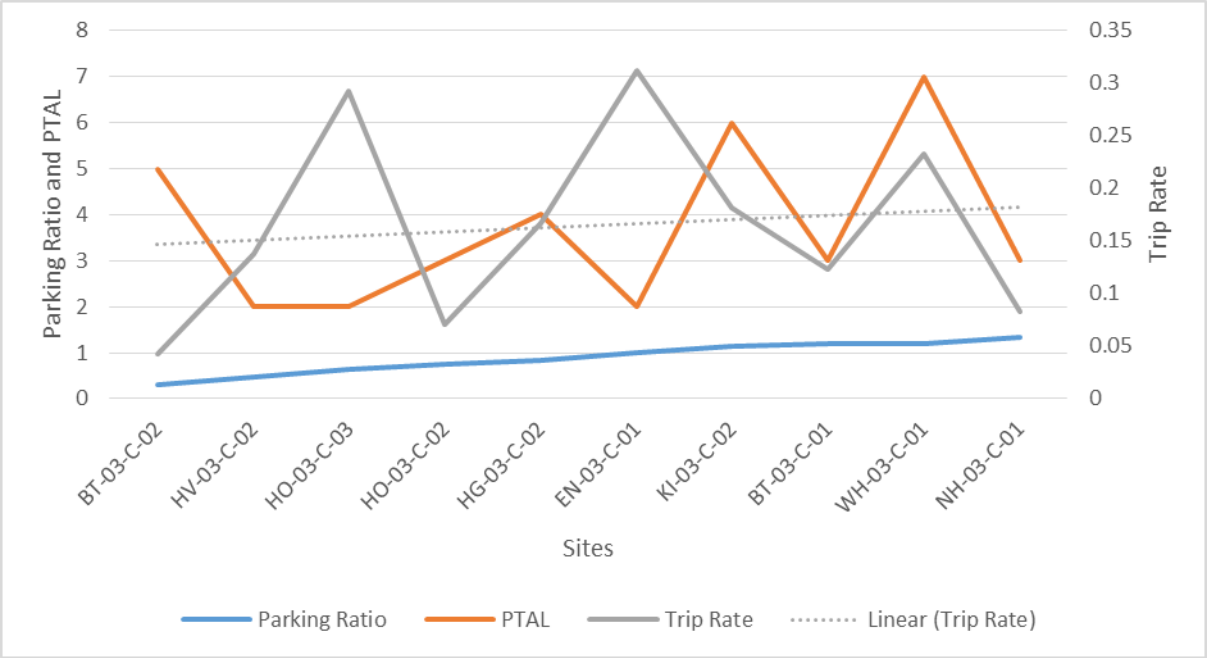
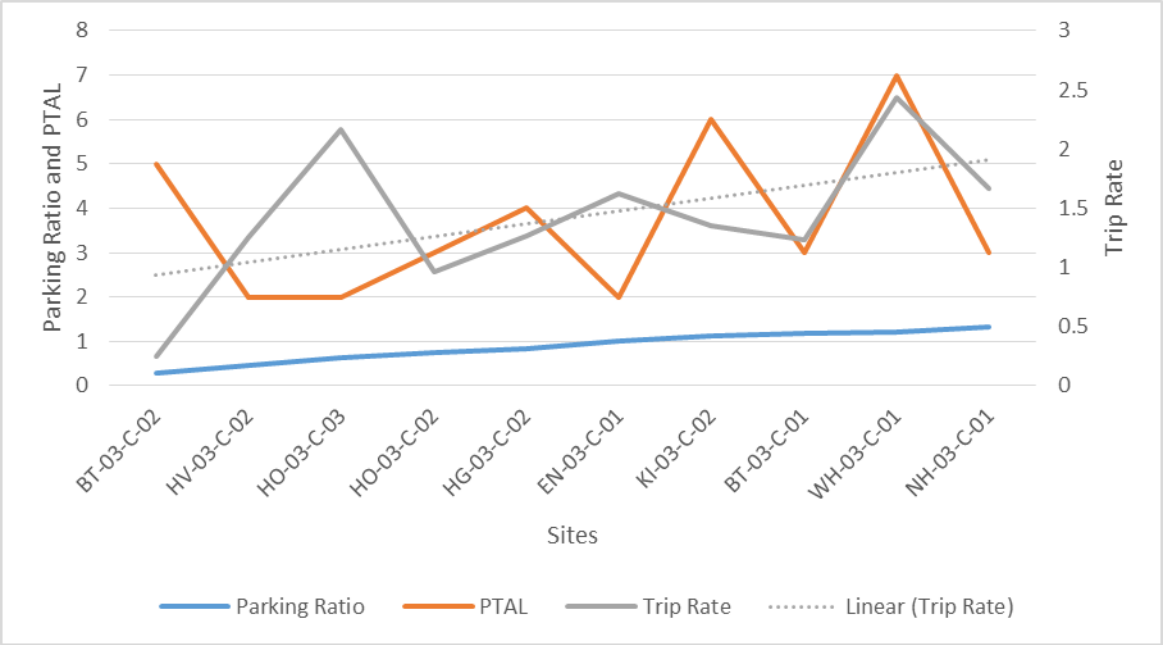


Figure 29. Outer London Sites – 12 Hours



6.3.15 The Outer borough data is helpful in showing how a low-car policy will impact on the lower PTAL areas of Tower Hamlets, which are likely to have travel patterns which are not dissimilar to those observed in comparable development types in Outer London. The 12-hour data shows that there are multiple sites which have low PTAL values (2-3) which also have lower trip rates and parking ratios than other sites with higher PTAL values; this data shows that it is clearly possible for the effects of a lower PTAL value to be "overcome". It is however also noted that sites which have similar parking ratios can have quite different vehicle trip rates, and that simply providing additional car parking evidently does not lead to increased vehicle trips in every case. Further, it is not the PTAL value which appears to differentiate these sites from one other.

6.3.16 The data from the TRICS© analysis shows clearly that there is not a simple linear relationship between a site's parking ratio and its PTAL score or its actual vehicle trip rate. Further, it would be typically expected that the vehicle trip rate at a site would be lower in a high PTAL area, and vice-versa, and this relationship is also subject to noticeable variation.

6.3.17 The information indicates that there are other factors affecting the identified sites beyond the criteria considered thus far. Given that the actual developments themselves are broadly comparable, it is considered that the variation observed is likely to stem from the environmental context of the identified sites. This is relevant to the Tower Hamlets policy direction as being able to cite evidence of these external factors in connection with a given proposal will enable the council to be robust in its position with a developer.

Geographical and transport context analysis

6.3.18 In order to develop a greater understanding of the additional factors influencing the relationship between parking ratio, PTAL and vehicle trip rates, the postcodes of each surveyed site have been used to examine their local context. This has involved a qualitative review of available public transport links, the local road network, distance to a TRLN or other strategic road link, and the surrounding built environment in terms of type and density of commercial and retail services and employment opportunities.

6.3.19 A summary of the main points of note for each site is given in table 3 below. The sites are ordered from the highest vehicle trip rate per dwelling to the lowest.

Table 16. Qualitative findings for identified sites

Site Ref	Area	Inner/Outer	Site Context Notes
WH-03-C-01	CLAPHAM JUNCTION	Inner	Residents may apply for on-street parking permits. Adjacent to A3220, 600m walk to Clapham Junction station.
KN-03-C-03	KENSINGTON	Inner	On-street residents' parking available close to site. On Kensington High Street, very close to High Street Kensington Station.
EN-03-C-01	ENFIELD	Outer	Very close to Ponders End station. Tower block and residential frontage, few commercial / retail properties in vicinity of site. Close to A-road distributor networks.
KN-03-C-02	SOUTH KENSINGTON	Inner	Close to A4 and A3220, Approx 1km from Earls Court Station. Surrounded by low density residential and scattered local retail.
HK-03-C-03	FINSBURY PARK	Inner	400m walk to Manor House Station. Small scale local shops, largely residential frontages. Easy access to A503 Seven Sisters Road.
HO-03-C-03	BRENTFORD	Outer	1.2km walk to Syon Lane station, site is hemmed by River Brent. Access to A4 Great West Road via A315. Selection of small local shops.
NH-03-C-01	STRATFORD	Outer	Located south-east of Stratford town centre in wholly residential area. Have to cross major roads to reach Stratford station. Abbey Road DLR within a 500m walk.
KI-03-C-02	KINGSTON UPON THAMES	Outer	Kingston town centre, very close to Kingston station. Also close to A307 and A308 strategic routes.
KN-03-C-01	NOTTING HILL	Inner	Close to Notting Hill station and core commercial areas; part of mixed residential area.
HV-03-C-02	ROMFORD	Outer	Part of old Romford Hospital site re-development. Close to A125, little to no active frontage on large part of walk to station (800m).
IS-03-C-03	ISLINGTON	Inner	Close to A1, Essex Road and Highbury and Islington Station. Significant active frontages. 1km to A501.
HO-03-C-02	BRENTFORD	Outer	Brentford Waterside development. Multiple retail and commercial uses in close proximity. Brentford and Kew Bridge stations are about 1km away. A4 and SRN also about 1 km away.
BT-03-C-01	PARK ROYAL	Outer	Very close to Park Royal Station and A40 Western Avenue. "Big Box" retail and leisure rather than local shops.
SK-03-C-01	SOUTHWARK	Inner	Very close to Borough Market area and Southwark Bridge Road. London Bridge station within 400m.
HG-03-C-02	WOOD GREEN	Outer	On A105, easy access to N Circular. About 1.2km walk to Wood Green station. Mixed residential and retail frontage.
BT-03-C-02	WEMBLEY	Outer	Close to Wembley Park station and multiple bus routes, significant retail and commercial activity nearby.
HM-03-C-01	FULHAM	Inner	Located directly in Fulham town centre; dense concentration of commercial uses.

IS-03-C-04	ISLINGTON	Inner	Close to edge of the congestion charge zone, near Old Street Station. High density of retail and employment uses.
SK-03-C-02	BERMONDSEY	Inner	Close to edge of the congestion charge zone, close proximity to London Bridge Station and Borough areas

6.3.20 Whilst this assessment is intended to only provide an overview of relevant information, it can be noted from the information that the sites with the lowest overall vehicle trip rates are those which are located in areas with large amounts of non-residential commercial and retail use. These sites are also located away from easy connections to the strategic road networks in London. It is helpful to note that not all of the low trip rate sites are in inner London.

6.3.21 The data suggests that the "usefulness" of a vehicle in terms of the development's surrounding context has a noticeable impact on the actual vehicle trip rate. The areas of the lowest trip rates have plentiful services in close proximity, and reaching the strategic network in order to make a trip of any length requires travelling through busy local roads. In contrast, the majority of sites at the top of the trip rate table are within wholly or largely residential areas, and there are quick and easy connections available to the strategic road network. It is also notable that the presence of a high PTAL value appears to do little to counter-act this effect.

6.3.22 It is noted that there are a couple of "outliers" in this data. The Wood Green site has a relatively low vehicle trip rate despite its context, whereas the Clapham Junction site has the highest vehicle trip rate per space of all identified sites, despite being in a very accessible location. This demonstrates the need for individual sites to be considered and any special circumstances identified.

6.3.23 These observations can be related back to the central question of the policy impacts on viability, as the key determinant of revenue is the sale (or rental) price, and this is driven heavily by the intended market.

6.3.24 For those sites which are similar to the "low trip rate" sites in table 3, the evidence indicates that the "usefulness" of vehicles in this context is somewhat limited. On this basis, it is reasonable to believe that potential customers will not place car parking as a high priority when choosing where to buy or rent. In this context, there are solid grounds to question the contribution which additional parking will make to scheme viability.

6.3.25 For those sites which are closer in context to the "high trip rate" sites in table 3, the situation is more nuanced. There is good reason to think that at least some residents in these areas have chosen the developments because they have need to travel by car, to destinations which are not easily reached by public transport. Additionally, the development context is likely to be either neutral to car users or to incentivise car use for some trips.

6.3.26 There is therefore likely to be some truth in a developers' assessment that providing less parking at a site of this type may affect viability, as their target market will include buyers who are both seeking parking and are prepared to pay for this. The "severity" of the impact on any given development needs to be considered on its merits and this is discussed further in section 4.

6.3.27 However, from a pure transport perspective, it is also true that restricting parking in these types of development is likely to remove more "trips per space" than the equivalent reduction in an area which reflects the "low trip generation" template as described above. The "gain" in policy terms from a low-car policy in these areas is therefore greater, and this supports the principle of a wider application of low-car policies. The gain from one individual site will be limited, but across the whole borough

would be far more significant, and this will present a strong argument that a low-car policy is justified.

6.3.28 What this means on balance is that there is likely to be greater legitimacy to viability arguments in areas which resemble the "high trip rate" locations, but also that the gains from the parking policy will be greater. In practice, officers will need to weigh up the schemes on offer and determine what compromise (if any) they are prepared to accept. The final section of this report examines how LBTH officers can apply policy to actual schemes in a manner which resists inappropriate development and identifies spurious viability claims, but also offers potential ways to resolve issues so that good developments can proceed without impediment.

6.4 Encouraging low-car development through policy

Summary of factors affecting car parking provision and viability

6.4.1 The results of the TRICS© analysis have shown that there is not a linear relationship between car parking provision, or PTAL scores, and vehicle trip rates. Instead, the available data suggests that the local context of a development exerts an influence on how people choose to travel.

6.4.2 It can be summarised that, where development takes place in an area with multiple public transport modes available, and a high density of commercial and retail services in its immediate vicinity, the number of car trips per day is relatively low, even where sites differ in the amount of car parking they have available. In contrast, in areas which are more wholly residential in nature, and have easy access to the TRLN or other strategic road route, the number of vehicle trips per day will be higher, even if the PTAL scores are high (6a or 6b) or the amount of car parking is reduced.

6.4.3 The data suggests that, in the first case, the developments in question appeal to people who have little desire to own a car, and the environment offers no incentives toward ownership. Conversely, in the second example, residents are making more vehicle trips even though they have good public transport options available. It is possible to consider that residents of these developments have been attracted because they regularly travel to locations where access is easier by car, and that developers are aware of this when designing their schemes.

6.4.4 The evidence therefore suggests that, looking specifically at the borough of Tower Hamlets, there are several areas where low-car development is a "natural" fit, and several others where the environment is more favourable to developments with higher parking provision. This does not mean that these latter areas should simply be excluded from a low-car policy, but officers should be aware that they are much more likely to face challenge to that policy.

6.4.5 The anticipated reasons behind that likelihood of challenge can be summarised as follows:

- Car Parking spaces do have greater "value" to a developer than the alternatives. The exceptions are likely to be in locations which already have a solid density of other uses, which in itself appears to be a "push" factor toward low car or car free development as the target customer base does not treat car parking availability as a high priority.
- Policies in other areas require a minimum parking provision which cannot be mitigated via alternatives. In many cases, this creates an incentive to deliver more parking to offset those costs, and the "cost per additional space" to the developer is reduced because the core infrastructure of the car park is required regardless.
- Policies relating to affordable housing are a particular issue in London, where requirements are much higher than in other areas of the country. Where a

development is not able to increase the sales price of market units to meet this requirement, parking sales can help to make up the difference.

Suggested tools for Highways Officers when considering the Viability Case for Parking

6.4.6 As has been shown in this note, assessing the viability of a proposed development is complex, with many factors involved. This complexity can potentially be exploited by developers who are seeking additional vehicle parking, although it should be noted that SYSTRA's experience does not suggest that this is particularly widespread.

6.4.7 There are certain questions which officers can pose to developers during the planning process to gain a clearer understanding of exactly what role additional parking will serve for a development. Chief amongst these is for the developer to clarify what the difference would be between a scheme with the parking they are seeking, and one which complies with an LBTH "maximum" standard. Even if a developer does not wish to reveal monetary values, they should be able to express this in terms of a number of affordable units lost, or a similar comparator.

6.4.8 The key requirement is for planning and highways officers to understand the trade-off, and then to determine internally whether this is acceptable or not. This may well require officers with different responsibilities to confer; a similar process has to occur within a development team when officer feedback results in conflicting demands. In this case, the resulting compromise will be determined based on each specialist's view of what is likely to be acceptable to their "opposite number" in the council, and how this affects the overall viability of the scheme. It is a frequent source of frustration to development teams when these compromises are rejected by officers; the perception held by many developers is that officers are only interested in "defending" their own policy areas rather than helping to develop an acceptable scheme. SYSTRA are aware from experience that this is far from the case, but the lack of an initial "joined up" response can cause confusion over the best way to resolve matters.

6.4.9 The use of generic viability assessments is essential in testing core policy such as a Local Plan. However, it must be recognised that even a site-specific assessment undertaken prior to an application scheme being developed will offer only a broad overview of the financial situation. In particular, these assessments cannot account for site-specific information which may only become available when site investigations begin in earnest. This does not mean that officers should not use this information to challenge developers if the council's calculation suggests that there is no financial basis for additional parking; however, the developer's assessment will incorporate far more information than that available to the council and thus it will be difficult to challenge specific details unless the council is willing to engage its own specialists directly. Unless there is clear evidence of a major flaw in the information presented, better results are likely to arise from a dialogue over what form a compromise should take.

6.4.10 Officers can also take note of the type of developer bringing a scheme forward. "Speculative" developers are those who will be seeking to sell a site with consent on to a house builder or similar; these developers are most likely to seek maximum flexibility in their consents as the buyer will almost certainly wish to make some amendments before actually entering construction. SYSTRA has also recently seen an increase in schemes being brought forward by developers who have a specific "end client" who will ultimately purchase the development and run it. As these end clients usually wish to proceed quickly to construction, they are likely to be more willing to compromise on issues such as parking. We are also seeing that these types of developers are generally seeking less parking as a whole in their developments as they will be responsible for long-term management, and their customers have fewer car parking requirements.

6.4.11 Opportunities are further presented through the differences between car parking for outright sale, and that which is to be available for rental. "Sales" spaces generate a one-off payment to the developer, whereas rental spaces generate a continuing revenue

stream over time. Rental spaces have several characteristics which have a positive relationship with a general low-car policy:

- Rental spaces are more flexible as they can be rented by people living in any unit, rather than being tied to just one dwelling.
- Rental spaces can be "given up" by residents if they do not require them. This would be advantageous if external travel conditions in the local area improve – this may happen over time if a site is part of a larger allocated area.
- Rental fees are usually payable to the site management company. These fees often get combined with management fees for each dwelling, so those renting a space (who are more likely to be wealthier residents) may in part help to keep fees lower for other residents.

6.4.12 There is scope within planning policy to condition the provision of additional spaces such that a proportion (or all) are required to be rented rather than sold; this could offer a potential method of compromise where a developer can demonstrate a need to generate revenue from parking, but in a manner which does not incentivise buyers to "invest" in a space. A space which is an ongoing cost rather than an owned asset for a resident instead incentivises that resident to make other arrangements if/when they can.

6.4.13 A final policy element which could be considered alongside a low-car parking policy is support for site owners who find that they have space which is surplus to requirements. SYSTRA has increasingly seen that developers of schemes which have consent for a given level of parking are subsequently returning to apply to reduce this, as travel patterns in London are gradually changing. It is suggested that LBTH policy could make it clear that applications for alternative development on existing car parking areas associated with residential sites will be supported unless the residual impacts are shown to be severe. These types of changes would be small at individual sites, but over time could lead to these areas becoming more like those which appear to favour low vehicle trip rates. This would create a "virtuous circle" which would support a move away from vehicle trips to other modes, and underpin the wider aims of the borough's parking policies.

7. THE IMPACT OF HOME DELIVERIES

7.1 Introduction

Background

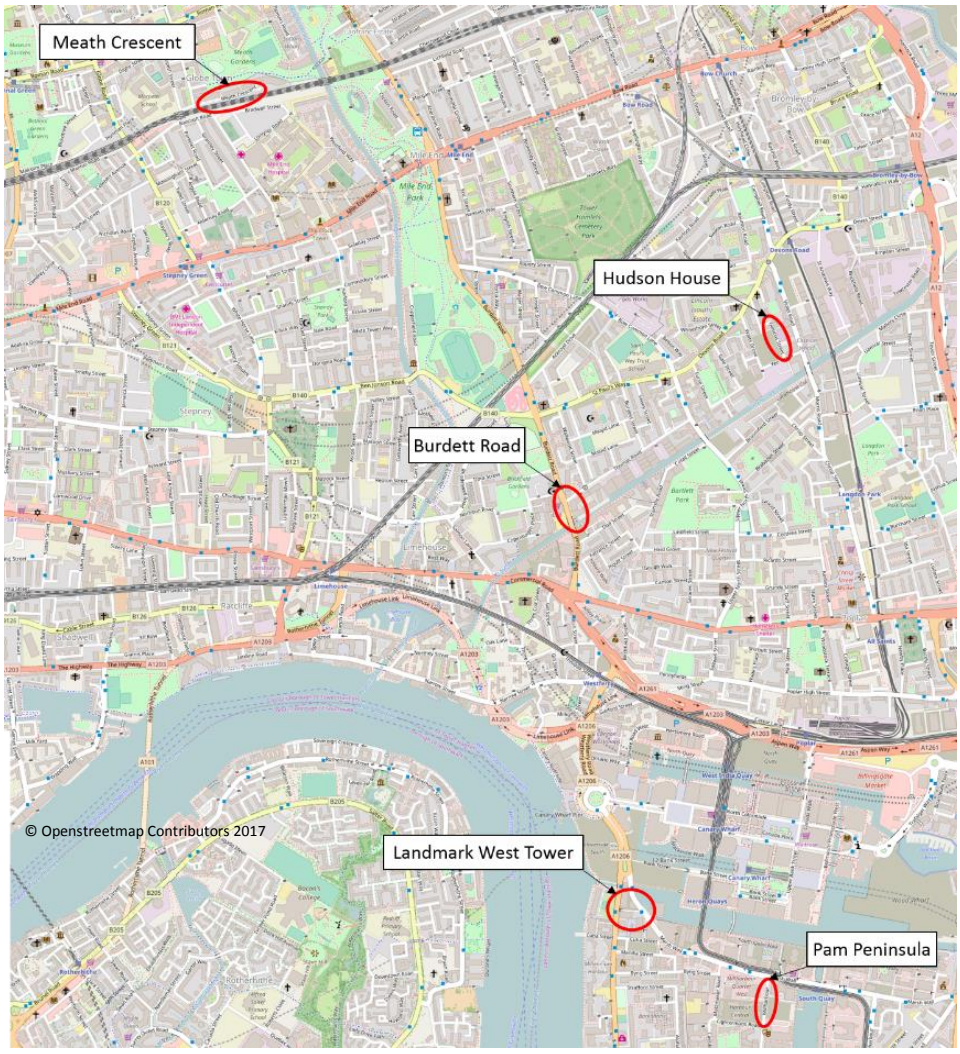
7.1.1 SYSTRA have been commissioned by the London Borough of Tower Hamlets (LBTH) to undertake a parking and freight study across five sites within the borough. Continuous parking surveys were conducted at each of these sites recording all kerbside parking and loading activity. This technical note sets out the results of these surveys.

Survey Specification

7.1.2 The surveys were carried out on behalf of the LBTH by Traffic Survey Partners (TSP) on three days in June 2017. They covered a standard weekday (Tuesday), a Friday and a Saturday.

7.1.3 The location of the six sites is shown in Figure 30.

Figure 30. Survey Site Locations



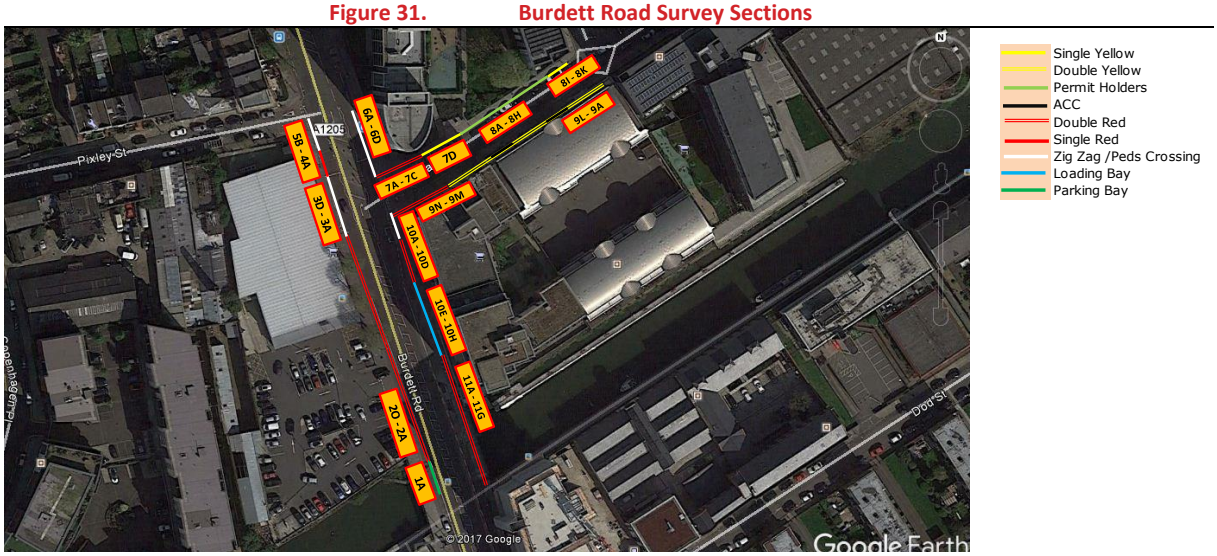
7.1.4 At each survey location the kerbside was broken into sections, classified according to the parking restrictions in place, which were in turn broken into individual bays. Throughout the survey period every vehicle which stopped at the kerbside was included within the survey results. The location where stopped, vehicle type, the activity undertaken whilst stopped, the arrival and departure time and the nature of any delivery made were all recorded.

7.1.5 The results for each locations are recorded and discussed within this sections below.

7.2 Results - Burdett Road

7.2.1 The parking area surveyed and the corresponding parking restrictions are shown in Figure 31.

Figure 31. Burdett Road Survey Sections



Vehicle Type by Time of Day

7.2.2 The tables below show the numbers of vehicles recorded by arrival time period on each of the three survey days.

Table 17. Burdett Road: Vehicle Type by Time of Day, Tuesday

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
07:00 to 10:00	24	6	0	3	0	2	4	39
10:00 to 13:00	19	15	0	5	0	0	0	39
13:00 to 16:00	44	7	0	2	0	1	0	54
16:00 to 19:00	41	3	0	0	0	4	2	50
19:00 to 22:00	45	2	0	0	1	0	3	51
TOTAL	173	33	0	10	1	7	9	233

Table 18. Burdett Road: Vehicle Type by Time of Day, Friday

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
07:00 to 10:00	41	4	0	1	0	2	3	51
10:00 to 13:00	22	15	0	8	0	0	2	47
13:00 to 16:00	33	6	0	3	3	2	1	48
16:00 to 19:00	27	6	0	0	0	1	2	36
19:00 to 22:00	74	3	0	0	0	0	4	81
TOTAL	197	34	0	12	3	5	12	263

Table 19. Burdett Road: Vehicle Type by Time of Day, Saturday

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
07:00 to 10:00	21	5	0	1	5	0	2	**34**
10:00 to 13:00	39	8	0	1	0	0	4	**52**
13:00 to 16:00	59	4	0	2	2	1	6	**74**
16:00 to 19:00	61	1	0	5	0	0	1	**68**
19:00 to 22:00	79	0	0	5	0	0	4	**88**
TOTAL	**259**	**18**	**0**	**14**	**7**	**1**	**17**	**316**

7.2.3 The vast majority of vehicles recorded across all three days were cars, whilst LGVs make up the second most common type. Across the whole of any given day the most good vehicles recorded was on Friday with a total of 49 LGVs and OGVs. 10:00 – 13:00 was the most common time period for good vehicles to arrive, whilst cars were most likely to arrive in the evening. The levels of vehicles recorded on the two week days were similar, with 263 vehicles recorded on the Friday and 233 on the Tuesday, whilst the Saturday was higher with 316 vehicles over the course of the day.

Average Duration of Stay

7.2.4 The average duration of stay by vehicle type and arrival time period is shown in the tables below.

Table 20. Burdett Road: Average Duration of Stay by Vehicle Type and Arrival Time, Tuesday (mins)

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	AVERAGE
07:00 to 10:00	79	5		7		7	2	**51**
10:00 to 13:00	15	4		14				**10**
13:00 to 16:00	21	6		29		8		**19**
16:00 to 19:00	35	5				4	30	**31**
19:00 to 22:00	10	11			169		9	**13**
Average	**29**	**5**		**15**	**169**	**5**	**11**	**24**

Table 21. Burdett Road: Average Duration of Stay by Vehicle Type and Arrival Time, Friday (mins)

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	AVERAGE
07:00 to 10:00	120	2		4		1	1	**97**
10:00 to 13:00	14	10		5			1	**10**
13:00 to 16:00	39	8		8	49	3	2	**32**
16:00 to 19:00	38	8				7	18	**31**
19:00 to 22:00	11	4					25	**11**
Average	**42**	**8**		**6**	**49**	**3**	**12**	**34**

Table 22. Burdett Road: Average Duration of Stay by Vehicle Type and Arrival Time, Saturday (mins)

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	AVERAGE
07:00 to 10:00	20	6		5	11		4	**15**
10:00 to 13:00	21	5		4			4	**17**
13:00 to 16:00	11	4		8	85	71	2	**13**
16:00 to 19:00	36	9		14			8	**33**
19:00 to 22:00	6			11			30	**7**
Average	**18**	**6**		**11**	**32**	**71**	**10**	**17**

7.2.5 The average duration of stay for cars is quite variable across both time of days and days of week with the average stay varying in length from 6 to 120 minutes across different time periods. These averages are partly reflective of vehicles which remained parked for the duration of the day increasing the overall average. In contrast LGVs were recorded as consistently staying for only short periods of time with an average stay on each of the three days between 5 – 8 minutes. OGVs were similar in generally staying for a limited amount of time, though with some exceptions where OGV2s were recorded staying for longer.

Vehicle Type by Parking Section

7.2.6 The total number of vehicles by type recorded stopping in each section is shown in Table 23 to Table 25.

Table 23. Burdett Road: Number of Vehicles by Type and Parking Section, Tuesday

BAYS	RESTRICTION	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
1A	Permit Holders	4	0	0	0	0	1	0	**5**
2A - 2O	Double Red	7	0	0	0	0	1	0	**8**
3A - 3D	Zig Zags	0	0	0	0	0	0	0	**0**
4A	Single Red	0	0	0	0	0	0	0	**0**
5A - 5B	Zig Zags	0	0	0	0	0	0	0	**0**
6A - 6D	Zig Zags	0	0	0	0	0	0	0	**0**
7A - 7C	Double Red	0	0	0	0	0	0	0	**0**
7D	Single Yellow	0	0	0	0	0	0	0	**0**
8A - 8H	Permit Holders	49	1	0	1	0	1	2	**54**
8I - 8K	Single Yellow	15	2	0	0	0	2	2	**21**
9A - 9L	Double Yellow	58	12	0	3	0	0	4	**77**
9M - 9N	Double Red	0	0	0	0	0	0	0	**0**
10A - 10D	Double Red	8	0	0	1	0	0	0	**9**
10E - 10H	Loading Bay	32	18	0	5	1	2	1	**59**
11A - 11G	Double Red	0	0	0	0	0	0	0	**0**

Table 24. Burdett Road: Number of Vehicles by Type and Parking Section, Friday

SECTION	RESTRICTION	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
1A	Permit Holders	4	1	0	3	0	1	0	9
2A - 2O	Double Red	6	0	0	1	0	0	1	8
3A - 3D	Zig Zags	0	0	0	0	0	0	0	0
4A	Single Red	0	0	0	0	0	0	0	0
5A - 5B	Zig Zags	0	0	0	0	0	0	0	0
6A - 6D	Zig Zags	0	0	0	0	0	0	0	0
7A - 7C	Double Red	3	0	0	0	0	0	0	3
7D	Single Yellow	12	2	0	0	0	0	0	14
8A - 8H	Permit Holders	35	3	0	0	0	1	0	39
8I - 8K	Single Yellow	22	3	0	0	0	0	3	28
9A - 9L	Double Yellow	45	10	0	2	0	3	6	66
9M - 9N	Double Red	0	0	0	0	0	0	0	0
10A - 10D	Double Red	14	1	0	1	1	0	1	18
10E - 10H	Loading Bay	56	14	0	5	2	0	1	78
11A - 11G	Double Red	0	0	0	0	0	0	0	0

Table 25. Burdett Road: Number of Vehicles by Type and Parking Section, Saturday

SECTION	RESTRICTION	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
1A	Permit Holders	7	2	0	0	0	1	0	10
2A - 2O	Double Red	5	1	0	1	0	0	1	8
3A - 3D	Zig Zags	0	0	0	0	0	0	0	0
4A	Single Red	0	0	0	0	0	0	0	0
5A - 5B	Zig Zags	0	0	0	0	0	0	0	0
6A - 6D	Zig Zags	0	0	0	0	0	0	0	0
7A - 7C	Double Red	6	0	0	1	0	0	1	8
7D	Single Yellow	11	0	0	0	0	0	0	11
8A - 8H	Permit Holders	57	3	0	0	0	0	1	61
8I - 8K	Single Yellow	11	0	0	0	0	0	0	11
9A - 9L	Double Yellow	67	6	0	0	0	0	4	77
9M - 9N	Double Red	1	0	0	0	0	0	0	1
10A - 10D	Double Red	33	0	0	3	1	0	3	40
10E - 10H	Loading Bay	61	6	0	9	6	0	7	89
11A - 11G	Double Red	0	0	0	0	0	0	0	0

7.2.7 Three locations experienced in excess of 35 vehicles stopping on all three of the survey days. These were the permit holders only parking on Thomas Road (8A – 8H), the double yellow lines on Thomas Road (9A – 9L) and the loading bays on Burdett Road (10E – 10H). The single yellow line on Thomas Road (8I – 8K) and the double red on Burdett Road by the corner of Thomas Road (10A – 10D) were further frequent stopping locations. All these locations were most heavily used by cars. Goods vehicles were most likely to stop in the Loading bays on Burdett Road, which also recorded the highest total number of vehicles, 89, across the course of Saturday.

Occupancy Levels

7.2.8 For each time period the proportion of each section that is occupied has been calculated. This is based on considering the duration of occupancy of each bay within the section. For example if a section comprises two bays, of which one is occupied then the section is considered 50% occupied. The recorded data only lists one bay for each vehicle irrespective of vehicle type, therefore it is always considered that a vehicle occupies only one bay. The occupancy levels for each section by time period for each survey day are shown below.

Table 26. Burdett Road: Occupancy Levels by Section, Tuesday

SECTION	RESTRICTION	07:00 - 10:00	10:00 - 13:00	13:00 - 16:00	16:00 - 19:00	19:00 - 22:00	DAILY TOTAL
1A	Permit Holders	0%	17%	8%	0%	0%	5%
2A - 2O	Double Red	0%	0%	0%	0%	0%	0%
3A - 3D	Zig Zags	0%	0%	0%	0%	0%	0%
4A	Single Red	0%	0%	0%	0%	0%	0%
5A - 5B	Zig Zags	0%	0%	0%	0%	0%	0%
6A - 6D	Zig Zags	0%	0%	0%	0%	0%	0%
7A - 7C	Double Red	0%	0%	0%	0%	0%	0%
7D	Single Yellow	0%	0%	0%	0%	0%	0%
8A - 8H	Permit Holders	61%	60%	49%	53%	59%	57%
8I - 8K	Single Yellow	26%	2%	4%	20%	66%	24%
9A - 9L	Double Yellow	2%	3%	4%	3%	6%	4%
9M - 9N	Double Red	0%	0%	0%	0%	0%	0%
10A - 10D	Double Red	0%	0%	1%	1%	1%	1%
10E - 10H	Loading Bay	5%	13%	7%	6%	31%	12%
11A - 11G	Double Red	0%	0%	0%	0%	0%	0%

Table 27. Burdett Road: Occupancy Levels by Section, Friday

SECTION	RESTRICTION	07:00 - 10:00	10:00 - 13:00	13:00 - 16:00	16:00 - 19:00	19:00 - 22:00	DAILY TOTAL
1A	Permit Holders	0%	24%	19%	0%	0%	9%
2A - 2O	Double Red	0%	0%	0%	0%	0%	0%
3A - 3D	Zig Zags	0%	0%	0%	0%	0%	0%
4A	Single Red	0%	0%	0%	0%	0%	0%

SECTION	RESTRICTION	07:00 - 10:00	10:00 - 13:00	13:00 - 16:00	16:00 - 19:00	19:00 - 22:00	DAILY TOTAL
5A - 5B	Zig Zags	0%	0%	0%	0%	0%	0%
6A - 6D	Zig Zags	0%	0%	0%	0%	0%	0%
7A - 7C	Double Red	0%	0%	0%	1%	0%	0%
7D	Single Yellow	0%	2%	10%	20%	12%	9%
8A - 8H	Permit Holders	99%	94%	79%	79%	96%	89%
8I - 8K	Single Yellow	59%	38%	37%	52%	71%	52%
9A - 9L	Double Yellow	2%	3%	2%	1%	3%	2%
9M - 9N	Double Red	0%	0%	0%	0%	0%	0%
10A - 10D	Double Red	0%	0%	5%	0%	5%	2%
10E - 10H	Loading Bay	3%	11%	18%	7%	42%	16%
11A - 11G	Double Red	0%	0%	0%	0%	0%	0%

Table 28. Burdett Road: Occupancy Levels by Section, Saturday

SECTION	RESTRICTION	07:00 - 10:00	10:00 - 13:00	13:00 - 16:00	16:00 - 19:00	19:00 - 22:00	DAILY TOTAL
1A	Permit Holders	6%	30%	26%	19%	3%	17%
2A - 2O	Double Red	0%	0%	0%	0%	0%	0%
3A - 3D	Zig Zags	0%	0%	0%	0%	0%	0%
4A	Single Red	0%	0%	0%	0%	0%	0%
5A - 5B	Zig Zags	0%	0%	0%	0%	0%	0%
6A - 6D	Zig Zags	0%	0%	0%	0%	0%	0%
7A - 7C	Double Red	0%	2%	0%	0%	2%	1%
7D	Single Yellow	0%	44%	55%	38%	62%	40%
8A - 8H	Permit Holders	7%	28%	47%	57%	52%	38%
8I - 8K	Single Yellow	0%	13%	12%	27%	33%	17%
9A - 9L	Double Yellow	2%	2%	2%	2%	3%	2%
9M - 9N	Double Red	0%	0%	0%	0%	0%	0%
10A - 10D	Double Red	0%	0%	4%	2%	3%	2%
10E - 10H	Loading Bay	12%	8%	23%	25%	52%	24%
11A - 11G	Double Red	0%	0%	0%	0%	0%	0%

7.2.9 Occupancy levels are generally low throughout the day. The only section which consistently approaches or exceeds 50% occupancy is the stretch of permit holder only parking on Thomas Street. This was particularly busy on the Friday with 89% of the available space in use across the course of the day. Despite the high level of use of the loading bays throughout the day, their occupancy was generally low peaking at between 31% – 52% in the evening period. This suggests that vehicles using the bays generally did not stay long.

Analysis of Deliveries

7.2.10 Across the three days, a total of 41 vehicles were identified undertaking loading or unloading activities. The breakdown between the survey days was as follows:

- 22 on Tuesday,
- 12 on Friday
- 7 on Saturday

7.2.11 Of the 41 vehicles, the following deliveries took place:

- 2 large boxes,
- 13 small boxes,
- 2 packages,
- 24 unknown.

7.2.12 The average duration of stay of these vehicles across the three days was 24 minutes 44 seconds. The average durations are broken down as follows:

- Tuesday: 11 minutes 54 seconds,
- Friday: 16 minutes 5 seconds,
- Saturday: 46 minutes 14 seconds.

7.2.13 Of the identified deliveries, 10 were recorded as completed deliveries, with 5 recorded as attempted but not completely delivered. The remaining 26 were unclassified.

7.2.14 The following types of delivery were recorded across the 3 days.

- Food – 9
- Cycle – 1
- Furniture or appliances – 1
- Rubbish - 1

Analysis of Parking and Waiting by Freight Vehicles

7.2.15 Across the three days, a further 102 LGV, OGV1 and OGV2 vehicles were recorded, but not specifically as delivering or unloading. These were broken down as follows:

- Tuesday - 30
- Friday - 40
- Saturday - 32

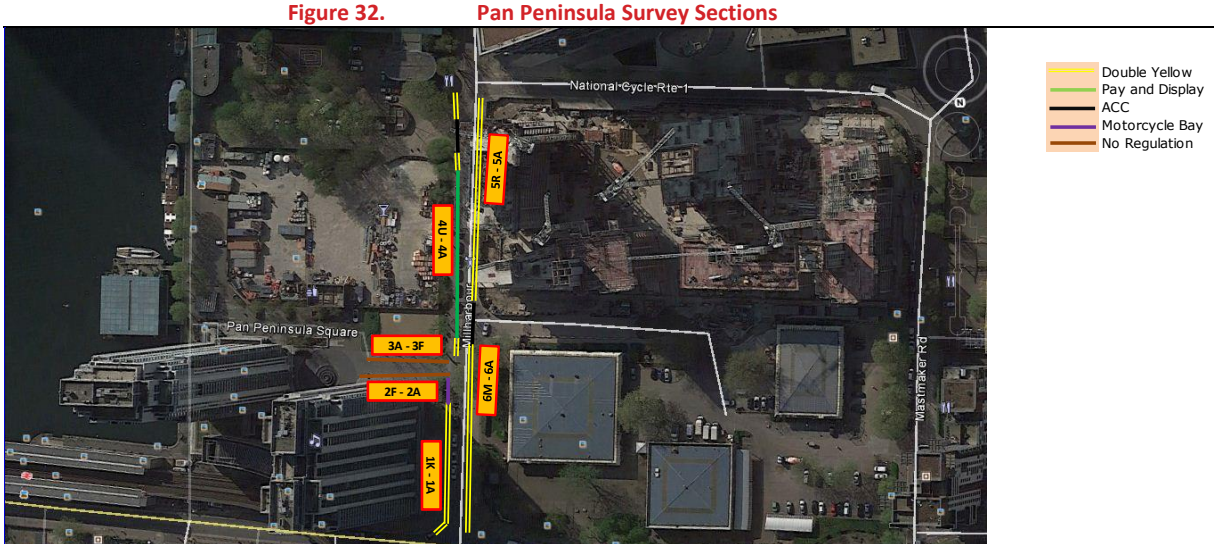
7.2.16 The average duration of stay of these vehicles across the three days was 7 minutes 29 seconds. The average durations are broken down as follows:

- Tuesday: 10 minutes 21 seconds
- Friday: 7 minutes 25 seconds
- Saturday: 4 minutes 42 seconds

7.3 Results - Pan Peninsula

7.3.1 The parking area surveyed and the corresponding parking restrictions are shown in Figure 32.

Figure 32. Pan Peninsula Survey Sections



Vehicle Type by Time of Day

7.3.2 The tables below show the numbers of vehicles recorded by arrival time period on each of the three survey days.

Table 29. Pan Peninsula: Vehicle Type by Time of Day, Tuesday

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
07:00 to 10:00	8	2	8	2	0	0	0	20
10:00 to 13:00	14	2	1	2	0	0	0	19
13:00 to 16:00	33	8	2	1	0	0	0	44
16:00 to 19:00	45	8	2	0	0	0	0	55
19:00 to 22:00	28	1	0	1	0	0	0	30
TOTAL	**128**	**21**	**13**	**6**	**0**	**0**	**0**	**168**

Table 30. Pan Peninsula: Vehicle Type by Time of Day, Friday

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
07:00 to 10:00	42	10	6	0	0	3	1	62
10:00 to 13:00	31	9	0	3	0	0	0	43
13:00 to 16:00	38	6	2	0	0	0	1	47
16:00 to 19:00	38	6	2	0	0	0	0	46
19:00 to 22:00	40	1	2	0	0	0	0	43
TOTAL	**189**	**32**	**12**	**3**	**0**	**3**	**2**	**241**

Table 31. Pan Peninsula: Vehicle Type by Time of Day, Saturday

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
07:00 to 10:00	29	1	2	0	0	0	1	33

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
10:00 to 13:00	26	2	0	0	0	0	0	**28**
13:00 to 16:00	29	2	0	1	0	0	0	**32**
16:00 to 19:00	41	0	0	0	0	0	1	**42**
19:00 to 22:00	30	0	0	1	0	0	0	**31**
TOTAL	**155**	**5**	**2**	**2**	**0**	**0**	**2**	**166**

7.3.3 Significantly more vehicles were recorded on the Friday with a total of 241 in the day whereas Tuesday and Saturday saw 168 and 166 vehicles respectively. The vast majority of these on all three days were cars, whilst LGVs make up the second most common type. Only seven goods vehicles were recorded on the Saturday whilst 27 stopped on the Tuesday and 35 on the Friday. All of these were either LGVs or OGV1s. The timing of goods vehicles varied, with more in the morning on the Tuesday, but more in the afternoon/evening on the Friday. The arrival time of cars was generally spread fairly evenly across the course of the day.

Average Duration of Stay

7.3.4 The average duration of stay by vehicle type and arrival time period is shown in the tables below.

Table 32. Pan Peninsula: Average Duration of Stay by Vehicle Type and Arrival Time, Tuesday (mins)

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	AVERAGE
07:00 to 10:00	30	7	557	9				**237**
10:00 to 13:00	4	14	260	2				**18**
13:00 to 16:00	75	28	40	3				**63**
16:00 to 19:00	42	50	97					**45**
19:00 to 22:00	31	1		27				**30**
Average	**43**	**32**	**384**	**8**				**67**

Table 33. Pan Peninsula: Average Duration of Stay by Vehicle Type and Arrival Time, Friday (mins)

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	AVERAGE
07:00 to 10:00	117	57	667			10	4	**153**
10:00 to 13:00	43	42		6				**40**
13:00 to 16:00	47	29	16				5	**42**
16:00 to 19:00	41	68	126					**48**
19:00 to 22:00	19	0	38					**20**

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	AVERAGE
Average	**55**	**48**	**363**	**6**		**10**	**4**	**67**

Table 34. Pan Peninsula: Average Duration of Stay by Vehicle Type and Arrival Time, Saturday (mins)

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	AVERAGE
07:00 to 10:00	237	505	778				90	**274**
10:00 to 13:00	31	1						**29**
13:00 to 16:00	74	23		0				**69**
16:00 to 19:00	39						1	**38**
19:00 to 22:00	23			11				**22**
Average	**78**	**111**	**778**	**6**			**46**	**86**

7.3.5 The average duration of stay for vehicles arriving between 07:00 – 10:00 is long on all three days, which is caused by vehicles arrive during this time period or were present before the survey started remaining for most of the day. Vehicles staying for periods in excess of one hour were common, increasing the average durations for all vehicle types. The tables below show the same average durations but with stays in excess of one hour excluded.

Table 35. Pan Peninsula: Average Duration of Stay (<1hr) by Vehicle Type and Arrival Time, Tuesday (mins)

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	AVERAGE
07:00 to 10:00	24	7	1	9				**17**
10:00 to 13:00	4	14		2				**5**
13:00 to 16:00	12	11	9	3				**12**
16:00 to 19:00	12	17	14					**13**
19:00 to 22:00	11	1		27				**11**
Average	**12**	**13**	**8**	**8**				**7**

Table 36. Pan Peninsula: Average Duration of Stay (<1hr) by Vehicle Type and Arrival Time, Friday (mins)

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	AVERAGE
07:00 to 10:00	9	12				10	4	**9**
10:00 to 13:00	7	5		6				**7**
13:00 to 16:00	11	17	16				5	**12**
16:00 to 19:00	8	5	10					**8**
19:00 to 22:00	7	0	14					**7**
Average	**8**	**9**	**14**	**6**		**10**	**4**	**9**

Table 37. Pan Peninsula: Average Duration of Stay (<1hr) by Vehicle Type and Arrival Time, Saturday (mins)

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	AVERAGE
07:00 to 10:00	20							**20**
10:00 to 13:00	14	1						**13**
13:00 to 16:00	11	23		0				**12**
16:00 to 19:00	11						1	**11**
19:00 to 22:00	3			11				**4**
Average	**11**	**12**		**6**			**1**	**7**

7.3.6 With vehicles parked for an excess of one hour removed the average duration of stay is very low. LGVs stopped for an average of 13 minutes on the Tuesday and 9 minutes on the Friday. The corresponding figures for OGVs were 8 and 6 minutes. Cars too did not remain long with daily average stays of between 8 – 11 minutes.

Vehicle Type by Parking Section

7.3.7 The total number of vehicles by type recorded stopping in each section is shown in Table 23 to Table 40.

Table 38. Pan Peninsula: Number of Vehicles by Type and Parking Section, Tuesday

BAYS	RESTRICTION	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
1A – 1K	Double Yellow/ Motorcycle Bay	43	7	13	6	0	0	0	69
2A – 2F	No Regulation	1	0	0	0	0	0	0	1
3A – 3F	No Regulation	7	2	0	0	0	0	0	9
4A – 4U	Permit Holders	70	8	0	0	0	0	0	78
5A – 5R	Double Yellow	4	0	0	0	0	0	0	4
6A – 6M	Double Yellow	3	4	0	0	0	0	0	7

Table 39. Pan Peninsula: Number of Vehicles by Type and Parking Section, Friday

SECTION	RESTRICTION	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
1A – 1K	Double Yellow/ Motorcycle Bay	42	10	12	2	0	0	0	66
2A – 2F	No Regulation	4	3	0	0	0	0	0	7
3A – 3F	No Regulation	9	0	0	0	0	0	0	9
4A – 4U	Permit Holders	96	15	0	0	0	2	2	115
5A – 5R	Double Yellow	31	2	0	0	0	1	0	34
6A – 6M	Double Yellow	7	2	0	1	0	0	0	10

Table 40. Pan Peninsula: Number of Vehicles by Type and Parking Section, Saturday

SECTION	RESTRICTION	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
1A – 1K	Double Yellow/ Motorcycle Bay	47	0	2	0	0	0	1	50
2A – 2F	No Regulation	1	0	0	0	0	0	0	1
3A – 3F	No Regulation	10	0	0	0	0	0	0	10
4A – 4U	Permit Holders	77	4	0	0	0	0	1	82
5A – 5R	Double Yellow	11	1	0	0	0	0	0	12
6A – 6M	Double Yellow	9	0	0	2	0	0	0	11

7.3.8 On all three days the greatest volume of vehicles was found within the stretch of permit holder only parking on Millharbour. This accounted for not just the greatest volume of cars, but also the most LGVs. The double yellow lines on the east side of Millharbour were the next most frequent stopping location with in excess of 40 cars on each day as well as some LGVs. This section also includes some motorcycle bays, which were used by 12 motorcycles on Tuesday and 13 on Friday.

Occupancy Levels

7.3.9 For each time period the proportion of each section that is occupied has been calculated. This is based on considering the duration of occupancy of each bay within

the section. For example if a section comprises two bays, of which one is occupied then the section is considered 50% occupied. The recorded data only lists one bay for each vehicle irrespective of vehicle type, therefore it is always considered that a vehicle occupies only one bay. The occupancy levels for each section by time period for each survey day is shown below.

Table 41. Pan Peninsula: Occupancy Levels by Section, Tuesday

SECTION	RESTRICTION	07:00 - 10:00	10:00 - 13:00	13:00 - 16:00	16:00 - 19:00	19:00 - 22:00	DAILY TOTAL
1A – 1K	Double Yellow/ Motorcycle Bay	31%	47%	46%	41%	21%	**37%**
2A – 2F	No Regulation	0%	0%	0%	0%	0%	**0%**
3A – 3F	No Regulation	0%	0%	2%	1%	0%	**1%**
4A – 4U	Permit Holders	0%	0%	30%	49%	60%	**28%**
5A – 5R	Double Yellow	0%	0%	0%	0%	0%	**0%**
6A – 6M	Double Yellow	0%	0%	0%	0%	0%	**0%**

Table 42. Pan Peninsula: Occupancy Levels by Section, Friday

SECTION	RESTRICTION	07:00 - 10:00	10:00 - 13:00	13:00 - 16:00	16:00 - 19:00	19:00 - 22:00	DAILY TOTAL
1A – 1K	Double Yellow/ Motorcycle Bay	29%	42%	40%	35%	31%	**35%**
2A – 2F	No Regulation	0%	1%	0%	0%	0%	**0%**
3A – 3F	No Regulation	0%	0%	0%	0%	1%	**0%**
4A – 4U	Permit Holders	58%	51%	52%	56%	54%	**54%**
5A – 5R	Double Yellow	2%	0%	1%	2%	1%	**1%**
6A – 6M	Double Yellow	0%	0%	0%	0%	0%	**0%**

Table 43. Pan Peninsula: Occupancy Levels by Section, Saturday

SECTION	RESTRICTION	07:00 - 10:00	10:00 - 13:00	13:00 - 16:00	16:00 - 19:00	19:00 - 22:00	DAILY TOTAL
1A – 1K	Double Yellow/ Motorcycle Bay	15%	32%	15%	19%	9%	**18%**
2A – 2F	No Regulation	0%	0%	0%	0%	0%	**0%**
3A – 3F	No Regulation	1%	0%	0%	0%	0%	**0%**
4A – 4U	Permit Holders	65%	63%	53%	59%	61%	**60%**
5A – 5R	Double Yellow	0%	0%	0%	1%	0%	**0%**
6A – 6M	Double Yellow	0%	0%	0%	0%	1%	**0%**

7.3.10 Only two sections experienced occupancy levels in excess of 10%. The highest occupancy was in the section of permit holder parking, at between 54% - 60% on the Friday and Saturday, but lower at 28% over the course of the Tuesday. This is caused by the absence of any vehicles in the first two time periods in this section on the Tuesday.

Occupancy of the section of double yellow line and motorcycle bay immediately outside the Pan Peninsula building was 35% and 37% on the Tuesday and Friday respectively and lower at 18% on the Saturday. This reflects the motorcycle bays being well used.

Analysis of Deliveries

7.3.11 Across the three days, a total of 10 vehicles were identified undertaking loading or unloading activities. The breakdown between the survey days was as follows:

- 3 on Tuesday,
- 7 on Friday
- Zero on Saturday

7.3.12 Of the 10 vehicles, the following deliveries took place:

- 1 large box
- 8 small boxes
- 1 packages

7.3.13 The average duration of stay across the two days with delivery activity was 2 hours 12 minutes 51 seconds; however, this was distorted by four recorded deliveries of boxes or packages when the vehicle then remained parked for at least 3 hours, and in one case 8½ hours.

7.3.14 Of the identified deliveries, 7 were recorded as completed deliveries, with 2 recorded as attempted but not completely delivered, 1 was unknown.

7.3.15 There was no recorded information about the type of delivery.

Analysis of Parking and Waiting by Freight Vehicles

7.3.16 Across the three days, a further 102 LGV, OGV1 and OGV2 vehicles were recorded, but not specifically as delivering or unloading. These were broken down as follows:

- Tuesday - 27
- Friday - 34
- Saturday - 7

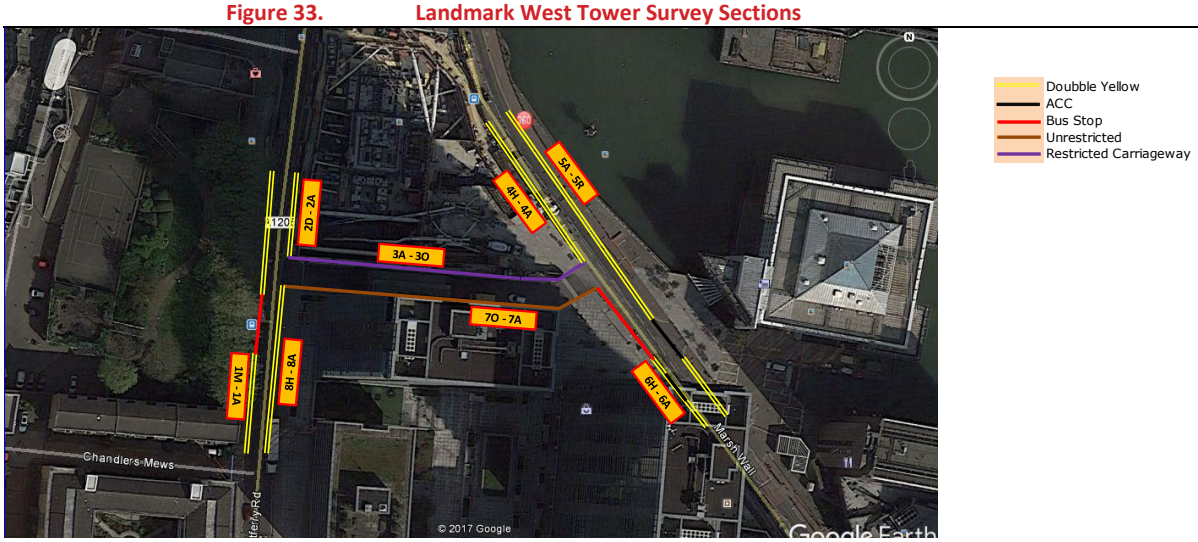
7.3.17 The average duration of stay across the three days was 37 minutes 34 seconds. The average durations are broken down as follows:

- Tuesday: 26 minutes 42 seconds
- Friday: 39 minutes 47 seconds
- Saturday: 46 minutes 14 seconds

7.4 Results - Landmark West Tower

7.4.1 The parking area surveyed and the corresponding parking restrictions are shown Figure 33.

Figure 33. Landmark West Tower Survey Sections



Vehicle Type by Time of Day

7.4.2 The tables below show the numbers of vehicles recorded by arrival time period on each of the three survey days.

Table 44. Landmark West Tower: Vehicle Type by Time of Day, Tuesday

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
07:00 to 10:00	19	8	0	4	3	1	1	36
10:00 to 13:00	18	16	0	4	0	0	0	38
13:00 to 16:00	27	9	0	4	0	0	3	43
16:00 to 19:00	18	9	0	1	0	2	3	33
19:00 to 22:00	22	1	0	1	0	1	3	28
TOTAL	104	43	0	14	3	4	10	178

Table 45. Landmark West Tower: Vehicle Type by Time of Day, Friday

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
07:00 to 10:00	17	3	0	2	1	2	0	25
10:00 to 13:00	14	20	0	9	0	2	0	45
13:00 to 16:00	17	15	0	4	1	0	1	38
16:00 to 19:00	20	9	0	4	0	2	0	35
19:00 to 22:00	32	0	0	1	0	0	1	34
TOTAL	100	47	0	20	2	6	2	177

Table 46. Landmark West Tower: Vehicle Type by Time of Day, Saturday

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
07:00 to 10:00	14	13	0	7	4	1	0	39
10:00 to 13:00	22	4	0	1	2	0	2	31
13:00 to 16:00	22	16	0	1	0	0	0	39
16:00 to 19:00	38	3	0	1	0	1	0	43
19:00 to 22:00	39	0	0	3	0	0	1	43
TOTAL	135	36	0	13	6	2	3	195

7.4.3 Vehicle numbers were almost identical on the Tuesday and Friday at 178 and 177 respectively. Slightly more were recorded on the Saturday, a total of 195. Cars made up the majority of vehicles, but significant numbers of good vehicles were also recorded. LGVs and OGVs totalled 60, 69 and 55 on each of the survey days respectively. 10:00 – 13:00 was the most common arrival time during the week, whilst on Saturday the most good vehicles arrived between 13:00 – 16:00. There were around twice as many LGVs as OGVS.

Average Duration of Stay

7.4.4 The average duration of stay by vehicle type and arrival time period is shown in the tables below.

Table 47. Landmark West Tower: Average Duration of Stay by Vehicle Type and Arrival Time, Tuesday (mins)

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	AVERAGE
07:00 to 10:00	4	5		16	37	16	2	**9**
10:00 to 13:00	5	8		23				**8**
13:00 to 16:00	6	6		11			7	**6**
16:00 to 19:00	1	8		9		48	1	**6**
19:00 to 22:00	3	5		0		19	2	**3**
Average	**4**	**7**		**15**	**37**	**33**	**3**	**7**

Table 48. Landmark West Tower: Average Duration of Stay by Vehicle Type and Arrival Time, Friday (mins)

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	AVERAGE
07:00 to 10:00	2	7		12	90	70		**12**
10:00 to 13:00	4	11		15		5		**9**
13:00 to 16:00	3	4		5	76		1	**6**
16:00 to 19:00	3	4		6		3		**4**
19:00 to 22:00	2			2			2	**2**
Average	**3**	**7**		**10**	**83**	**26**	**1**	**7**

Table 49. Landmark West Tower: Average Duration of Stay by Vehicle Type and Arrival Time, Saturday (mins)

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	AVERAGE
07:00 to 10:00	26	8		4	32	6		**16**
10:00 to 13:00	32	159		4	0		4	**44**
13:00 to 16:00	3	8		7				**5**
16:00 to 19:00	2	4		19		1		**3**
19:00 to 22:00	3			4			1	**3**
Average	**10**	**25**		**5**	**22**	**3**	**3**	**12**

7.4.5 The average duration of stay was brief across all three survey days, with an average of seven minutes on both the weekdays and 12 minutes on the Saturday. During the week cars stopped for 3 – 4 minutes on average, whilst LGVs average 7 minutes. OGVs stayed for slightly longer on average, with the average OGV1 stay being 15 minutes on the Tuesday and 10 minutes on the Friday. stopping durations were similar on the Saturday, although the occasional vehicle staying for an extended period increased the overall averages.

Vehicle Type by Parking Section

7.4.6 The total number of vehicles by type recorded stopping in each section is shown below.

Table 50. Landmark West Tower: Number of Vehicles by Type and Parking Section, Tuesday

BAYS	RESTRICTION	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
1A – 1M	Double Yellow	5	0	0	1	1	2	0	9
2A – 2D	Double Yellow	0	0	0	0	0	0	0	0
3A – 3O	Restricted Carriageway	3	1	0	0	0	0	0	4
4A – 4H	Double Yellow	0	0	0	0	0	0	0	0
5A – 5R	Double Yellow	21	9	0	4	1	1	3	39
6A – 6H	Double Yellow	20	5	0	0	0	1	2	28
7A – 7O	No Regulation	33	17	0	5	0	0	3	58
8A – 8H	Double Yellow	22	11	0	4	1	0	2	40

Table 51. Landmark West Tower: Number of Vehicles by Type and Parking Section, Friday

BAYS	RESTRICTION	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
1A – 1M	Double Yellow	3	0	0	0	0	2	0	5
2A – 2D	Double Yellow	0	0	0	0	0	0	0	0
3A – 3O	Restricted Carriageway	0	0	0	0	0	0	0	0
4A – 4H	Double Yellow	0	0	0	1	0	0	0	1
5A – 5R	Double Yellow	16	25	0	6	0	1	0	48
6A – 6H	Double Yellow	11	2	0	2	0	2	0	17
7A – 7O	No Regulation	36	12	0	8	0	0	1	57
8A – 8H	Double Yellow	34	8	0	3	2	1	1	49

Table 52. Landmark West Tower: Number of Vehicles by Type and Parking Section, Saturday

BAYS	RESTRICTION	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
1A – 1M	Double Yellow	4	1	0	0	0	1	0	6
2A – 2D	Double Yellow	0	1	0	0	0	0	0	1
3A – 3O	Restricted Carriageway	3	2	0	0	0	0	0	5
4A – 4H	Double Yellow	0	0	0	0	0	0	0	0
5A – 5R	Double Yellow	29	5	0	2	2	1	1	40
6A – 6H	Double Yellow	17	4	0	2	2	0	1	26
7A – 7O	No Regulation	44	18	0	5	0	0	1	68
8A – 8H	Double Yellow	38	5	0	4	2	0	0	49

7.4.7 Four locations accounted for nearly all stopping activity. These were the double yellow lines to the east side of Marsh Wall (5A – 5R), the double yellow lines on the west of Marsh Wall adjacent to the West Tower access road (6A – 6H), the south side of the access road (7A – 7O) and the double yellow lines to the east side of Westferry Road, south of the access road (8A – 8H). The access road was the most common stopping location on all three days. After this very similar numbers of vehicles were recorded on the double yellows on the east sides of Marsh Wall and Westferrry Road. These patterns were repeated for goods vehicles when considered separately to cars.

Occupancy Levels

7.4.8 For each time period the proportion of each section that is occupied has been calculated. This is based on considering the duration of occupancy of each bay within the section. For example if a section comprises two bays, of which one is occupied then the section is considered 50% occupied. The recorded data only lists one bay for each vehicle irrespective of vehicle type, therefore it is always considered that a vehicle occupies only one bay. The occupancy levels for each section by time period for each survey day is shown below.

Table 53. Landmark West Tower: Occupancy Levels by Section, Tuesday

SECTION	RESTRICTION	07:00 - 10:00	10:00 - 13:00	13:00 - 16:00	16:00 - 19:00	19:00 - 22:00	DAILY TOTAL
1A – 1M	Double Yellow	2%	0%	0%	0%	0%	0%
2A – 2D	Double Yellow	0%	0%	0%	0%	0%	0%
3A – 3O	Restricted Carriageway	0%	0%	0%	0%	0%	0%
4A – 4H	Double Yellow	0%	0%	0%	0%	0%	0%
5A – 5R	Double Yellow	2%	2%	3%	1%	1%	2%
6A – 6H	Double Yellow	1%	2%	1%	7%	1%	2%
7A – 7O	No Regulation	3%	9%	3%	2%	1%	3%
8A – 8H	Double Yellow	6%	4%	4%	2%	3%	4%

Table 54. Landmark West Tower: Occupancy Levels by Section, Friday

SECTION	RESTRICTION	07:00 - 10:00	10:00 - 13:00	13:00 - 16:00	16:00 - 19:00	19:00 - 22:00	DAILY TOTAL
1A – 1M	Double Yellow	1%	0%	0%	0%	0%	0%
2A – 2D	Double Yellow	0%	0%	0%	0%	0%	0%
3A – 3O	Restricted Carriageway	0%	0%	0%	0%	0%	0%
4A – 4H	Double Yellow	0%	0%	0%	0%	0%	0%
5A – 5R	Double Yellow	5%	3%	2%	1%	0%	2%
6A – 6H	Double Yellow	0%	2%	1%	0%	0%	1%
7A – 7O	No Regulation	1%	8%	3%	1%	1%	3%
8A – 8H	Double Yellow	2%	8%	8%	5%	2%	5%

Table 55.

Table 56. Landmark West Tower: Occupancy Levels by Section, Saturday

SECTION	RESTRICTION	07:00 - 10:00	10:00 - 13:00	13:00 - 16:00	16:00 - 19:00	19:00 - 22:00	DAILY TOTAL
1A – 1M	Double Yellow	0%	0%	0%	0%	0%	**0%**
2A – 2D	Double Yellow	0%	3%	0%	0%	0%	**1%**
3A – 3O	Restricted Carriageway	0%	0%	0%	0%	0%	**0%**
4A – 4H	Double Yellow	0%	0%	0%	0%	0%	**0%**
5A – 5R	Double Yellow	3%	0%	1%	0%	0%	**1%**
6A – 6H	Double Yellow	0%	0%	1%	0%	0%	**0%**
7A – 7O	No Regulation	9%	13%	18%	15%	16%	**14%**
8A – 8H	Double Yellow	9%	2%	1%	4%	3%	**4%**

7.4.9 Occupancy levels are generally low throughout the day. Even the busiest section in terms of number of vehicles, on the access road, had a daily average occupancy level of less than 5% at during the week and 14% and the weekend. No other section exceeded 10% in any time period or 5% on average across the course of a whole day.

Analysis of Deliveries

7.4.10 Across the three days, a total of 112 vehicles were identified undertaking loading or unloading activities. The breakdown between the survey days was as follows:

- 42 on Tuesday,
- 45 on Friday
- 25 on Saturday

7.4.11 Of the 112 vehicles, the following deliveries took place:

- 6 large boxes,
- 66 small boxes,
- 8 packages,
- 32 unknown.

7.4.12 The average duration of stay across the three days was 13 minutes 25 seconds. The average durations are broken down as follows:

- Tuesday: 14 minutes 45 seconds,
- Friday: 17 minutes 33 seconds,
- Saturday: 12 minutes 30 seconds.

7.4.13 Of the identified deliveries, 67 were recorded as completed deliveries, with 14 recorded as attempted but not completed deliveries. The remaining 31 were unknown.

7.4.14 Limited information can be ascertained from the type of delivery or the company name.

Analysis of Parking and Waiting by Freight Vehicles

7.4.15 Across the three days, a further 81 LGV, OGV1 and OGV2 vehicles were recorded, but not specifically as delivering or unloading. These were broken down as follows:

- Tuesday - 14
- Friday - 28
- Saturday - 39

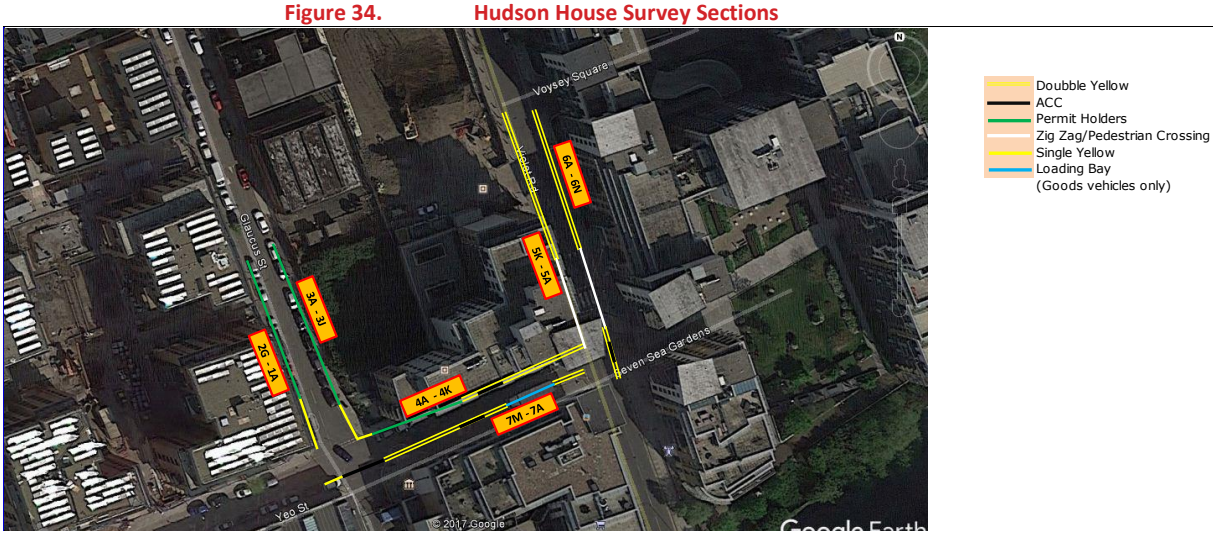
7.4.16 The average duration of stay across the three days was 39 minutes 2 seconds. The average durations are broken down as follows:

- Tuesday: 5 minutes 39 seconds
- Friday: 4 minutes 5 seconds
- Saturday: 20 minutes 54 seconds

7.5 Results - Hudson House

7.5.1 The parking area surveyed and the corresponding parking restrictions are shown in Figure 34.

Figure 34. Hudson House Survey Sections



Vehicle Type by Time of Day

7.5.2 The tables below show the numbers of vehicles recorded by arrival time period on each of the three survey days.

Table 57. Hudson House: Vehicle Type by Time of Day, Tuesday

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
07:00 to 10:00	39	19	0	4	0	2	0	64
10:00 to 13:00	38	19	0	8	0	0	1	66
13:00 to 16:00	33	17	0	4	0	0	1	55
16:00 to 19:00	51	10	0	0	0	1	0	62
19:00 to 22:00	66	3	0	1	0	0	0	70
TOTAL	227	68	0	17	0	3	2	317

Table 58. Hudson House: Vehicle Type by Time of Day, Friday

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
07:00 to 10:00	56	21	0	11	0	0	0	88
10:00 to 13:00	44	19	0	6	0	0	1	70
13:00 to 16:00	46	14	0	3	1	1	1	66
16:00 to 19:00	77	15	0	0	0	1	2	95
19:00 to 22:00	76	6	0	2	0	0	1	85
TOTAL	299	75	0	22	1	2	5	404

Table 59. Hudson House: Vehicle Type by Time of Day, Saturday

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
07:00 to 10:00	48	11	0	7	0	0	0	66
10:00 to 13:00	67	10	0	2	0	0	1	80
13:00 to 16:00	87	10	0	2	0	0	0	99
16:00 to 19:00	96	3	0	0	0	0	0	99
19:00 to 22:00	124	1	0	0	0	0	0	125
TOTAL	422	35	0	11	0	0	1	469

7.5.3 The most vehicles were recorded on the Saturday, 469 over the course of the survey period. Fewer vehicles parked or stopped on the weekdays, a total of 317 and 404 on the Tuesday and Friday respectively. The majority of these vehicles were cars on all three survey days, however a number of goods vehicles were also noted. Goods vehicles numbers were much higher on the weekdays, with a total of 68 LGVs on the Tuesday and 75 on the Friday. These were supplemented by 17 and 23 OGVS respectively. On Saturday there were a 46 goods vehicles in total when both LGVs and OGVs were considered. On all three days most goods vehicles arrived in the morning, in the two time periods covering 07:00 – 13:00.

Average Duration of Stay

7.5.4 The average duration of stay by vehicle type and arrival time period is shown in the tables below.

Table 60. Hudson House: Average Duration of Stay by Vehicle Type and Arrival Time, Tuesday (mins)

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	AVERAGE
07:00 to 10:00	77	41		29		2		**61**
10:00 to 13:00	18	15		16			0	**16**
13:00 to 16:00	23	12		19			4	**19**
16:00 to 19:00	31	14				3		**28**
19:00 to 22:00	17	17		12				**17**
Average	**31**	**21**		**20**		**2**	**2**	**28**

Table 61. Hudson House: Average Duration of Stay by Vehicle Type and Arrival Time, Friday (mins)

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	AVERAGE
07:00 to 10:00	98	22		15				**70**
10:00 to 13:00	30	10		10			1	**22**
13:00 to 16:00	42	12		3	2	29	1	**32**
16:00 to 19:00	35	23				1	1	**32**
19:00 to 22:00	20	12		22			1	**19**
Average	**43**	**17**		**12**	**2**	**15**	**1**	**36**

Table 62. Hudson House: Average Duration of Stay by Vehicle Type and Arrival Time, Saturday (mins)

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	AVERAGE
07:00 to 10:00	179	16		9				**134**
10:00 to 13:00	20	15		20			0	**19**
13:00 to 16:00	26	4		39				**24**
16:00 to 19:00	31	2						**30**
19:00 to 22:00	11	0						**11**
Average	**39**	**11**		**17**			**0**	**37**

7.5.5 The average stay for cars varied between 31 – 43 minutes across the three survey days. The average duration was particularly long for vehicles that arrived during the first time period as this included some cars which were parked for the whole day. Goods vehicles had much shorter durations of stay, ranging between 11 – 21 minutes for LGVs and 12 –

20 minutes for OGVs. If the vehicles which stayed for less than one hour only are considered the average stay durations would be as shown in the tables below.

Table 63. Hudson House: Average Duration of Stay (<1hr) by Vehicle Type and Arrival Time, Tuesday (mins)

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	AVERAGE
07:00 to 10:00	8	16		5		2		**61**
10:00 to 13:00	9	15		16			0	**16**
13:00 to 16:00	8	12		19			4	**19**
16:00 to 19:00	5	4				3		**28**
19:00 to 22:00	7	17		12				**17**
Average	**7**	**13**		**15**		**2**	**2**	**28**

Table 64. Hudson House: Average Duration of Stay (<1hr) by Vehicle Type and Arrival Time, Friday (mins)

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	AVERAGE
07:00 to 10:00	5	6		15				**7**
10:00 to 13:00	5	10		10			1	**7**
13:00 to 16:00	7	12		3	2	29	1	**8**
16:00 to 19:00	6	7				1	1	**6**
19:00 to 22:00	8	12		22			1	**9**
Average	**6**	**9**		**12**	**2**	**15**	**1**	**7**

Table 65. Hudson House: Average Duration of Stay (<1hr) by Vehicle Type and Arrival Time, Saturday (mins)

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	AVERAGE
07:00 to 10:00	8	16		9				**10**
10:00 to 13:00	5	8		20			0	**6**
13:00 to 16:00	5	4		39				**6**
16:00 to 19:00	4	2						**4**
19:00 to 22:00	5	0						**5**
Average	**5**	**9**		**17**			**0**	**5**

7.5.6 When vehicles making extended stays in excess of one hour are excluded, the average duration of stop across vehicle types is brief. The greatest impact is on cars, for which the average duration of stay is reduced to between 5 – 7 minutes. No OGV1s remained for more than one hour so their average duration is unchanged. LGV average wait times are reduce to between 9 – 13 minutes. In most weekday time periods LGVs stayed on average for in excess of 10 minutes.

Vehicle Type by Parking Section

7.5.7 The total number of vehicles by type recorded stopping in each section is shown in Table 66 to 66.

Table 66. Hudson House: Number of Vehicles by Type and Parking Section, Tuesday

BAYS	RESTRICTION	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
1A – 1E	Single Yellow	19	3	0	0	0	0	0	**22**
2A – 2G	Permit Holders	21	3	0	0	0	0	0	**24**
3A – 3J	Permit Holders	29	6	0	0	0	0	0	**35**
4A – 4K	Permit Holders / Double Yellow	0	0	0	0	0	0	0	**0**
5A – 5K	Double Yellow	7	6	0	2	0	1	0	**16**

BAYS	RESTRICTION	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
6A – 6N	Double Yellow	27	8	0	5	0	1	0	**41**
7A – 7M	Double Yellow / Loading Bay	**124**	**42**	**0**	**10**	**0**	**1**	**2**	**179**

Table 67. Hudson House: Number of Vehicles by Type and Parking Section, Friday

BAYS	RESTRICTION	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
1A – 1E	Single Yellow	7	4	0	1	0	0	0	**12**
2A – 2G	Permit Holders	22	2	0	0	0	0	0	**24**
3A – 3J	Permit Holders	35	5	0	0	0	1	0	**41**
4A – 4K	Permit Holders / Double Yellow	50	5	0	1	0	0	1	**57**
5A – 5K	Double Yellow	17	9	0	3	1	0	0	**30**
6A – 6N	Double Yellow	32	18	0	5	0	0	3	**58**
7A – 7M	Double Yellow / Loading Bay	**136**	**32**	**0**	**12**	**0**	**1**	**1**	**182**

Table 68. Hudson House: Number of Vehicles by Type and Parking Section, Saturday

BAYS	RESTRICTION	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
1A – 1E	Single Yellow	15	0	0	0	0	0	0	15
2A – 2G	Permit Holders	18	0	0	0	0	0	0	18
3A – 3J	Permit Holders	27	0	0	0	0	0	0	27
4A – 4K	Permit Holders / Double Yellow	58	4	0	0	0	0	0	62
5A – 5K	Double Yellow	13	2	0	0	0	0	0	15
6A – 6N	Double Yellow	61	5	0	8	0	0	0	74
7A – 7M	Double Yellow / Loading Bay	230	24	0	3	0	0	1	258

7.5.8 By far the greatest level of activity was recorded on the south side of Yeo Street (7A – 7M), which is mainly double yellow line, but also contains a loading bay which could accommodate two LGVs. This section accounts for the majority of both car and goods vehicle activity. On the Friday and Satruday in excess of 50 vehicles used either the mix of permit holder parking and double yellow line on the north side of Yeo Street (4A – 4K) or the double yellow lines on the east side of Violet Road (6A – 6N). However no vehicle activity was noted on the former section on the Tuesday.

Occupancy Levels

7.5.9 For each time period the proportion of each section that is occupied has been calculated. This is based on considering the duration of occupancy of each bay within the section. For example if a section comprises two bays, of which one is occupied then the section is considered 50% occupied. The recorded data only lists one bay for each vehicle irrespective of vehicle type, therefore it is always considered that a vehicle occupies only one bay. The occupancy levels for each section by time period for each survey day is shown below.

Table 69. Hudson House: Occupancy Levels by Section, Tuesday

SECTION	RESTRICTION	07:00 - 10:00	10:00 - 13:00	13:00 - 16:00	16:00 - 19:00	19:00 - 22:00	DAILY TOTAL
1A – 1E	Single Yellow	32%	14%	2%	12%	49%	22%
2A – 2G	Permit Holders	67%	54%	38%	55%	55%	54%
3A – 3J	Permit Holders	40%	35%	22%	20%	25%	28%
4A – 4K	Permit Holders / Double Yellow	0%	0%	0%	0%	0%	0%
5A – 5K	Double Yellow	2%	3%	1%	0%	2%	1%
6A – 6N	Double Yellow	1%	3%	3%	1%	3%	2%
7A – 7M	Double Yellow / Loading Bay	11%	11%	11%	12%	23%	14%

Table 70. Hudson House: Occupancy Levels by Section, Friday

SECTION	RESTRICTION	07:00 - 10:00	10:00 - 13:00	13:00 - 16:00	16:00 - 19:00	19:00 - 22:00	DAILY TOTAL
1A – 1E	Single Yellow	1%	0%	12%	15%	39%	**13%**
2A – 2G	Permit Holders	77%	55%	39%	57%	66%	**59%**
3A – 3J	Permit Holders	62%	51%	41%	62%	81%	**59%**
4A – 4K	Permit Holders / Double Yellow	23%	20%	21%	30%	28%	**25%**
5A – 5K	Double Yellow	2%	2%	1%	1%	0%	**1%**
6A – 6N	Double Yellow	1%	5%	1%	1%	2%	**2%**
7A – 7M	Double Yellow / Loading Bay	12%	15%	11%	18%	32%	**18%**

Table 71. Hudson House: Occupancy Levels by Section, Saturday

SECTION	RESTRICTION	07:00 - 10:00	10:00 - 13:00	13:00 - 16:00	16:00 - 19:00	19:00 - 22:00	DAILY TOTAL
1A – 1E	Single Yellow	39%	28%	49%	43%	34%	**39%**
2A – 2G	Permit Holders	66%	57%	52%	54%	74%	**60%**
3A – 3J	Permit Holders	72%	64%	42%	58%	67%	**61%**
4A – 4K	Permit Holders / Double Yellow	44%	39%	35%	34%	35%	**38%**
5A – 5K	Double Yellow	0%	0%	1%	1%	0%	**0%**
6A – 6N	Double Yellow	4%	3%	2%	1%	1%	**2%**
7A – 7M	Double Yellow / Loading Bay	18%	15%	13%	17%	26%	**18%**

7.5.10 The occupancy levels show varying levels of occupancy across the different areas. Although the area on the south side of Yeo Street experience by far the greatest volume of activity, it was only occupied for 14% of the time on the Tuesday and 18% on the Friday and Saturday. This suggests that most vehicles did not stay long. The highest occupancy levels were found in the sections of permit holder parking, a result of vehicles being parked for most or all of the day. Levels of occupancy did not show a great deal of variation across the course of the day.

Analysis of Deliveries

7.5.11 Across the three days, a total of 37 vehicles were identified undertaking loading or unloading activities. The breakdown between the survey days was as follows:

- 18 on Tuesday,
- 11 on Friday,
- 8 on Saturday

7.5.12 Of the 37 vehicles, the following deliveries took place, the following details of the deliveries were captured:

- 5 small boxes,
- 1 package,
- 31 unknown.

7.5.13 The average duration of stay across the three days was 33 minutes 35 seconds. The average durations are broken down as follows:

- Tuesday: 55 minutes 53 seconds,
- Friday: 31 minutes 57 seconds,
- Saturday: 12 minutes 54 seconds.

7.5.14 The Tuesday data included a delivery recorded at over 7 hours, and another two of between 1 and 2 hours long. The Friday data also included a delivery recorded as 3 hours 40 minutes.

7.5.15 Of the identified deliveries, 2 were recorded as completed deliveries, with 2 recorded as attempted but not completed deliveries. The remaining 33 were unknown.

7.5.16 Limited information can be ascertained from the type of delivery or the company name.

Analysis of Parking and Waiting by Freight Vehicles

7.5.17 Across the three days, a further 194 LGV, OGV1 and OGV2 vehicles were recorded, but not specifically as delivering or unloading. These were broken down as follows:

- Tuesday - 67
- Friday - 88
- Saturday - 39

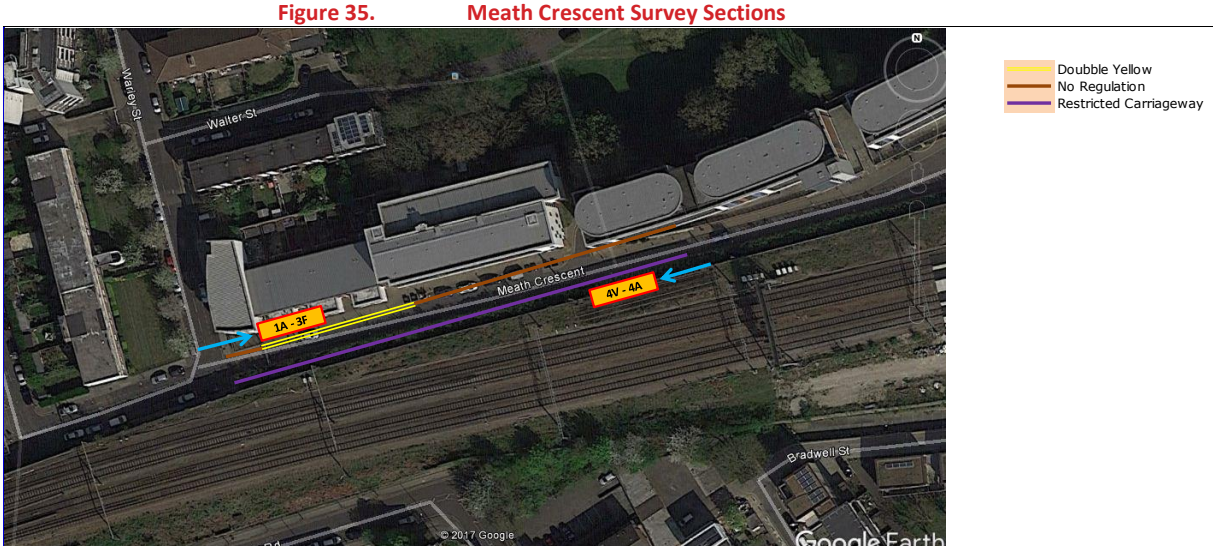
7.5.18 The average duration of stay across the three days was 13 minutes 1 seconds. The average durations are broken down as follows:

- Tuesday: 11 minutes 40 seconds
- Friday: 15 minutes 47 seconds
- Saturday: 11 minutes 35 seconds

7.6 Results - Meath Crescent

7.6.1 The parking area surveyed and the corresponding parking restrictions are shown in Figure 35.

Figure 35. Meath Crescent Survey Sections



Vehicle Type by Time of Day

7.6.2 The tables below show the numbers of vehicles recorded by arrival time period on each of the three survey days.

Table 72. Meath Crescent: Vehicle Type by Time of Day, Tuesday

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
07:00 to 10:00	8	1	0	0	0	0	0	**9**
10:00 to 13:00	8	8	0	0	0	0	0	**16**
13:00 to 16:00	5	3	0	2	0	0	0	**10**
16:00 to 19:00	9	1	0	0	0	0	0	**10**
19:00 to 22:00	10	0	0	0	0	0	0	**10**
TOTAL	**40**	**13**	**0**	**2**	**0**	**0**	**0**	**55**

Table 73. Meath Crescent: Vehicle Type by Time of Day, Friday

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
07:00 to 10:00	4	2	0	1	0	0	0	**7**
10:00 to 13:00	5	7	0	0	0	0	0	**12**
13:00 to 16:00	9	0	0	0	0	0	0	**9**
16:00 to 19:00	12	0	0	0	0	0	0	**12**
19:00 to 22:00	4	1	0	0	0	0	0	**5**
TOTAL	**34**	**10**	**0**	**1**	**0**	**0**	**0**	**45**

Table 74. Meath Crescent: Vehicle Type by Time of Day, Saturday

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
07:00 to 10:00	0	0	0	0	0	0	0	**0**
10:00 to 13:00	8	5	0	0	0	0	0	**13**
13:00 to 16:00	12	0	0	0	0	0	0	**12**
16:00 to 19:00	12	0	0	0	0	0	0	**12**
19:00 to 22:00	6	0	0	0	0	0	0	**6**
TOTAL	**38**	**5**	**0**	**0**	**0**	**0**	**0**	**43**

7.6.3 The total number of vehicles stopping on Meath Crescent ranged between 43 – 55 across the three survey days. Nearly all of these were cars, alongside 28 LGVs and 3 OGVs over the three days. Where good vehicles were recorded, they mostly arrived in the morning with 10:00 – 13:00 being the busiest period on each of the days surveyed.

Average Duration of Stay

7.6.4 The average duration of stay by vehicle type and arrival time period is shown in the tables below.

Table 75. Meath Crescent: Average Duration of Stay by Vehicle Type and Arrival Time, Tuesday (mins)

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	AVERAGE
07:00 to 10:00	102	4						91
10:00 to 13:00	12	79						46
13:00 to 16:00	96	5		9				51
16:00 to 19:00	35	1						31
19:00 to 22:00	34							34
Average	51	50		9				49

Table 76. Meath Crescent: Average Duration of Stay by Vehicle Type and Arrival Time, Friday (mins)

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	AVERAGE
07:00 to 10:00	38	3		13				25
10:00 to 13:00	100	4						44
13:00 to 16:00	117							117
16:00 to 19:00	30							30
19:00 to 22:00	3	0						3
Average	61	3		13				47

Table 77. Meath Crescent: Average Duration of Stay by Vehicle Type and Arrival Time, Saturday (mins)

	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	AVERAGE
07:00 to 10:00								
10:00 to 13:00	29	4						20
13:00 to 16:00	99							99
16:00 to 19:00	67							67
19:00 to 22:00	42							42
Average	65	4						58

7.6.5 The average stay for cars exceeded one hour on both the Friday and Saturday and was 51 minutes on the Tuesday. This reflects a number of vehicles being parked for much or all of the day increasing the overall average. LGVs generally had very short stays of five minutes of less, with the exception of one time period on the Tuesday where an LGV arrived and parked for the rest of the day. Vehicle Type by Parking Section

7.6.6 The total number of vehicles by type recorded stopping in each section is shown in Table 78 to 80.

Table 78. Meath Crescent: Number of Vehicles by Type and Parking Section, Tuesday

BAYS	RESTRICTION	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
1A – 1J	Double Yellow	15	1	0	0	0	0	0	**10**
2A – 2E	Parking Bay	9	9	0	2	0	0	0	**5**
3A – 3F	No Regulation	5	2	0	0	0	0	0	**6**
4A – 4K	Restricted Carriageway	11	1	0	0	0	0	0	**22**

Table 79. Meath Crescent: Number of Vehicles by Type and Parking Section, Friday

BAYS	RESTRICTION	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
1A – 1J	Double Yellow	15	5	0	0	0	0	0	**20**
2A – 2E	Parking Bay	11	0	0	0	0	0	0	**11**
3A – 3F	No Regulation	2	5	0	1	0	0	0	**8**
4A – 4K	Restricted Carriageway	6	0	0	0	0	0	0	**6**

Table 80. Meath Crescent: Number of Vehicles by Type and Parking Section, Saturday

BAYS	RESTRICTION	CAR	LGV	MCY	OGV1	OGV2	COACH	TAXI	TOTAL
1A – 1J	Double Yellow	16	1	0	0	0	0	0	**17**
2A – 2E	Parking Bay	13	2	0	0	0	0	0	**15**
3A – 3F	No Regulation	6	2	0	0	0	0	0	**8**
4A – 4K	Restricted Carriageway	3	0	0	0	0	0	0	**3**

7.6.7 The most common stopping location on all three survey days was the section of double yellow lines on the north side of Meath Crescent. Parking behaviour of both cars and goods vehicles was otherwise spread across the various sections of the street. On the Friday and Saturday the parking bays were the next most frequently used location whilst on the Tuesday the restricted carriageway on the south side of Meath Crescent was the second most frequently used.

Occupancy Levels

7.6.8 For each time period the proportion of each section that is occupied has been calculated. This is based on considering the duration of occupancy of each bay within the section. For example if a section comprises two bays, of which one is occupied then the section is considered 50% occupied. The recorded data only lists one bay for each vehicle irrespective of vehicle type, therefore it is always considered that a vehicle occupies only one bay. The occupancy levels for each section by time period for each survey day is shown below.

Table 81. Meath Crescent: Occupancy Levels by Section, Tuesday

SECTION	RESTRICTION	07:00 - 10:00	10:00 - 13:00	13:00 - 16:00	16:00 - 19:00	19:00 - 22:00	DAILY TOTAL
1A – 1J	Double Yellow	20%	13%	6%	12%	19%	**14%**
2A – 2E	Parking Bay	12%	18%	27%	40%	60%	**31%**
3A – 3F	No Regulation	0%	1%	0%	1%	0%	**0%**
4A – 4K	Restricted Carriageway	1%	0%	0%	0%	0%	**0%**

Table 82. Meath Crescent: Occupancy Levels by Section, Friday

SECTION	RESTRICTION	07:00 - 10:00	10:00 - 13:00	13:00 - 16:00	16:00 - 19:00	19:00 - 22:00	DAILY TOTAL
1A – 1J	Double Yellow	0%	5%	7%	12%	11%	**7%**
2A – 2E	Parking Bay	17%	21%	30%	54%	41%	**33%**
3A – 3F	No Regulation	1%	0%	0%	0%	0%	**0%**
4A – 4K	Restricted Carriageway	0%	0%	0%	0%	0%	**0%**

Table 83. Meath Crescent: Occupancy Levels by Section, Saturday

SECTION	RESTRICTION	07:00 - 10:00	10:00 - 13:00	13:00 - 16:00	16:00 - 19:00	19:00 - 22:00	DAILY TOTAL
1A – 1J	Double Yellow	0%	0%	9%	15%	20%	**9%**
2A – 2E	Parking Bay	0%	4%	52%	63%	67%	**37%**
3A – 3F	No Regulation	0%	1%	1%	0%	0%	**0%**
4A – 4K	Restricted Carriageway	0%	0%	0%	0%	0%	**0%**

7.6.9 The parking bays showed the greatest level of occupancy with an average of between 31% - 37% across the three days. Occupancy was generally highest in the final two time periods of the day. Occupancy on the double yellow lines was generally low, peaking at 20% in the evening of the Saturday. The remaining two sections had occupancy levels of 1% or less across all time periods.

Analysis of Deliveries

7.6.10 Across the three days a total of 29 vehicles were identified undertaking loading or unloading activities. The breakdown between the survey days was as follows:

- 8 on Tuesday,
- 9 on Friday,
- 12 on Saturday

7.6.11 Of the 29 vehicles the following deliveries took place, the following details of the deliveries were captured:

- 3 large boxes,
- 24 small boxes,
- 2 unknown.

7.6.12 The average duration of stay across the three days was 36 minutes 59 seconds. The average durations are broken down as follows:

- Tuesday: 9 minutes 1 seconds,
- Friday: 27 minutes 45 seconds,
- Saturday: 1 hour 2 minutes.

7.6.13 The Saturday data included one delivery with a duration of nearly 7 hours.

7.6.14 Of the identified deliveries, 25 were recorded as completed deliveries, with 2 recorded as attempted but not completed deliveries. The remaining 2 were unknown.

7.6.15 Limited information can be ascertained from the type of delivery or the company name.

Analysis of Parking and Waiting by Freight Vehicles

7.6.16 Across the three days, a further 20 LGV, OGV1 and OGV2 vehicles were recorded, but not specifically as delivering or unloading. These were broken down as follows:

- Tuesday - 9
- Friday - 7
- Saturday - 4

7.6.17 The average duration of stay across the three days was 2 minutes 32 seconds. The average durations are broken down as follows:

- Tuesday: 26 minutes 42 seconds
- Friday: 39 minutes 47 seconds
- Saturday: 46 minutes 14 seconds

7.7 Conclusions

7.7.1 The main summary conclusions from the analysis of the data are:

- At all locations car was the predominant vehicle type;
- Goods vehicles were recorded in varying numbers at all site, mostly in the form of LGVs, with OGVs only prevalent at Landmark West Tower and Hudson House;
- The average duration of stay for cars was often high reflecting vehicles being parked for much of the day;
- LGVs generally stopped for less than 10 minutes, with OGVs waiting slightly longer;
- Whilst permitted parking areas and loading bays were frequently used where available, sections of double yellow line were often utilised for vehicles stopping;
- Occupancy levels were generally low with the exception of permit holder parking areas, suggesting that vehicles stopping in other areas generally did not stay long
- An average of just over 15 deliveries were observed per site per day
- Average delivery time was just under 27 minutes; however, this included a number of instances where individual delivery vehicles effectively parked for long periods of the day
- On average, 11% of deliveries were definitely uncompleted with the driver returning to their vehicle with the delivery. If incomplete entries are excluded from the data set, this value rises to 18%.
- On average, 31 other LGV, OGV1, and OGV2 vehicles per day per site were observed parking or waiting in the vicinity of the developments, even though they were not observed making a delivery. On average, these vehicles were parked for 12 minutes.

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