Industrial Land and Transport Study

Final Report

On behalf of **Transport for London**

TRANSPORT FOR LONDON
EVERY JOURNEY MATTERS

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Summary

Peter Brett Associates LLP was commissioned to undertake a study of the issues surrounding transport and the economic activity sited on land designated as 'Industrial Land' in London. The primary context is the volume of industrial land that has been released for housing development in recent years, reflecting the demand for new housing in London, and the potential for negative impacts on London's transport networks associated with economic activity of an industrial nature being displaced to other locations in London, and further afield. The evidence gathered in this study should be seen in the context of the Industrial Land Demand Study (ILDS) which has considered future scenarios for industrial land release at the London borough level.

In order to address these issues an overall narrative has been developed, based on a combination of desk-based research, analytical work and engagement with industry in London, as follows:

Where and how much land might be released in future? The ILDS scenarios have been analysed and the five emerging scenarios summarised.

What sort of activity takes place at Industrial Land Sites? Detailed analysis of BRES data was undertaken (and an associated mapping tool developed) to provide an analysis of the types of economic activity currently undertaken on Industrial land, focussing on Strategic Industrial Locations (SILs). This confirmed that much of the activity taking place at these sites is not typically 'industrial' in nature, and a wide range of service based and other types of activity have been identified. However, the types of activity which would traditionally be thought of as industrial (and therefore greater generators of traffic associated with the movement of goods and products) are disproportionately present at Industrial Land locations as defined by SILs and Locally Significant Industrial Sites (LSISs). Any displacement of activity out of current SILs and LSISs is therefore likely to have a material impact on these types of operation, and hence the movement of goods.

What determines the 'transport intensity' of economic activity, therefore the potential impact of relocating this activity? There is a wide range of transport-related activity which can be associated with any individual organisation or a group of organisations located on the same site, where land could potentially be released. These characteristics would be central to identifying the potential transport impacts of any specific land release. In order to provide some structure to these considerations, this report sets out a framework which can be used to systematically consider the likely range of demands, defined as 'transport density' in terms of three key aspects: (i) employees commuting to and from the site; (ii) the movement of physical goods and products on and off site – quantities / range of origins and destinations / type of vehicles used / spread of demand across the day etc; and (iii) the movement of people on and off site (excluding commuting). This framework has been developed in part from a range of findings drawn from engagement with industry concerning: (i) current and future trends in how businesses organise their transport related activities, and (ii) a wider range of issues surrounding the location and operation of their business. This framework could potentially be developed and applied by TfL / GLA in the context of any give location where industrial land release is being considered, to provide a structured approach to the analysis of the likely implications of any redistribution of this activity on transport, thus feeding in to any land release decision.

What sort of transport demands are associated with Industrial Land sites? The report has presented the available observed and modelled evidence concerning the scope and scale of transport demand associated with the key SIL sites in London. Analysis of census data provides a definitive guide to commuting patterns to the top 12 SILs which has revealed a mix of very local catchments at some sites and much more dispersed patterns at others. This analysis allows a qualitative assessment to be made of the impact on commuting patterns of

any relocation of activity out of a given SIL. For all but the most local moves, the likelihood is that any relocation would lead to increased commuting distances or the potential loss of local staff. TfL's LoHAM model has been used to provide a high level assessment of the totality of road based transport associated with the same top 12 sites. In the main, the modelled travel patterns show a more local pattern for car traffic (as it includes commuting) and a more dispersed pattern for LGV/OGV[1] traffic. Interestingly, for most sites the percentage of LGV/OGV traffic associated with London Central Services Property Market Area (PMA) and destinations outside London is similar. In broad terms, these traffic patterns do support the theory that displacing economic activity further away from central London would likely lead to an overall increase in vehicle kilometres. The process of engagement with industry revealed a range of issues and behaviours that could be affected by displacement of activity including compromised service level agreements, the use of electric vehicles and last mile delivery.

What happens to occupants of sites which are released? This analysis has set out the range of behavioural responses potentially resulting from the release of an industrial land site for housing. The analysis of postal relocations data provides valuable insights into the destination location of those companies moving out of SILs. The two main responses are: (i) move locally within the same London PMA, maximising the potential to retain labour and minimising any transport impacts – this may also reflect those for whom access to central London is important; and (ii) move out of London to the wider south east, generally within the same broad radial corridor or wedge – potentially reflecting those for whom access to central London is less important, or whose activities are more focussed in outer London anyway. This clearly implies a much bigger change for the firm from both an operational and labour market perspective, as in the latter case the evidence from census data suggests that the amount of 'out-commuting' from London to industrial sites in the wider south east is limited.

If re-located where should industrial activity best be located? This analysis has presented quantified evidence of how the future distribution of employment (and population) in London, combined with forecast travel times and volumes (reflecting increasing congestion) would influence the future level of car / goods vehicle (and public transport based) connectivity to employment and population across London. This has demonstrated a differential impact across London, whereby some parts of London are forecast to see their level of connectivity deteriorate to a greater extent than others. A recurring result is the relatively poor connectivity in east and south London, a situation which is being exacerbated over time. All of these issues would have a bearing on the potential impact on London's transport networks of any further redistribution of industrial activity caused by the release of industrial land. This analysis can be used to identify locations at both a London-wide and intra-borough level which will provide relatively good connectivity in future, and hence provide a suitable site for potentially displaced businesses which require good connectivity to other businesses (evidenced by employment) and also London's population.

What would be the impact of the ILDS Scenarios on Transport? The potential impact of each ILDS scenario on key strategic transport corridors has been considered at the level of the London PMAs and a systematic commentary around this has been developed. This draws together the various elements of the work to identify potential impacts by scenario, by PMA, by transport corridor. It identifies at the broad corridor level whether each scenario, at the PMA level would potentially have a low, medium or high impact on London's transport network.

A key objective of the study was therefore to provide evidence and conclusions with regard to the transport implications of:

- re-locating industry away from the markets they serve;
- re-locating and intensifying industrial land from inner London to outer London; and
- re-locating and intensifying industrial land from inner London and outer London to locations outside London (in the wider south east).

[1] LGV – Lights Goods Vehicle, OGV – Ordinary Goods Vehicle (includes Heavy Goods Vehicles)

The impact of any individual land release or programme of industrial land release on London's transport networks is a complex issue and would be determined by a wide range of factors which would be specific to the site or location in question, and the quantum of sites and land affected. As such, it is clear that this is a multi-faceted issue, about which it is difficult to draw conclusions in a general sense, without reference to a specific land release proposition (ie knowing the sites and organisations potentially affected). Instead this study has developed a structured approach to analysing how transport behaviours and networks could be affected by the release of industrial land, and presented the existing evidence and reference material to allow a more informed view to be taken in a planning context.

The impacts in terms of transport of any land release could range from: (i) **insignificant** e.g. if the economic activity which is displaced places **low demands** on the transport network and is dispersed to a relatively **uncongested** area; to (ii) **highly significant** if the entities displaced place **high demands** on the network and are relocated to relatively **more congested** areas of the network. A framework has therefore been developed which would allow a consistent analysis of transport intensity to be developed in the context of any given location or site. A detailed analysis of connectivity has also been undertaken to determine the most efficient locations in London for servicing London's jobs and population.

The five scenarios developed in the ILDS vary widely in scale of land release. In some scenarios, there is the potential for a large proportion of industrial land to be lost within individual boroughs and the study has determined where this coincides with a particularly significant proportion of industrial economic activity.

The evidence developed in this study would therefore suggest that there are a range of potential negative impacts on London's transport networks which could emerge as a result of the increased vehicle kilometres associated with the displacement of economic activity to potentially sub-optimal locations. These issues are associated with: (i) the commuting patterns of workers; (ii) inbound and outbound supply chain issues; and (iii) the transport requirements of staff in the course of their work, and would emerge in the form of:

- increased traffic congestion;
- deteriorating local air quality; and
- potentially road safety and other environmental issues.

It is possible that these effects would multiply as the range of locally alternative sites diminishes and firms are forced to move outside London – these are the two main relocation types observed in the data. Where activity is intensified on site, transport impacts will be much more localised with no significant area wide impact. The potential for co-location between residential and industrial land uses would depend on the specific nature of the activity undertaken at the site, but again any area wide traffic impacts would be limited.

What further research could be undertaken to increase our understanding? A range of ideas for further research have been put forward here. These focus on the development of guidance, potentially informed by: (i) the further analysis of existing data and the use of new data sources; and (ii) evaluation of case study land release programmes.

1 Introduction

1.1 Background

1.1.1 There has been a recent trend of the release of industrial land to provide land for housing development in London. Given the limited availability of industrial land in London, this release is typically associated with a movement of economic activity to locations further away from central London. Associated with this is an increasing concern that this may be detrimental to the operational efficiency of, and external impacts of traffic on, London's transport networks. These negative impacts could be evidenced by:

- additional vehicle kilometres – increasing global emissions (CO_2);
- impacts on other road users through increased congestion on key congested corridors and more unreliable journey times when roads are operating close to capacity;
- impacts on crowding on train and underground public transport services in particular;
- a detrimental impact in road safety, through increased traffic volumes and the potential routing of vehicles onto unsuitable roads, including interaction with cyclists;
- deteriorating local air quality – a particular issue given the association of diesel vehicles with industrial economic activity, and the increasing recognition of the negative health impacts of diesel emissions; and
- increased noise and vibration caused by the movement of larger goods vehicles in particular.

1.2 Purpose of Report

1.2.1 The implications in terms of ***transport*** of any individual land release or programme of land release over time will vary widely on a case by case basis. There are a range of possible responses from present occupiers of any 'released' site, and there is also the unknown associated with the choices made by firms who would otherwise have occupied these sites in the future, had these locations remained available for industrial purposes.

1.2.2 Given this high degree of uncertainty, the purpose of this report is therefore to set out the parameters and evidence which would determine the extent to which the release of industrial land is likely to be 'problematic' from a transport perspective. In addition, the study has generated a wide range of **reference material** which can be used by TfL / GLA in future to inform decisions relating to specific examples of land release, or land release scenarios.

1.2.3 Much of this reference material is presented in graphical form in a series of accompanying PowerPoint presentation files. These files are as described in the table below.

Table 1.1: Details of Accompanying Report Graphics

File Name	Description
Industrial-Land-BRES-SIL	Top 10 SIC Level 2 employment at all SILs and across London
Industrial-Land-BRES-LSIL	Top 10 SIC Level 2 employment at all LSISs (borough level) and across London
Industrial-Land-BRES-combined	Combined SIL and LSIS employment for the four main industrial SIC Level 1 categories
Industrial-Land-census-TTW-car	Top 12 SILs – 2011 Census commuting to each SIL by car

File Name	Description
Industrial-Land-census-TTW-non-car	Top 12 SILs – 2011 Census commuting to each SIL by non-car modes
Industrial-Land-census-TTW-combined	Top 12 SILs – 2011 Census commuting to each SIL by all modes
Industrial-Land-Demand-Car	Top 12 SILs – 2031 Inter-peak forecast car demand to each SIL
Industrial-Land-Demand-Goods	Top 12 SILs – 2031 Inter-peak forecast LGV/OGV demand to each SIL
Industrial-Land-census-TTW-combined	Top 12 SILs – 2031 Inter-peak forecast car demand to each SIL
Industrial-Land-Connectivity-Road-London	Relative connectivity to London's forecast jobs and population in 2031, based on modelled forecast journey times by car Change in relative connectivity to jobs and population between 2011 and 2031
Industrial-Land-Connectivity-Road-boroughs	Relative connectivity at the borough level to London's forecast jobs and population in 2031, based on modelled forecast journey times by car
Industrial-Land-Connectivity-PT-London	Relative connectivity to London's forecast jobs and population in 2031, based on modelled forecast journey times by public transport Change in relative connectivity to jobs and population between 2011 and 2031
Industrial-Land-Connectivity-PT-boroughs	Relative connectivity at the borough level to London's forecast jobs and population in 2031, based on modelled forecast journey times by public transport
Industrial-Land-Business Moves	Graphical representation of out-movements from the top 12 SILs, based on Post Office mail forwarding data

1.2.4 This report does not set out to determine the *economic* impact of industrial land release but does explore the operational implications on firms of having to operate from sites which are perhaps located further from existing or potential labour supply / markets / customers / suppliers.

1.3 London Industrial Land Demand Study

1.3.1 In parallel to this study, the London Industrial Land Demand Study (ILDS) was undertaken by a team led by CAG Consultants. This study undertook an assessment of the demand for industrial land in London over a 25 year forecast period (2016-41). A key part of this was the analysis of forecast supply and demand scenarios for the further release of industrial land in the context of recent and future trends.

1.3.2 As these scenarios provide alternative views of the future pathway for the further release of industrial land for housing development, this study provides supporting evidence and commentary around the potential implications for transport in London, were any of these scenarios / pathways to be adopted.

1.4 Approach

1.4.1 The approach taken in this study has been a combination of desk-based research, analytical work and engagement with industry in London as set out below:

- Desk based research: the study has: (i) considered how policy has dealt with the issue of planning for industrial land in major urban centres including in an international context; (ii) reviewed recent UK trends in the key logistics sector; and (iii) reviewed recent literature regarding the location decisions making process undertaken by industrial operators and the spatial models typically adopted to plan for industrial land – this has also considered case studies in the context of industrial land release and the implications for occupiers of these sites;
- Analytical Work: the work has focused on BRES data, Census data, Post Office redirections data and data extracted from London's transport modelling suite to analyse: (i) the nature of occupiers of industrial land; (ii) the demands these operations place on the transport network; (iii) what happens when occupiers move from industrial sites; and (iv) patterns of connectivity across London both now and in the future; and
- Industry Engagement: a focussed programme of engagement with key stakeholders in the industrial and logistics sector has been used to determine the main behavioural characteristics of these operators and how they view the future.

1.5 Structure of Report

1.5.1 The above approach has been used to develop an overarching narrative which shapes the report as follows:

- Chapter 2: what are the main issues affecting industrial / logistics sectors in London from an operational and locational perspective?
- Chapter 3: how much land may be released and where?
- Chapter 4: What sort of activity is taking place at these site?
- Chapter 5: What determines 'transport intensity'?
- Chapter 6: Empirical evidence – what sort of demand for transport is generated from industrial land?
- Chapter 7: What happens to activity when industrial land is released?
- Chapter 8: Where should industrial activity be sited in future?
- Chapter 9: Provides a commentary on each ILDS scenario from the perspective of potential transport impacts and develops study conclusions; and
- Chapter 10: Directions for Future Research.

2 Logistics & Industrial Location

2.1 Introduction

2.1.1 As the logistics sector is almost wholly concerned with the movement of products and goods, and is therefore responsible for high volumes of traffic on the road network, it is a key sector which would be likely to be impacted by changes in industrial land allocation. Given the importance of this sector and its potential to place an evolving demand on transport in future with changes in technology and consumer behaviours, a brief overview of the main trends affecting the sector is provided here.

2.1.2 In addition, as the study is concerned with the potential relocation of economic activity and the implications of this, a brief review of the factors which influence location decision making and the spatial 'models' adopted to organise industrial land is also provided. An international perspective is also included in Appendix A.

2.2 Logistics Trends

Why is freight and logistics important?

2.2.1 At some point all of the goods and services we need on a daily basis are part of a supply chain and can be considered as freight. It's how food and drink reaches shops, pubs and restaurants. It's the bit in between when you click to buy something online and it gets delivered to your home or work or you collect it from a delivery point. It's how concrete, bricks and blocks arrive at construction sites to build the homes we live in and it is how waste is collected and recycled. Freight involves every form of transport from ships, boats, barges and cranes to planes, trains, lorries, vans, cars, motorcycles, bicycles and people.

2.2.2 It's often thought of as something that just happens in the background and it is often only the negative aspects that are noticed, especially in urban areas – large vehicles, noise, emissions and conflict with other road users. However, it supports everything we do and the success of London is dependent on the efficient movement of goods and services as well as people. The London economy relies on freight to construct, supply and service the Greater London area and beyond, and we need to do all of this in the most sustainable and environmentally friendly way possible, which provides a major challenge.

What factors are influencing supply chains?

2.2.3 A range of factors are influencing supply chains, in particular those associated with urban logistics, and driving the trends that have been seen over the past 10 years across the industry including:

- **Rising demand:** increasing population and quality of life;
- **Changing customer demands:** pushing service levels up – next day delivery, same day delivery, one-hour delivery, and returns;
- **Changes in point of delivery:** home, work, click and collect, local collection points, locker banks;
- **Changing technology:** fuel / traction, telematics, real-time data, new modes of delivery;
- **Industry changes:** e-commerce, omni-channel retailing, near-sourcing, port-centric logistics, order consolidation, delivery consolidation, last mile logistics, returns and reverse logistics, 24hr delivery, sub-contracting – third party logistics (3PL), 4PL, 5PL, owner drivers, warehouse automation; and

- **Infrastructure changes:** reallocation of road and kerb space, pressure on train paths, rail heads / terminals and wharves / docks, loss of industrial land.

2.2.4 The dominant mode for deliveries and servicing is still road and will continue to be so for the foreseeable future – some 90% of goods and services in London is carried by road. Rail is predominantly used for bulk goods (aggregates, waste etc) and non-time dependent commodities, although the industry is adapting to be more flexible in an attempt to be more competitive. Water freight also plays an important role, generally for bulk and non-time dependant goods. An excellent, but unique example is the Thames Tideway Tunnel super sewer project that will move the vast majority of excavated and construction materials by barge on the River Thames.

2.2.5 Online purchasing and delivery markets are growing with the greater use of tablet and mobile devices and consumers developing round-the clock purchasing habits. Competition within the retail, and subsequently, the logistics sector is in turn driving carriers to continuously review their proposition and provide more delivery options and higher service levels to customers. This has resulted in the rise of next day, same day and hourly delivery windows.

2.2.6 The scale of influence of the different factors listed above varies from sector to sector i.e. business to business (b2b), business to customer (b2c), couriers, manufacturing, construction etc. However, all sectors have been influenced in one way or another by one or more of the factors and the pace of change has never been higher with the influence of technology. One of the biggest consequences has been fragmentation of the supply chain, which has ultimately led to the large growth in vans that has been witnessed on our roads. However, it should also be borne in mind that a significant proportion of this is attributable to the servicing activities rather than deliveries.

What factors will influence supply chains in the future?

2.2.7 The range of factors that could influence supply chains and urban logistics in the future are numerous, wide ranging and still uncertain. The list below should be considered as a broad summary of factors that may come to fruition and includes, but is not limited to:

- **E-commerce:** increasing demand, greater breadth of products and commodities, showrooms not shops;
- **Connectivity and communication:** internet of things, sharing economy, smart cities;
- **Mobility as a Service (MaaS):** changing perception of travel and transport in general;
- **Open data and co-operative systems:** open source data, data sharing - collaboration between companies driving efficiency;
- **Traction, fuel, emissions:** alternative fuels – compressed natural gas, hydrogen. electric vehicles (EVs) – battery technology, range improvements, quiet vehicles, zero emissions;
- **Connected and autonomous vehicles:** lorry platooning on strategic roads, connected vehicles and infrastructure, autonomous delivery vehicles;
- **Alternative delivery modes/types:** drones and bots, peer to peer delivery, e-bike logistics, 24hr delivery as the norm;
- **Consolidation, last mile:** multi-user shared consolidation facilities, micro-urban consolidation, delivery point consolidation, more last mile operations;
- **Infrastructure:** mixing land uses – layered buildings, multi-storey warehouses, dynamic shared use loading bays;
- **Warehouse automation:** reducing manufacturing and fulfilment costs, increasing fulfilment capacity and intensifying operations around the clock;
- **3D printing:** at warehouse, store, home, work, construction site - eliminating part of the supply chain; and

- **Policy and regulation:** road charging, ultra-low emission zones (ULEZ), Direct Vision Standard, autonomous vehicles only in urban areas.

2.2.8 In short there are a wealth of potential factors that will likely influence supply chains and urban logistics in the future. The scale of influence and what this means for the industry will be borne out in time. However, a few key factors appear to be almost certain – demand for goods and services will increase associated with increased population, urbanisation and more e-commerce. Technology across all areas and the use of data will continue to improve, proliferate and disrupt the industry and open the door to less traditional and more innovative forms and type of delivery. Operating models will change and adapt and there will be a greater need or requirement for collaboration and consolidation. Automation of processes, particularly warehouse automation, will lead to increased productivity and fulfilment in turn leading to intensification of operations and potentially more vehicle movements.

2.2.9 A few perhaps lesser knowns at the moment would be just how easily and quickly autonomous zero emission delivery vehicles will materialise – human input may still be necessary to complete final delivery, how well can different land uses be mixed and be accepted by the public, and what the impact of the 3D printing will be as its potential is realised.

2.2.10 One thing that will remain consistent is that freight and logistics and the movement of goods and services will continue to underpin the economy and support how London functions. This in turn requires businesses to be located in reasonable proximity to and also be accessible to both their suppliers and their customers. Therefore, the provision of suitable industrial land within urban areas to allow this to happen is critical not just for the industry itself, but to everyone who relies on the crucial function it performs.

2.3 Factors in Industrial Location

The Push and Pull of Industrial Relocation

2.3.1 A wide variety of studies have put forward theories to explain why firms choose to base their activities from a particular location; however, re-location theories are comparatively rare and are often viewed as sub-set of location theory itself[2]. In simple terms, a business will relocate if it can no longer remain on its current site or if the attractiveness to a new location is sufficiently great to overcome the costs of moving. As such this review considers both the possible reasons for moving and the features that industrial businesses seek in a new location, i.e. the push and the pull.

Pull Factors

2.3.2 In 2011, the London Borough of Newham commissioned GLA to undertake an Employment Land Review to identify appropriate sites for future development of 'B class' land uses. This study was informed by an extensive Business Survey[3], which asked business owners what they considered to be the most important features of a site for the successful operation of their business. The top 10 answers for industrial business types were found to be:

- Good security features – this was the number one concern for both construction and vehicle repair businesses;
- Cheap rents – this factor was very important to 50% of respondents from manufacturing and warehousing sectors, indicating how sensitive these business types are to changes in operating costs;

[2] P. H. Pellenberg, L. J. van Wissen and J. van Dijk, "Firm Relocation: State of the Art and Research Prospects," Urban and Regional Studies Institute, University of Groningen, Groningen, 2002

[3] GVA Grimley, "Employment Land Review, Business Survey Results," London, 2010

- On-site parking availability – parking provision was 'important' or 'very important' to 43% of industrial respondents, especially so to manufacturing and vehicle repair businesses;
- Good local site access;
- HGV access – perhaps unsurprisingly of primary importance to wholesale and distribution businesses;
- Two factors scored equally: Located close to customers / suppliers and having storage space;
- Good transport links – primary concern for transport and communications businesses;
- Management and maintenance of premises; and
- Fast access to the motorway – although important, it is interesting that access to the motorway ranks below proximity to consumers and access to the local area, suggesting that access to local London markets is of greater importance to the majority of businesses surveyed.

2.3.3 Internationally, China has also seen significant conversion of industrial land within cities to housing, and the movement of firms to large industrial parks on the edges of the city. Ying cites the example of Dalian where 4.1 million square metres of land has been cleared to make way for housing and business land uses[4]. She notes the positive effects of relocation, but provides little comment on the downsides of this change. Those benefits being proceeds from sale of land as a more lucrative land use; greater space to expand the business; economies of agglomeration and also environmental impacts (such as reduced noise, smells, air pollution etc. affecting city residents).

Push Factors

2.3.4 This review has identified many examples of businesses being pushed from their current premises, but few of industrial businesses considering that conditions were better for them further out of the city. This section explains the mechanics behind this process in the current market.

2.3.5 Across London, there is a shortage of space and high demand for residential property, particularly in locations where there is high accessibility and close proximity to central London. At the same time, it is widely accepted that manufacturing in the UK is generally in decline and demand for large manufacturing sites has similarly declined. However, there is disagreement on the severity of this decline.[5] Given the high value of residential land in London and apparently bleak future of industry in the capital, landowners often pursue opportunities to convert industrial land to housing. In her paper *The end of Industry in London?*, Jenny Jones explains '*Valuation Office Agency figures show that in 2011 industrial land owners could double their money on the land value alone if they successfully converted it to a residential use'*. This encourages landowners to offer short term or insecure lease arrangements to industrial tenants, such that if an opportunity arises for residential redevelopment, they are in a position to capitalise upon it. Just Space highlight examples of this process occurring on Camley Street and Charlton Riverside in their 2015 *London for All!* Handbook[6].

2.3.6 As redevelopment progresses within an area and industrial space is lost, conditions typically become more challenging for those affected. Raco and Tunney surveyed businesses whose premises were subject to Compulsory Purchase Order to make way for the Olympic Park in

[4] L. Ying, "Effects of the Relocation of Industrial Enterprise on Traffic Demand and Land Use," in Information and Business Intelligence, International Conference, IBI 2011, Proceedings Part II, Chongqing

[5] J. Ferm and E. Jones, "London's industrial land: Cause for concern?, Working Paper," Bartlett School of Planning, University College London, London, 2015

[6] Just Space Economy and Planning Group, London for All!, London: Belmont Press, 2015

Stratford (72% of which were industrial businesses)[7], and found that:

- It was challenging for businesses to find alternative premises within the area, as regeneration reduced the pool of suitable sites and increased land values, which in turn caused rents to increase. This meant that many were forced to leave the area in which they previously operated;
- Furthermore, tenants had difficulty in finding sites elsewhere in London with a similar ratio of cost to proximity to central London. Raco and Tunney found that 55% were moving to places significantly more expensive;
- Many small to medium firms had a local customer base which was lost when they had to relocate outside of their area;
- Also, businesses are interdependent and as businesses on the Olympic Park site began to move away, those remaining also lost some of their own customers; and
- Finally, businesses had located in the area because it provided access to a skilled workforce, many of whom could not commute to the new site. Raco and Tunney highlighted that workers at industrial sites are commonly low to middle-income earners who could not afford high commuting costs at their current wage, leaving business owners either to incentivise their existing staff or find new.

Case Studies

2.3.7 *London for all!* provides a case study on the **Camley Street** industrial estate which sits on the edge of central London and is proposed for redevelopment. The estate covers approximately two hectares and supports around 20 businesses and over 500 jobs. The London Borough of Camden owns the freehold for the Cedar Way portion of the estate and is also the direct landlord. In recent years, Camden has chosen to offer leases on empty units on a short-term basis with no security of tenure. This introduced uncertainty for tenants and dissuades capital investment.

2.3.8 Just Space notes that Camley Street adjoins Central London where displacement pressures are strongest, yet the site has no protection as '*strategic'* or other employment space either in the London Plan or Camden's plan, although a Supplementary Planning Document (SPD) is now being prepared. The site is very close to the Regent's Canal, where upmarket housing development has been expanding at pace, predominantly replacing industrial land.

2.3.9 In 2013, the industrial estate tenants and local residents formed a Neighbourhood Forum with an aim to influence planning decisions concerning the area. The forum considered that they could not stop redevelopment through the planning system alone however, and will instead put forward their own Neighbourhood Plan, which will include an ambitious new model with a Community Land Trust (CLT) at its core. The CLT will seek to purchase the land from the council and lead their own re-development in line with the council's housing targets, while retaining the existing industrial businesses within the scheme.

2.3.10 *London for all!* also highlights the conflicting views over the future of the **Charlton Riverside**, which is being proposed for mixed use redevelopment on the basis that the estate is underutilised.

2.3.11 Charlton Riverside is a protected industrial estate on the River Thames, which falls within a defined Opportunity Area and is the subject of a masterplan for redevelopment produced by the Royal Borough of Greenwich. As has been seen elsewhere in London, the landlord has begun offering short-term insecure leases on some industrial units and, other sites have remained vacant and premises become dilapidated. This supported an argument that the estate is under-used and that the area should be re-planned. However, it is unclear whether

[7] M. Raco and E. Tunney, "Visibilities and Invisibilities in Urban Development: Small Business Communities and the London Olympics 2012," vol. XX, 2010

there was no demand for these premises or whether landowners have elected not to replace tenants with an eventual aim of facilitating more lucrative residential development.

2.3.12 Just Space mobilised a group of University College London students to gather evidence on the state of business activity within the area and survey local attitudes towards redevelopment. This work has supported local forums in contesting proposals set out under the Greenwich Core Strategy and challenged attitudes towards the value of the industrial estate.

2.3.13 Murphy Limited operated a civil, electrical and utility service business from a depot located within 200 metres of **Tottenham Hale** rail, tube and bus interchanges. The site employed 350-400 people and was the head office for a workforce of over 1,000. Tottenham Hale is identified as a Strategic Industrial Location and also falls within the Upper Lea Valley Opportunity Area. Additionally, in 2010 the draft Core Strategy Proposed Submission earmarked Ashley Road, and the area around Tottenham Hale railway station for mixed use regeneration. In response, Murphy Limited commissioned King Sturge LLP to submit a representation to London Borough of Haringey on their behalf[8]. This letter explained that Murphy Limited did not wish to move from their present site which they felt was ideally located for their business purposes and questioned whether it would be possible to find an alternative location which could offered the same accessibility to public transport and central London. Murphy Limited also highlight that they are concerned that, even if their own site was preserved, then historic function of the SIL would be undermined by the progressive development brought about in the Opportunity Area. The concern being that future inhabitants of redeveloped areas may lobby complaints against remaining industrial operators on account of noise and 24-hour use, threatening the business's ability to function as it did at the time.

2.3.14 Additionally, they point out that the business will be adversely affected by the high costs associated with relocation, loss of profits due to business interruption and other financial costs that are 'a direct and natural consequence' of moving from their current site. In short, if an entirely equivalent site were found at the same rental cost, then the relocation for redevelopment would still adversely affect the business.

2.3.15 However, Murphy Ltd went into administration in 2013 and the depot in Tottenham Hale is now permanently closed. It is unclear whether the depot has had other tenants since, but it is presently the subject of an outline planning application. Application HGY/2016/4165 proposes the demolition of the existing buildings on the Ashley House an adjacent Cannon Factory sites and replacement with new structures hosting 3,600sqm of commercial floor space (GEA) (Class A1/A3/B1/D1), up to 265 residential units (Class C3), new public realm, landscaped amenity space, car and cycle parking and all associated works.

2.3.16 In **summary** moving any business involves considerable upheaval, disruption and cost to the firm and as such will be resisted unless a substantially better site can be found. This review indicates that in the majority of cases, the de-industrialisation of London has not been driven by attraction to better premises outside of the central area, but instead by industrial land being converted into more lucrative alternative uses. A number of sources therefore indicate that policy has not proved sufficiently able to prevent speculation on industrial sites' suitability for conversion to higher value land uses, such as housing. In response, landowners often offer short-term leases and do not guarantee tenure. This is obviously a less attractive prospect for businesses, discouraging new firms moving to the estate and all firms from investing in it. With reduced occupancy and lesser investment, the case for redevelopment strengthens.

2.3.17 A diminishing pool of suitable industrial properties and ongoing redevelopment causes rents to rise and forces businesses either out of the area or to incur higher overheads. Given the local and often inter-related nature of small businesses, movement out of the area to a new site

[8] King Sturge, "King Sturge LLP for Murphy Ltd," 21 June 2010. [Online]. Available: http://www.haringey.gov.uk/sites/haringeygovuk/files/king_sturge_llp_for_murphy_ltd.pdf. [Accessed 08 February 2017].

creates challenges in retaining existing customers and employees.

2.3.18 The cases where a tenant is pushed from a site to accommodate new development are considered to be more publicly documented, but that is not to say that some other businesses have not felt it advantageous to move to a new site of their own volition. London Borough of Newham surveyed businesses in the borough to identify the most important features of a business premises, which will be sought by those looking for a new site. Site security ranked most highly overall among industrial firms, followed by cheap rents. Cheap rents were found to be very important to 63% of manufacturing businesses, which suggests how sensitive these businesses are likely to be to increased operational costs. Also, five of the top 10 factors related to site access, with local access and proximity to customers/suppliers ranking more highly than motorway access. This underlines the importance of access to local markets and may explain some of the reluctance to move from central London sites.

2.4 Overview of Spatial Models

2.4.1 The following sections provide an overview of the advantages and disadvantages of three possible different spatial models in relation to industrial land.

1 - Consolidation / clustering in large industrial estates (assumed within London)

Advantages

- Better access to central London customers;
- Businesses are often inter-dependent, and on industrial estates, suppliers and business clients may be located in the same place, reducing delivery distances;
- Increased pool of skilled workers (industrial workers often low- to middle-earners, meaning that they are unlikely to be able to commute long distances), given better public transport links;
- No need for workers to relocate to access employment;
- Less likely to receive complaints from nearby residents as located in the 'correct' place;
- Large industrial sites will bring down the value of surrounding property providing affordable housing, central to the city;
- Agglomeration economies;
- More likely to be located near alternative transport connection such as canals or railways lines, which can be used to reduce the volume of road traffic; and
- A defined large industrial estate is likely to be easier to manage than a series of small sites, which should lead to more effective maintenance and security.

Disadvantages

- Competing with other land uses for space, so rents are likely to be higher and less storage space. However, some industrial uses are unlikely to be able to do so and will be pushed out regardless;
- Often unused at night, but within proximity of residential properties, potentially attracting anti-social behaviour;
- Often unsightly;
- Consolidation of deliveries less viable option, as already within London, therefore likely to involve greater numbers of HGV trips to central London;

- Embedded preference within planning policy to regenerate brownfield sites, particularly within central and highly access areas. Unlikely to be able to stave off speculation for change of use, unless explicitly protected;
- Concentration of industrial uses in central area more likely to create or exacerbate existing air quality issues; and
- Parking availability likely to be constrained.

2 - Consolidation / clustering on the edge of London

Advantages

- Greater land supply and less competition for space from other land uses, resulting in lower rents and greater potential to accommodate growth;
- Greater potential for consolidation of deliveries, reducing HGV numbers in central London;
- Faster access to the motorway and airports;
- Better HGV access;
- Higher on-site parking availability;
- Agglomeration economies;
- Lesser impact on surrounding property values;
- Less likely to be a 'bad neighbour', on basis of 24-hour operation, noise or air quality impacts; and
- Although often unsightly, concentrations of industrial use can be softened by planting where less pressure on space.

Disadvantages

- Located further from customers, meaning that delivery distances will be longer;
- Likely to be further from employee residences, making recruitment of skilled staff more challenging and increasing trip distances;
- Less likely to have effective public transport links, encouraging car dependency and more car trips;
- Unlikely to be located in a high quality area – the quality of the area does not matter for many industrial businesses, but equally there are other for whom this is important e.g. vehicle repair garages;
- Industrial estates typically need to be constructed on a speculative basis, without guarantee of the proportion of units which will be filled; and
- There is a trend for increased demand for small industrial units and lesser demand for large scale units. Small industrial operators are less likely to be able to absorb higher transportation costs and so should ideally be located in closer proximity to customers.

3 - Many small industrial estates spread throughout the city

Advantages

- Easier for businesses to locate themselves in the most appropriate location for their customers – this will reduce delivery distances;
- Likely to be closer to public transport connections, making it easier to recruit skilled staff and reducing the proportion of employees travelling to work by car;

- Industrial units can be embedded within the city itself. This is likely to benefit site security and reduce anti-social behaviour where sites are overlooked or pass-by traffic continues outside standard working hours;
- Small estates should have a lesser impact on surrounding property values; and
- Better able to satisfy trend for small industrial units.

Disadvantages

- No economies of agglomeration, leading to higher production costs;
- Not possible to distribute goods produced via freight consolidation;
- Industrial uses will again be competing for space with other land uses, which will likely increase rents. Again, many industrial businesses will not be able to compete with potential gains to be made from residential development and will be pushed out anyway;
- Smaller groups of businesses are less likely to be heard by decision makers, as was found during the relocation of businesses from Olympic Park;
- Parking availability will be constrained, and industrial unit parking is more likely to spill over onto surrounding streets; and
- A small number of industrial properties in an otherwise residential area are more likely to be viewed as a 'bad neighbour' and receive complaints. Industrial functions may be restricted by the need minimise disruption to surrounding properties.

2.4.2 The current model is a mix of all three of these. (1) and (2) supported by SIL and LSIS, and (3) is the myriad of smaller industrial sites. Also it should be noted that these spatial models are not mutually exclusive, and indeed are potentially complementary.

Overview

2.4.3 Across the UK, councils are struggling to meet government targets for housebuilding and also comply with guidance which promotes development in highly accessible areas. This places industrial firms in direct competition for space with more lucrative land uses, and unsurprisingly the higher value land uses win out in the long run. Without explicit protections and greater resistance from planning authorities, it seems inevitable that industrial premises will be lost in densely populated areas.

2.4.4 Once inner city industrial areas are lost, they will be very nearly impossible to reintroduce without application of Compulsory Purchase Order powers. As such, local authorities must find alternative sites, and these will inevitably be on the edges of the city where land is more plentiful and competition reduced. However, this relocation will cost businesses in terms of access to customers and staff, and haulage costs. Research indicates that many industrial sectors are highly sensitive to changes in costs, and consideration must be given to the ability of these business types to continue to compete effectively.

3 Where, and How Much Land May be Released?

3.1 Introduction

3.1.1 As noted in Chapter 1, the Industrial Land Demand Study (ILDS) analysed the future demand for industrial land in the context of recent and future trends and outlines a series of scenarios for the further release of industrial land in future.

3.2 ILDS Scenarios

3.2.1 The ILDS notes that the recent rate of industrial land release has been 106 hectares per annum between 2010 and 2015, well in excess of the previous 'benchmark' figure of 37 hectares per annum. It then sets out a number of possible scenarios surrounding the future release of industrial land in London. These are summarised below:

Baseline Scenario: the different components of demand for industrial land and vacant industrial land produces a Baseline Release Scenario of 233 ha of industrial land over the London Plan period 2016-41 at an average of **9.3 ha** per annum.

Supply Trend Scenario: if recent trends in industrial land release were projected forward, applying past rates of industrial land loss over the period 2006-15 to the London Plan period 2016-41 would imply the loss of 1,630 ha of industrial land at an average of **65.2 ha** per annum.

Potential Pipeline Scenario: this scenario factors in all existing commitments and planned proposals to release industrial land through Opportunity Area Planning Frameworks and other spatial planning initiatives. This would imply the loss of 838 ha of industrial land at an average of **33.5 ha** per annum.

Potential Pipeline plus Infrastructure Scenario: this scenario adds to the Potential Pipeline Scenario recognising the potential land release associated with strategic infrastructure including Crossrail 2 and Bakerloo Line Extension. This scenario implies a loss of 1,277 ha at an average of **51.1 ha** per annum.

Intensification and Substitution: for this scenario, the potential for increasing the amount of industrial floorspace per hectare in the least densely developed industrial boroughs up to the current London average is considered. It also factors in increasing substitution of logistics activity being serviced from outside of London due to constraints on available land supply. This produces a loss of 778 ha of industrial land at an average of **31.1 ha** per annum. Note that the intensification element of this scenario will not result in the loss of industrial floorpsace but the substitution element will, and this scenario seeks to intensify industrial and warehousing floorspace and activity in order to compensate for, and facilitate the release of other industrial land to alternative uses.

3.2.2 These London wide figures can be disaggregated to the borough and London Property Market Area (PMA) level, of which there are five as follows:

- Central Services;
- Lea Valley;
- Park Royal / Heathrow;
- Thames Gateway; and
- Wandle Valley.

3.2.3 These areas are shown in the figure below together with existing Strategic Industrial Locations (SIL) and Locally Significant Industrial Sites (LSIS). These designations form the bulk of industrial land use locations in London and SILs in particular represent the key, large scale

sites. These sites form the basis of much of the analysis which follows in this report.

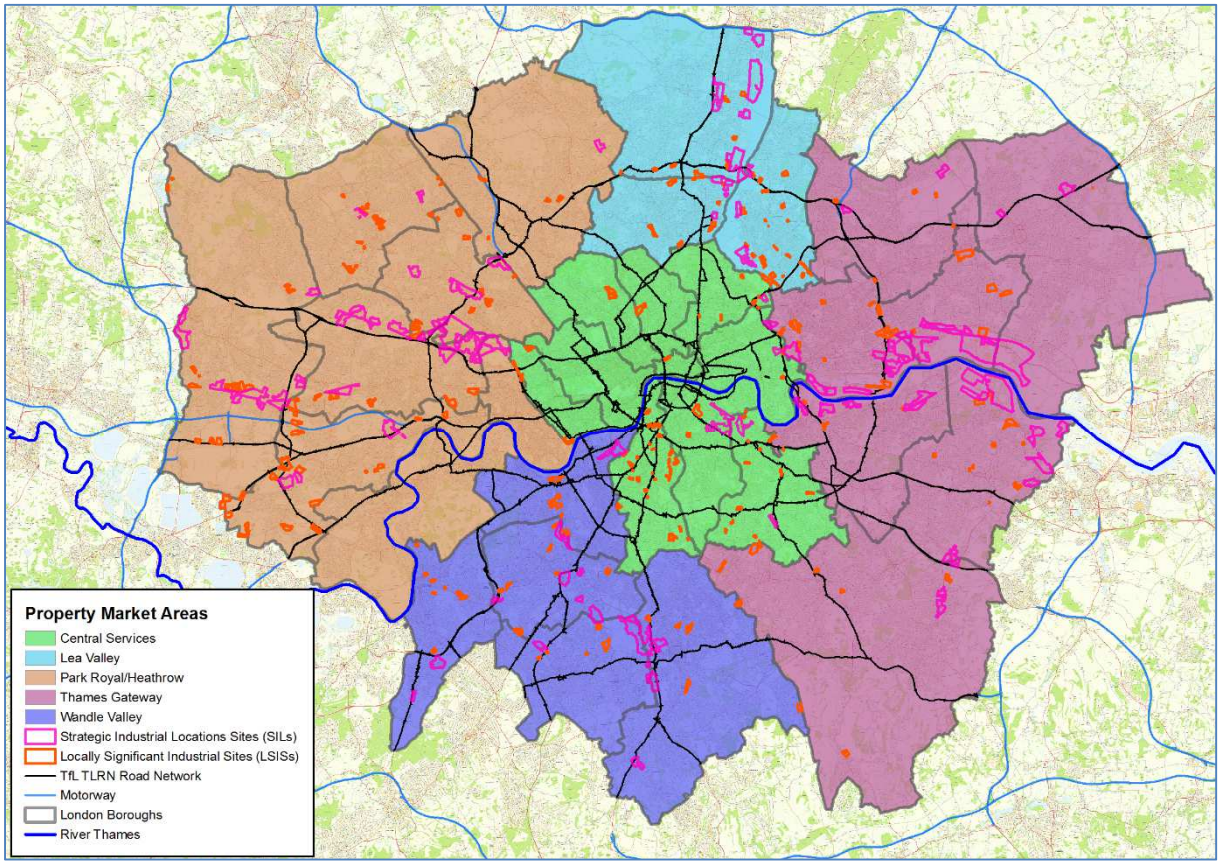


Figure 3.1 London Boroughs, Property Market Areas and SIL / LSIS Locations

3.2.4 The table below shows the five ILDS scenarios by borough, together with the current identified stock of industrial land in each borough.

Table 3.1: ILDS Scenarios by Borough, 2016-41

Borough	*Stock, 2015 (Ha)*	Baseline (Ha)	Supply Trend (Ha)	Potential Pipeline (Ha)	Potential Pipeline and Infrastructure (Ha)	Intensification & Substitution (Ha)
Barking and Dagenham	*517.3*	-8.7	-24.2	-1.0	-111.3	-152.0
Barnet	*102.3*	1.6	-2.3	0.0	-12.3	-5.1
Bexley	*523.1*	-17.1	-39.3	-2.1	-45.9	-122.6
Brent	*426.0*	-13.1	-27.0	-5.1	-38.4	-43.1
Bromley	*135.1*	-4.6	-12.0	-1.2	-1.4	-3.3
Camden	*39.8*	-10.6	-36.0	-11.0	-1.0	-9.2
City of London	*3.4*	-9.9	-60.1	-10.2	0.0	-0.8
Croydon	*163.0*	-21.5	-78.5	-5.5	-1.3	-2.3
Ealing	*511.2*	-39.7	-88.7	-57.0	-54.1	-31.0
Enfield	*462.7*	-0.2	-7.9	-0.1	-159.7	-39.0
Greenwich	*233.0*	41.7	-57.6	-42.4	-52.3	-33.0
Hackney	*55.9*	-31.2	-34.5	-31.2	-10.2	-7.1

Borough	*Stock, 2015 (Ha)*	Baseline (Ha)	Supply Trend (Ha)	Potential Pipeline (Ha)	Potential Pipeline and Infrastructure (Ha)	Intensification & Substitution (Ha)
Hammersmith & Fulham	*139.3*	6.2	-59.3	-26.9	-67.5	-9.3
Haringey	*154.9*	7.3	-29.1	-1.8	-83.8	-19.2
Harrow	*64.5*	43.0	-55.2	-38.4	-20.6	22.0
Havering	*438.3*	35.6	-84.2	-54.1	-21.0	-87.8
Hillingdon	*395.6*	4.7	-61.0	-67.5	-69.8	-5.0
Hounslow	*481.6*	1.2	-25.8	-20.6	-12.8	-49.5
Islington	*34.9*	-26.9	-99.1	-69.8	-8.2	-12.2
Kensington and Chelsea	*18.2*	-31.8	-54.3	-12.8	-1.2	-13.0
Kingston upon Thames	*116.2*	12.0	-17.4	-0.7	-81.0	-2.7
Lambeth	*75.9*	-43.7	-46.5	-111.3	-13.7	-4.4
Lewisham	*107.3*	-12.3	-12.1	-45.9	-10.2	-5.3
Merton	*167.5*	5.3	-13.4	-1.4	-44.2	10.2
Newham	*513.6*	19.8	-49.4	-52.3	-83.5	-102.2
Redbridge	*65.8*	-38.9	-203.4	-21.0	-2.3	-6.9
Richmond upon Thames	*38.4*	-115.7	-186.6	-83.5	-0.7	7.5
Southwark	*144.0*	-0.1	-29.8	-2.3	-53.5	-19.5
Sutton	*333.3*	-6.5	-54.6	-1.3	-17.7	-8.4
Tower Hamlets	*153.8*	-7.2	3.2	-0.6	-58.0	-13.4
Waltham Forest	*198.9*	-2.8	-25.0	-0.8	-70.7	-17.5
Wandsworth	*149.4*	14.9	-3.7	-17.7	-68.9	3.8
Westminster	*12.1*	16.3	-54.8	-40.0	-0.1	3.7
London	***6976.3***	**-233**	**-1,630**	**-837**	**-1,277.3**	**-777.5**
Total per annum		**-9.3**	**-65.2**	**-33.5**	**-51.1**	**-31.1**

3.2.5 These figures for land release are aggregated to the London PMA level in the figures below, both in absolute and percentage terms.

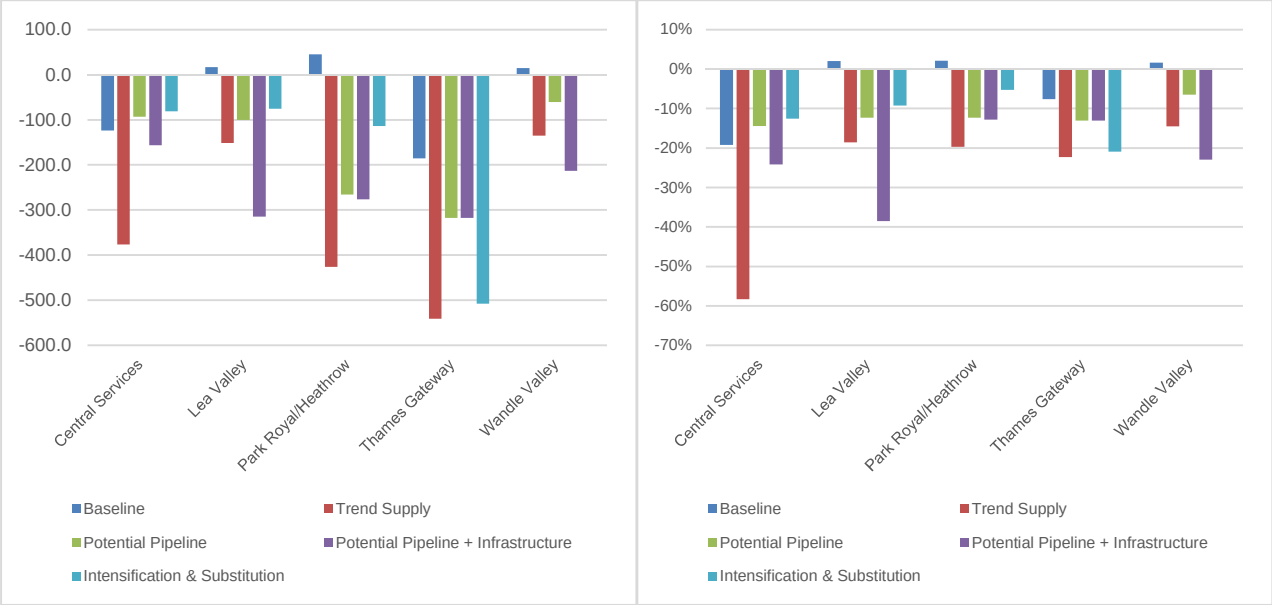


Figure 3.2 ILDS Scenarios by Property Market Area (2016-41), hectares, abs and %)

3.2.6 The following observations can be drawn from, this:

- the Baseline scenario sees further release in the Central Services and Thames Gateway areas only;
- the other scenarios typically see release levels of 10-20% of existing stock, although Wandle Valley sees little release relative to the other areas except in the Potential Pipeline + Infrastructure scenario; and
- in absolute terms, the Thames Gateway typically sees the largest projected releases in all five scenarios, with a particular focus on Barking & Dagenham, Havering and Newham, followed by Park Royal / Heathrow PMA - most of the release in this PMA is associated with Old Oak and parts of Hillingdon. The absolute levels of release are much lower in Lea Valley and Wandle Valley.

3.2.7 These ILDS scenarios therefore set the scene for the scale and scope of potential industrial land release in London under a number of scenarios.

3.2.8 The next chapter goes on to analyse the types of economic activity being undertaken on industrial sites in London at present.

4 What Sort of Activity Takes Place at Industrial Sites?

4.1 Overview and Data Cleaning

4.1.1 The purpose of this analysis is to gain a fuller understanding of the types of economic activity which are taking place on land currently defined as 'Industrial' in London. This will in turn provide a means to comment on the likely impact of any future 'displacement' of these land uses.

4.1.2 Industrial land is classified into three groups (GIS shape files relating to these three designations were provided to the study team by TfL):

- Strategic Industrial Locations (SIL) (63, rationalised to 56 sites);
- Locally Significant Industrial Site (LSIS) (279 sites); and
- Non designated land (referred to as NAL) (circa 25,000 sites).

4.1.3 Business Register and Employment Survey (BRES) data for 2015 were obtained for total employment at Standard Industrial Classification (SIC) Level 3, which disaggregates economic activity into 272 categories. These data were also aggregated to SIC Level 2 (88 categories) and SIC Level 1 (21 categories) for the purposes of this analysis. This BRES data was obtained at the most detailed level of spatial geography available, the Lower Super Output Area (LSOA), of which there are 4,835 in London.

4.1.4 The LSOAs corresponding to the SILs and LSISs were determined using GIS-based methods. For the larger SILs a good match was generally achieved between SIL and LSOA. For the smaller SILs however, the SIL may sit entirely within an LSOA. Where the remainder of the LSOA is residential, it was reasonable to assume that all of the jobs in the LSOA could be attributed to the SIL. However, analysis of the data showed that in some sites the LSOA attributed to the SIL contained educational and retail establishments which are significant generators of employment. Those SILs where there were educational / major retail establishments within their boundaries have been identified and the associated education / retail jobs figures retained. Where the educational / retail establishment was clearly outwith the SIL boundary, these employment figures have been discarded.

4.1.5 It was therefore possible to obtain a reasonable estimate of the level of employment by SIC type (Levels 1, 2 and 3) for each individual SIL and all SILs taken together as a whole.

4.1.6 The LSISs are typically much smaller, and often sit wholly within an LSOA where there may well be other sources of employment. In the analysis, the LSOAs in which at least one LSIS site appears have been aggregated at the borough level to provide an estimate of the breakdown of employment in LSISs by SIC by borough, subject to this caveat. Given the relative sizes of the LSISs and the LSOAs, it is not possible to accurately determine the absolute levels of employment by SIC in each LSIS.

4.1.7 The NAL sites are very small and cannot be meaningfully analysed with LSOA level BRES data.

4.2 Mapping Tool

4.2.1 As part of this study a GIS-based mapping tool was developed which allows SIL and borough level employment by individual SIC (Level 1 and Level 2) to be mapped in a number of formats. Example images are contained in the accompanying PowerPoint and are referred to where appropriate in this chapter.

4.3 Strategic Industrial Locations

4.3.1 A total of 342,800 jobs were identified across the 59 SIL areas. On average each SIL hosts around 6,600 jobs, with the sites ranging widely in size from 500 to 42,000 employees. The largest 12 sites by this measure are:

- Park Royal;
- Purley Way Beddington Lane Industrial Estate / Willow Lane;
- Hayes Industrial Area;
- Uxbridge Industrial / North Uxbridge Industrial;
- Dagenham Dock/ Rainham Employ / Rippleside;
- Alperton Lane Greenford / Northolt Greenford;
- Brentford Transport Avenue / Great West Road;
- Central Leaside Business Area (parts);
- Wembley;
- Brimsdown;
- North Feltham Trading Estate; and
- Morden Road Factory Estate and Prince George's Road.

4.3.2 The first eight of these sites host more than 10,000 employees and these 12 sites account for nearly 60% of all SIL employment by this measure. The following sections consider the composition of the organisations occupying the SILs at SIC Levels 1-3.

Level 1 SIC

4.3.3 Employment levels in the SILs by the highest category of SIC are shown in the figure below.

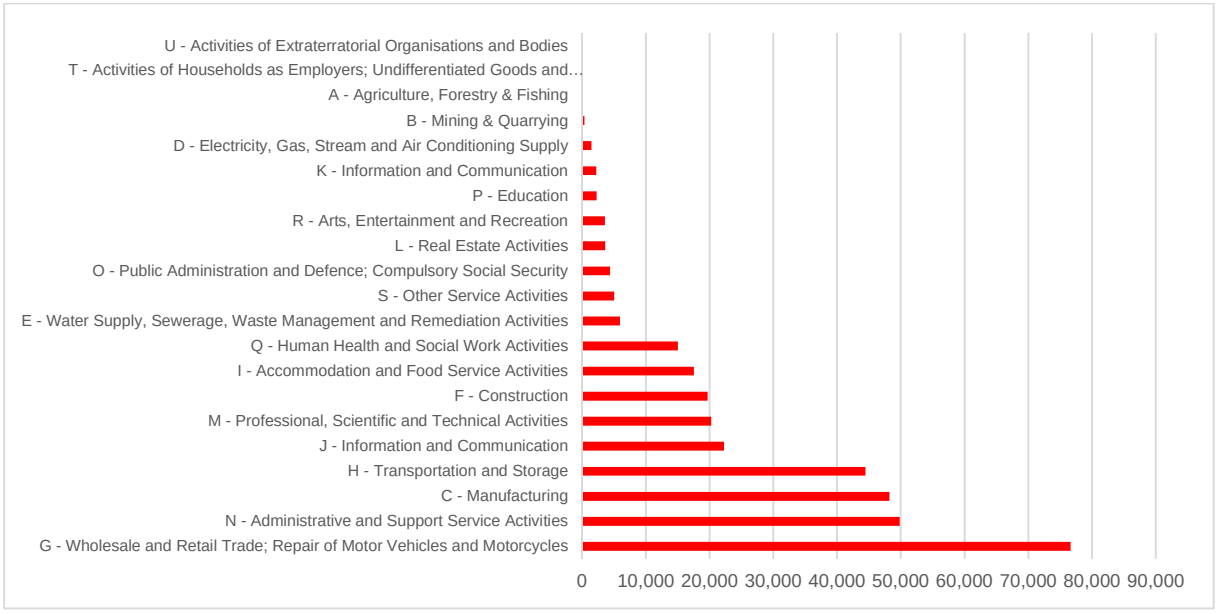


Figure 4.1: SILs, total employment by SIC Level 1

4.3.4 At SIC Level 1, employment is therefore dominated by G - Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles, N - Administrative and Support Service Activities, and C – Manufacturing, with these three sectors accounting for 51% of total employment. In total,

Manufacturing accounts for only around 14% of all jobs in the SILs.

4.3.5 At this level, it could be envisaged that the SICs with a higher likelihood of comprising activities with a high degree of transport intensity (i.e. the physical movement of goods) would be:

- C – Manufacturing;
- F – Construction;
- G – Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles; and
- H - Transportation and Storage.

4.3.6 All four of these classifications do feature strongly above.

Level 2 SIC

4.3.7 The top 20 SIC Level 2 categories for all the SILs taken together are shown in the figure below. The letter in square brackets is the equivalent SIC Level 1 category. These 20 categories (out of 88) account for 75% of all jobs located in SILs.

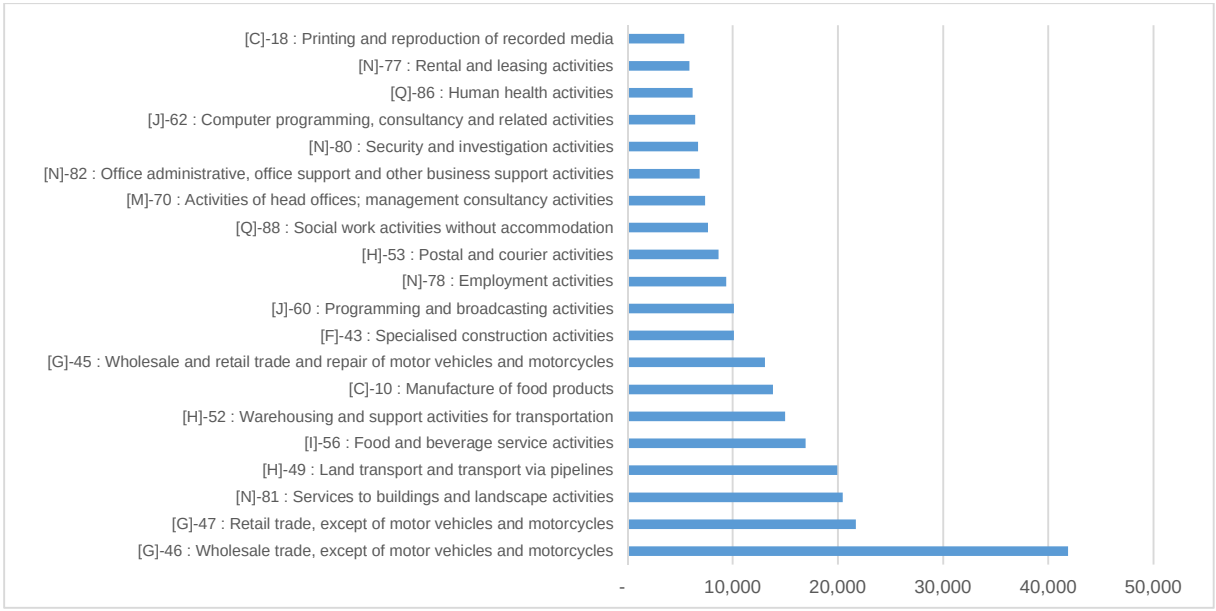


Figure 4.2: SILs, Top 20 total employment by SIC Level 2

4.3.8 At this level, wholesale and retail trade are the largest employment sectors, followed by services to buildings and landscape activities. In terms of manufacturing, manufacture of food products is the largest employer.

4.3.9 Images have been produced for the top 10 SIC Level 2 employment sectors as follows:

- Total employment by all SILs in London; and
- Employment density at LSOA level at LSOA level – included to show the all-London distribution of employment in this sector.

4.3.10 A sample image is shown below for SIC 46 *Wholesale Trade, Except Motor Vehicles and Motorcycles*. Images for the top-10 SIL employment sectors at SIC Level 2 can be found in the accompanying PowerPoint.

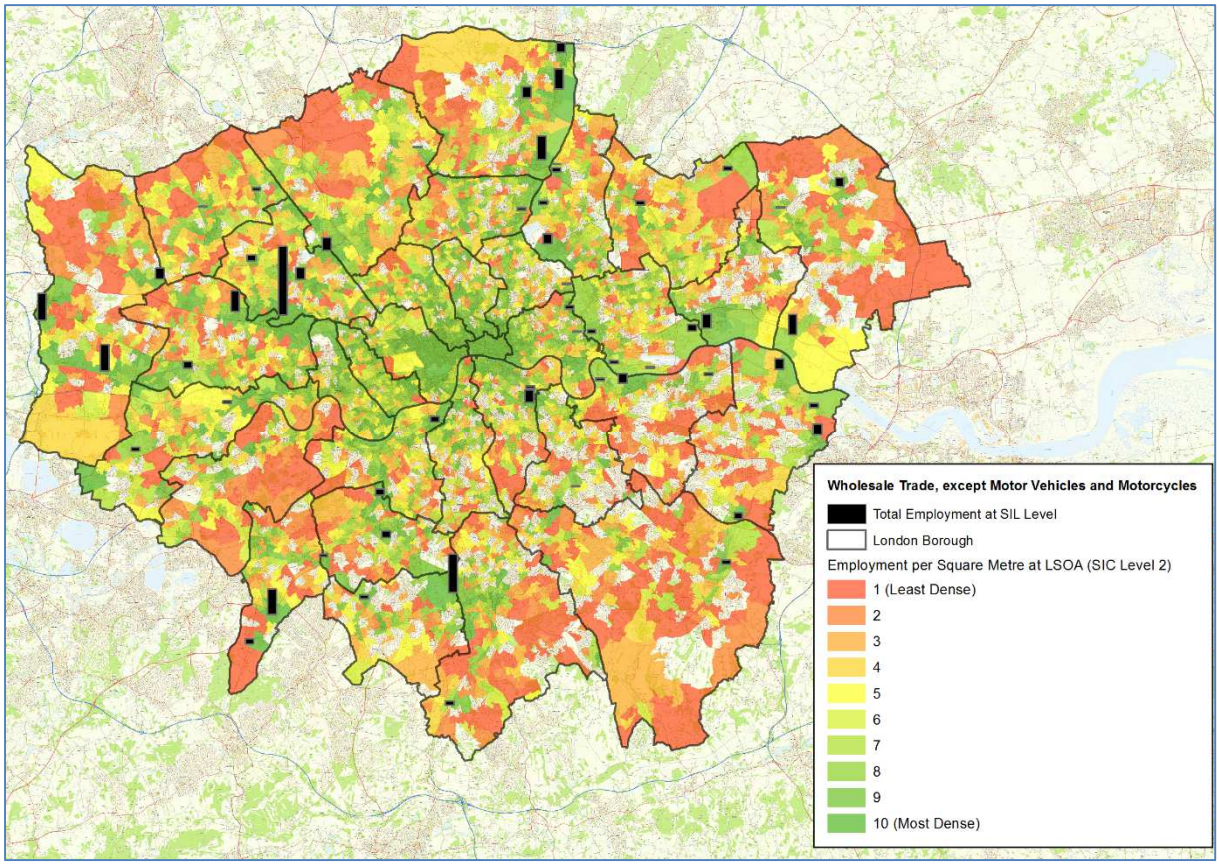


Figure 4.3: Sample SIC Level 2 Image for SILs, Wholesale Trade, Except Motor Vehicles and Motorcycles

4.3.11 This image demonstrates that the main SIL locations with large numbers of jobs in Wholesale trade are located in west London. A 'corridor' of high employment density in this sector can also be seem running broadly west to east across London.

Level 3 SIC

4.3.12 At a higher level of disaggregation, the chart below shows the top 20 SIC Level 3 categories located in the SILs. Although there is a very wide range of employment present on these sites, this top 20 accounts for nearly half of the jobs.

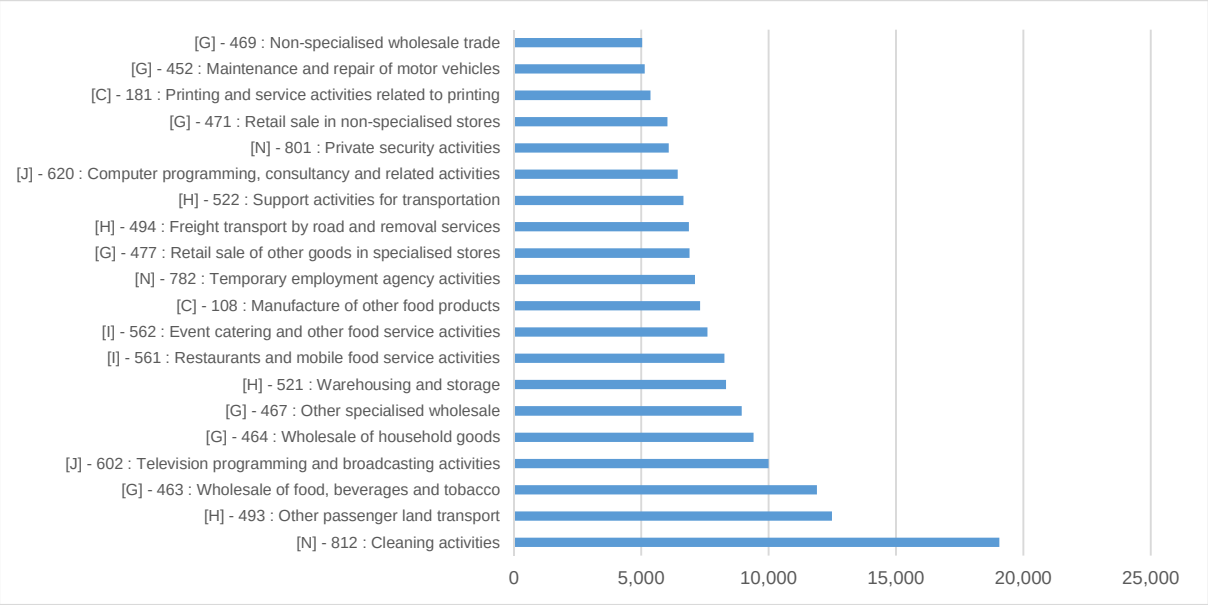


Figure 4.4: SILs, Top 20 total employment by SIC Level 3

4.3.13 At the SIC3 level, 'Cleaning Services', and 'Other Passenger Land Transport' are the two categories with the highest employment levels. SIC 812 includes 'General cleaning of buildings', 'Other building and industrial cleaning activities', 'Window cleaning services' and 'Specialised cleaning services', and this indicates that there are a lot of cleaning companies operating out of industrial locations.

Analysis by SIL

4.3.14 The figure below provides a partial breakdown of employment by individual SIL. For each SIL, the percentage of employment associated with what could be regarded as the main transport intensive SIC categories, i.e. C – Manufacturing, F – Construction, G – Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles, and H - Transportation and Storage is shown.

4.3.15 The purpose of this is to provide an initial illustration of which SILs have the highest proportion of organisations in these sectors, i.e. are most transport intensive. So for example, around 60% of employment in the Wembley SIL is associated with these sectors.

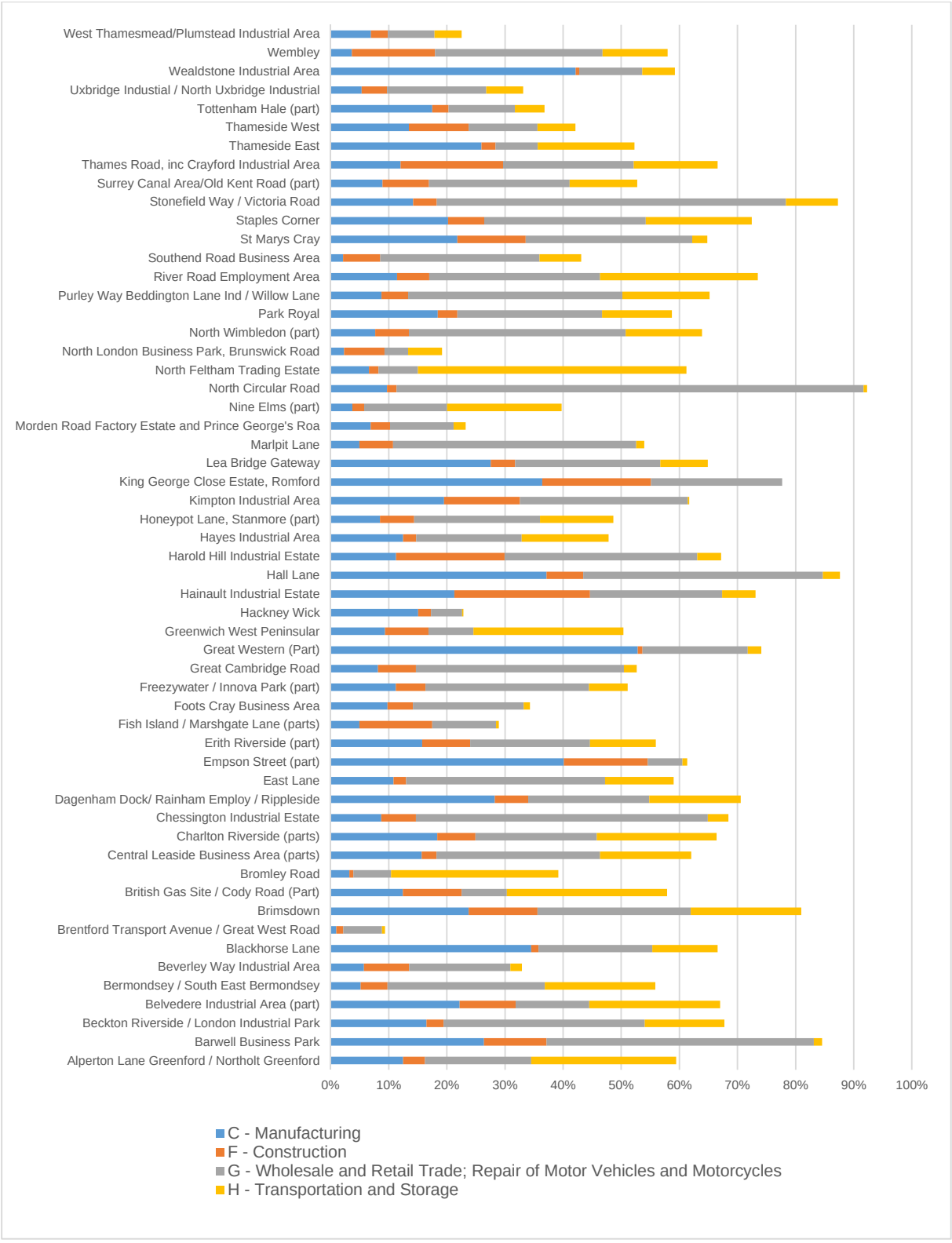


Figure 4.5: SILs 'Transport Intensive' Employment by SIL, SIC Level 1

4.3.16 Finally, the SIL proportions by Level 1 SIC can be compared with the equivalent figures for the rest of London.

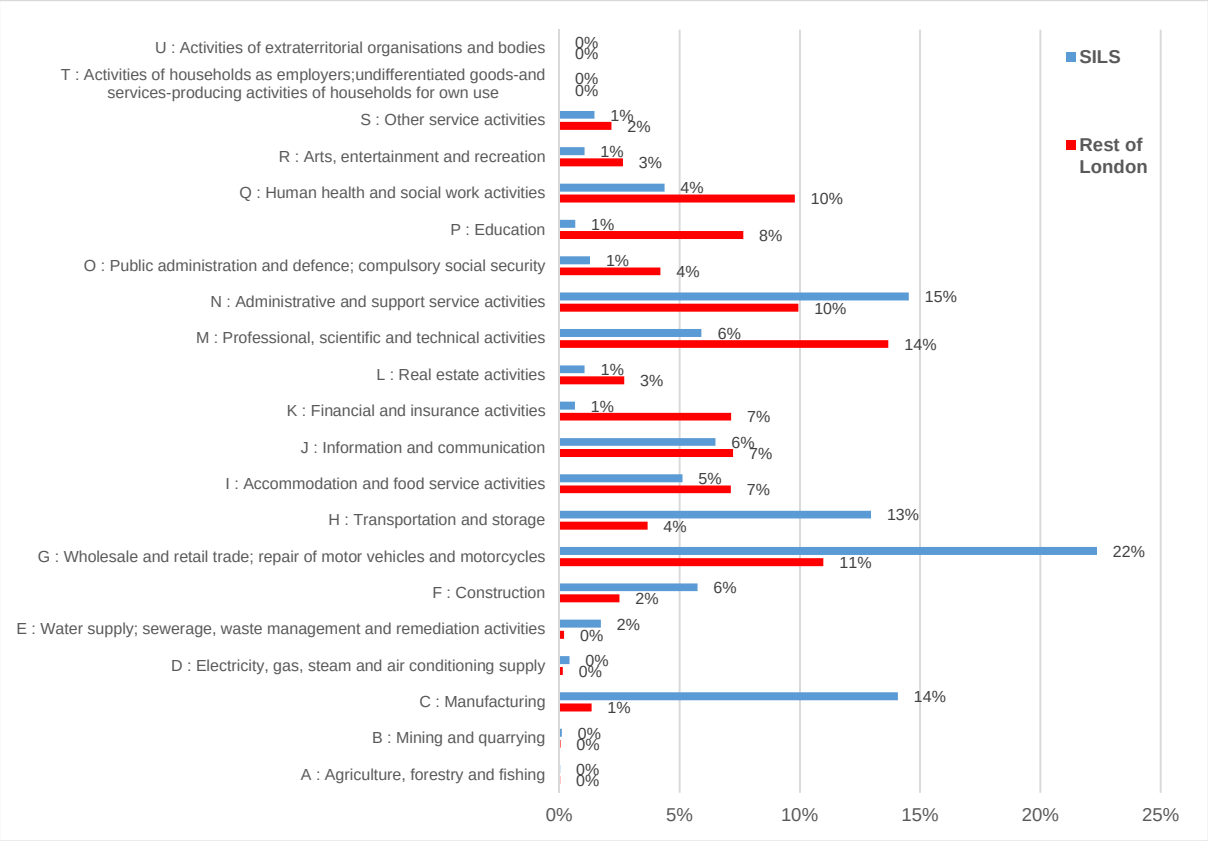


Figure 4.6: Comparison of employment in SILs and rest of London, SIC Level 1

4.3.17 This data confirms that the SILs host a higher proportion of Wholesale & Retail, Manufacturing, Construction and Transportation & Storage, the four SICs likely to generate the movement of physical goods, than locations in the rest of London. This confirms the importance of these locations as hubs for the movement of physical goods. The proportion of Financial & Insurance and Professional / Scientific / Technical activities in SILs is much lower than in the rest of London, again in line with expectation.

4.3.18 Nevertheless, there are a wide range of economic sectors represented in the SILs.

4.4 Locally Significant Industrial Sites

4.4.1 As noted above, the LSOA level BRES data has been used to estimate the breakdown of the types of activity operating from LSISs at the London borough level. Similar to the above figure, the figure below shows the percentage of jobs associated with the four key transport intensive SIC Level 1 categories by borough.

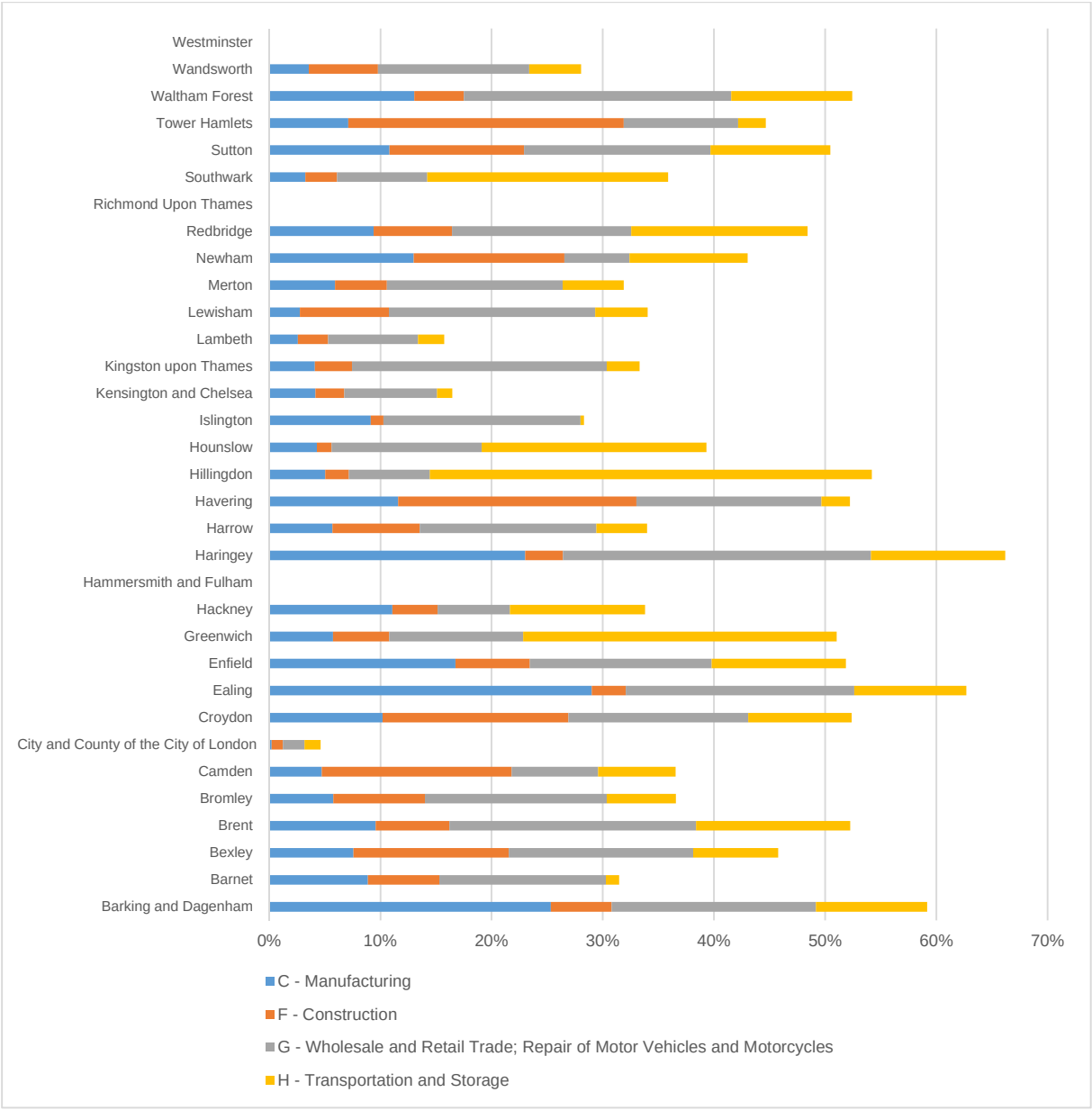


Figure 4.7: 'Transport Intensive' Employment by LSIS by Borough, SIC Level 1

4.4.2 By this measure, the boroughs with the highest proportion of transport intensive industries associated with LSISs are Haringey, Ealing and Barking & Dagenham. Those with low figures are the City of London, Lambeth and Kensington & Chelsea (there are no LSIS sites in Westminster, Richmond or Hammersmith & Fulham).

4.4.3 As noted above, the composition of the LSOA in which each LSIS was sited was taken as representative of the sectoral breakdown of employment in the LSIS. Using this approach, the top 10 Level 2 SIC categories associated with the LSIS sites were:

- 70 - Activities of head offices; management consultancy activities;
- 46 - Wholesale trade, except of motor vehicles and motorcycles;
- 69 - Legal and accounting activities;
- 56 - Food and beverage service activities;

- 52 - Warehousing and support activities for transportation;
- 81 - Services to buildings and landscape activities;
- 86 - Human health activities;
- 78 - Employment activities;
- 49 - Land transport and transport via pipelines; and
- 47 - Retail trade, except of motor vehicles and motorcycles.

4.4.4 Similar to the SILs images have been produced for each of these top 10 SIC Level 2 categories showing:

- total borough level employment in LSIS sites only, in London by borough; and
- employment density at LSOA level – included to show the all-London distribution of employment in this sector.

4.4.5 A sample graphic for the above is shown below for SIC 70 (Land Transport and Transport via Pipelines). Images for all 10 of the above can be found in the accompanying PowerPoint.

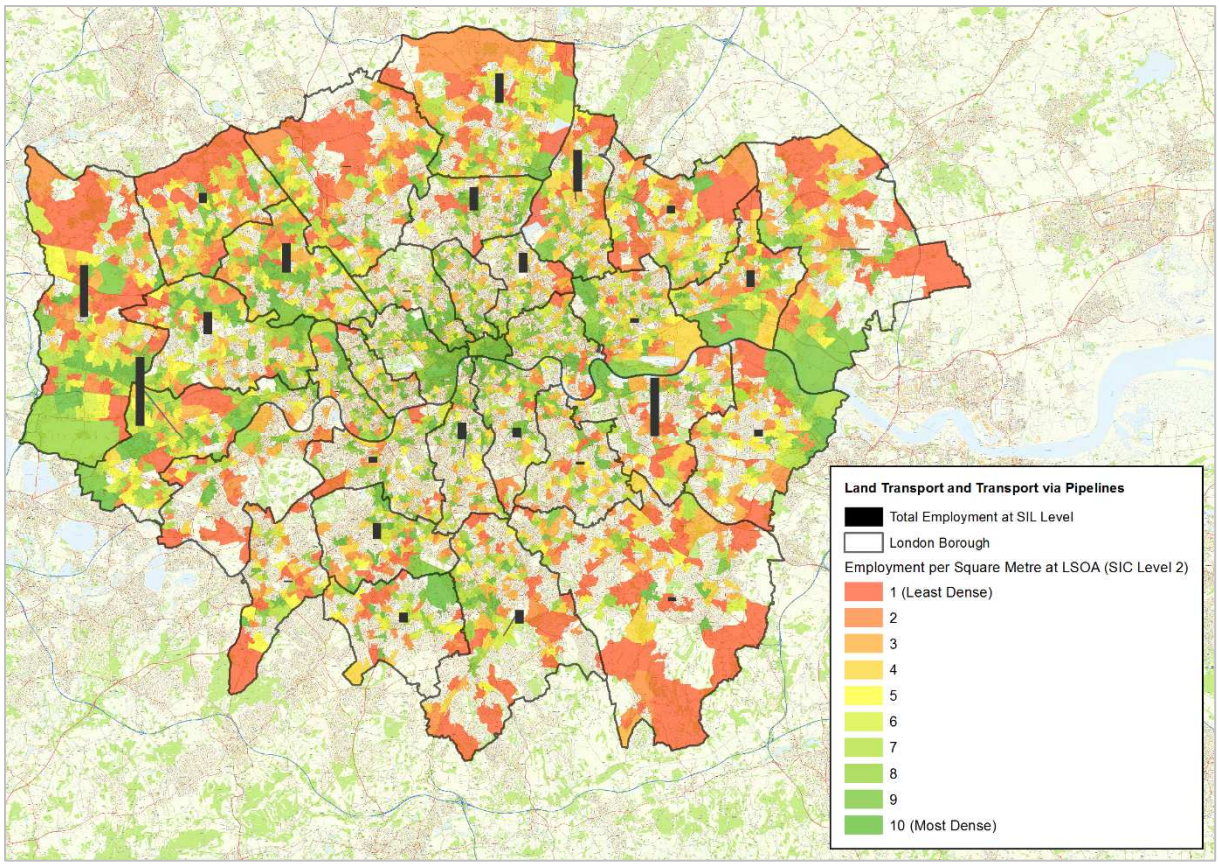


Figure 4.8: Sample SIC Level 2 Image for LSISs, Land Transport and Transport via Pipelines

4.4.6 There is a much more dispersed pattern of LSIS employment in Land Transport, with some boroughs hosting very little of this employment.

4.5 Combined Data

4.5.1 For each of the four most transport intensive SIC Level 1 categories, that is Construction, Manufacturing, Transportation & Storage, and Wholesale & Retail, the SIL and LSIS data has

been combined to provide a clear picture of how these activities are distributed across London. A sample for Manufacturing is shown below and a full set of images can be found in the accompanying PowerPoint.

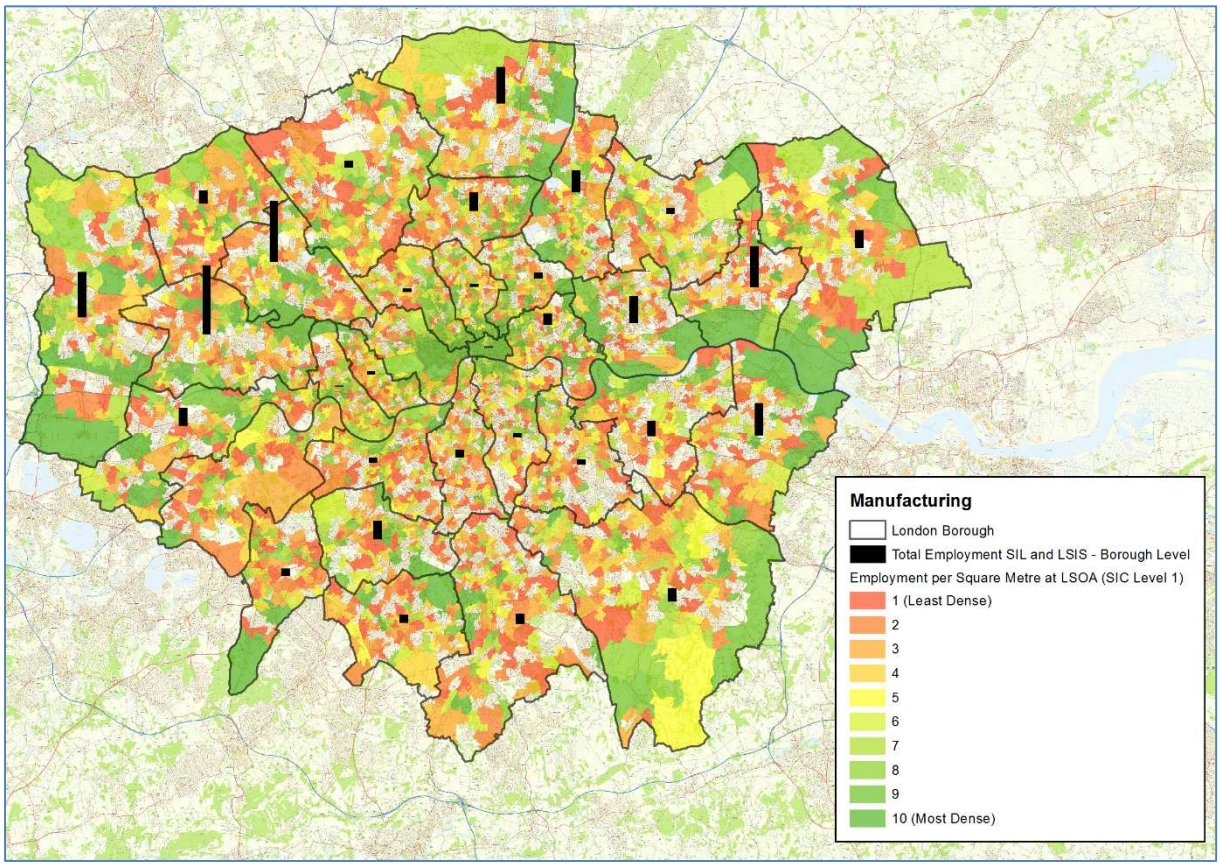


Figure 4.9: Distribution of SIL and LSIS Manufacturing Employment by Borough

4.5.2 It is therefore clear that the bulk of manufacturing taking place on Industrial Land (SILs and LSISs) is located north of the river and mainly in the north west and north east areas of London. This presumably reflects supply chains to the north and west of London.

4.6 ILDS Scenarios and BRES Data

4.6.1 As an initial guide, the borough level transport intensity (defined here as the percentage of Wholesale & Retail, Manufacturing, Construction and Transportation & Storage, as proportion of all SIL-based jobs by borough) can be compared with the levels of industrial land release by borough envisaged in the five ILDS scenarios. Each borough has been placed into one of three categories based on this transport intensity metric as follows:

- *Low*: 0-30% (Camden, City of London, Islington, Kensington and Chelsea, Lambeth, Westminster, Richmond Upon Thames, Barnet and Hackney;
- *Medium*: 30% - 60% (Hounslow, Wandsworth, Merton, Hillingdon, Tower Hamlets, Lewisham, Greenwich, Harrow, Bexley, Southwark, Newham, Redbridge and Ealing); and
- *High*: >60% (Hammersmith and Fulham, Brent, Haringey, Enfield, Sutton, Croydon, Bromley, Havering, Waltham Forest, Kingston upon Thames and Barking and Dagenham).

4.6.2 For reference, these boroughs are mapped in the figure below.

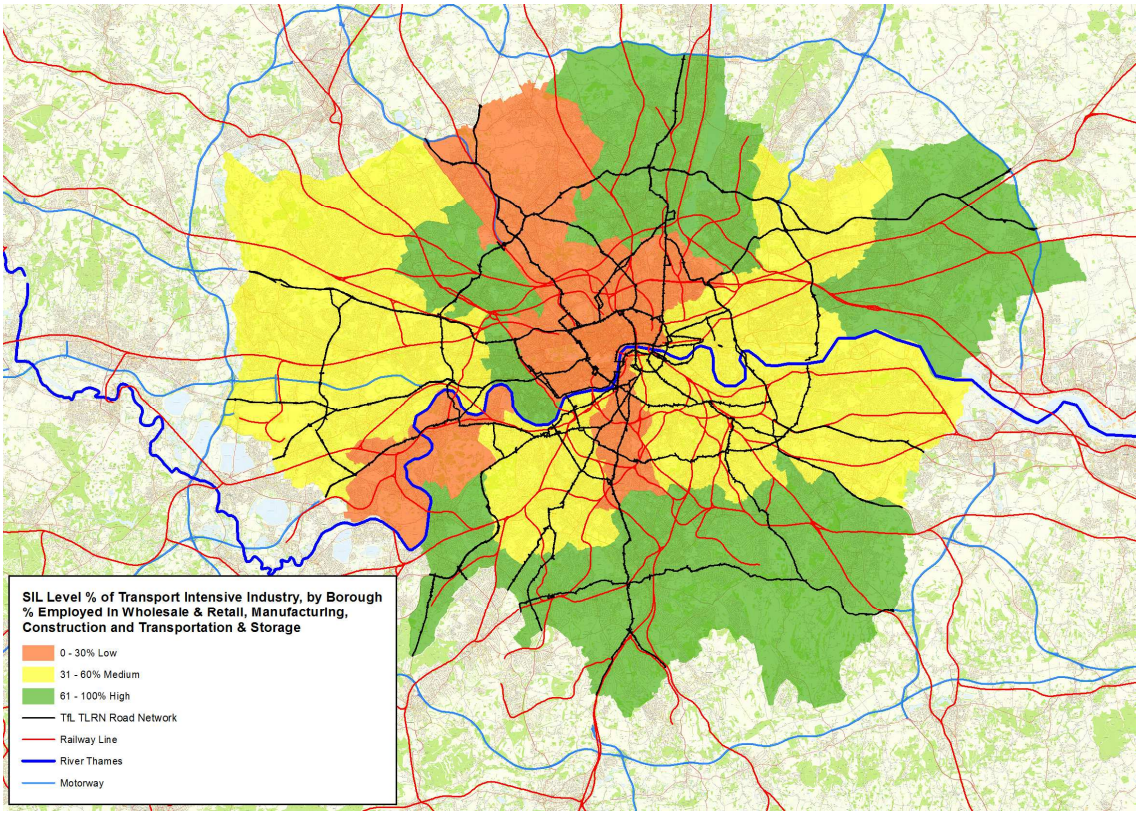


Figure 4.10: % Transport Intensive SIL based employment by Borough

4.6.3 The charts below show the hectares of land envisaged for release in each ILDS scenario grouped into 'low', 'medium' or 'high' transport intensity boroughs.

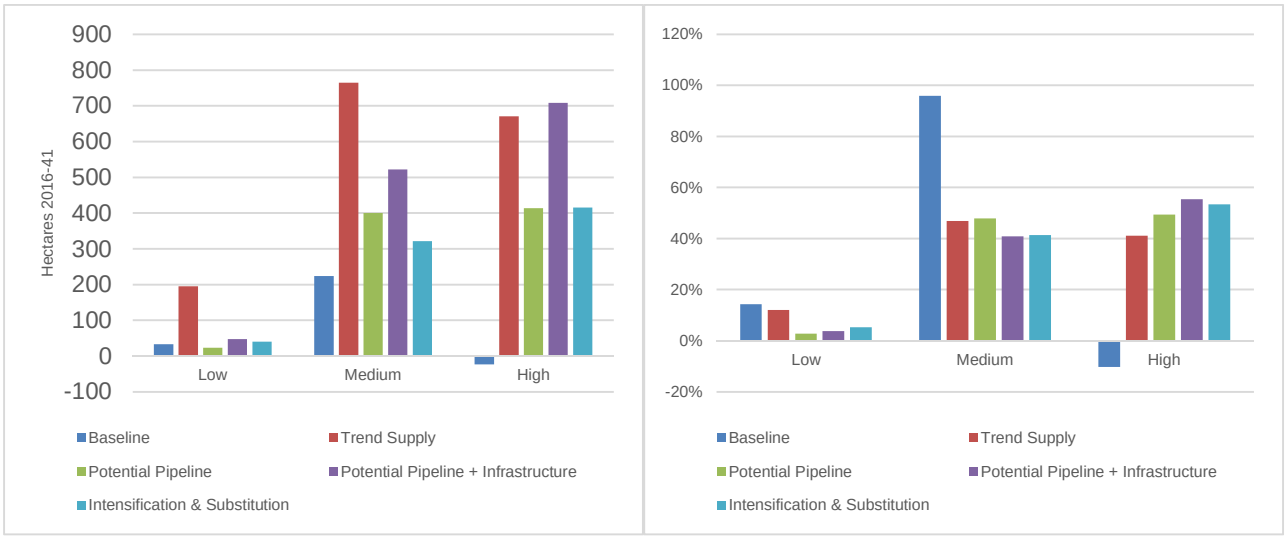


Figure 4.11: ILDS Scenario Land Release by 'Transport Intensity' of borough (hectares & %)

4.6.4 This analysis suggests that the Trend Supply scenario would see the largest release of land from boroughs with a high quantum of potentially transport intensive activity, therefore implying the biggest potential impact on the network. The Baseline scenario would see no release from these areas.

4.7 Summary

4.7.1 The detailed analysis of BRES data with respect to Industrial Land has confirmed that much of the activity taking place at these sites is not typically 'industrial' in nature. However, the types of activity which may traditionally be thought of as industrial (and therefore greater generators of traffic associated with the movement of goods) are disproportionately present at Industrial Land locations as defined by SILs and LSISs compared to other locations in London.

4.7.2 Any displacement of activity out of current SILs and LSISs is therefore likely to have a material impact on these types of firms which are typically associated with the movement of goods.

4.7.3 The analysis developed would be of assistance in determining the potential impact of land release at specific SIL sites.

5 What Determines 'Transport Intensity'?

5.1 Introduction – What is Transport Intensity?

5.1.1 The undertaking of any given economic activity at any given location will give rise to a set of specific demands on London's transport network. Some activities will imply a very low demand and others a very high demand, and this is referred to here as *Transport Intensity*. This chapter explores the potential defining characteristics of transport intensity in more detail.

5.2 Insights from Industry

5.2.1 A key element of the study was to engage directly engage with industry to explore the emerging issues surrounding: (i) the differing scope of transport and connectivity requirements now and in the future; and (ii) the current and future locational requirements of those potentially most directly affected by changes in the pattern of industrial land use allocations. Both of these factors would have an impact on the 'transport intensity' of these operations and the main findings of this engagement are reported here.

5.2.2 A total of 28 stakeholders were contacted to participate in the stakeholder engagement exercise and a total of 18 stakeholders completed the engagement. The stakeholders engaged included logistics and distribution companies, freight forwarders, pallet networks, construction logistics companies, retailers, service providers, manufacturers, developers, industry associations and academics. A topic paper was produced and agreed, which formed the basis for the engagement and covered a range of themes to help guide discussions and enable information to be captured and reported. Each engagement was completed through a semi-structured telephone interview to allow the stakeholders to give fuller answers and ensure their views were expressed. Notes from the individual consultation meetings have been made available to TfL.

5.2.3 The information gathered has been distilled and anonymised and the key themes under each topic heading have been drawn out. The findings have then been used to help support the overall narrative of the study.

What's moving where? Goods and products coming in and going out

5.2.4 Inbound and outbound supply chain movements varied according to a number of factors including business sector and type, size, operating model, the goods and services being moved, mode of transport and vehicle fleet operations. Goods and services being transported ranged from specialist engineering equipment shipped internationally for a specific project to daily deliveries of raw materials for food manufacture and everything in between. The courier and parcels sector saw huge flows of goods moving in and out, around, across and through London at all times of day and emphasised the importance of the whole industry allowing London to thrive as a global city.

5.2.5 Some similarities were noticed with stakeholders tending to have inbound supply chains coming from the west and north of London, also supplemented by movements from the south east and south west. Heathrow and its hinterland also provides a significant hub.

5.2.6 Destinations in London were spread right across the Greater London area with variations again depending on business sector and type. The Central Activities Zone (CAZ) attracted a large proportion of activity due to the density of businesses and also people receiving deliveries as well as the associated supporting services.

5.2.7 Variations in movements can be seen by one stakeholder's business operating from a single base using on average 15 vehicles per day, whilst another has circa 40 sites and some 600 vehicles operating in London at any one time.

Fleet and Supply Chain – how many, what type, contracts, operating model?

5.2.8 The full range of vehicle types were identified by stakeholders from cargo bikes and small vans for courier and last mile operations up to 44t articulated lorries, tipper trucks and ready mix concrete lorries. The type of vehicle employed is dependent on the sector and type of operation, supply chain, efficiency, goods being moved and access arrangements at final destination. Electric Vehicles (EVs) were already quite prevalent in van fleets with further uptake likely, larger EVs (>7.5t) were not really identified as being in use just yet, although some trials had been carried out.

5.2.9 The majority of stakeholders appeared to lease their vehicles, although some larger companies owned their fleet and others were looking to do the same. Some stakeholders preferred to subcontract their logistics, this appeared to vary depending on business type i.e. whether logistics was their primary function or not. Fleet renewal cycles were generally seen to be between 5-10 years depending on vehicle type with stakeholders looking at a range of options when renewing including EVs and other alternative fuels mainly due to forthcoming legislation through Ultra Low Emission Zones (ULEZ) and also Direct Vision Standards (DVS).

5.2.10 The operating model be it hub and spoke, consolidation, last mile or a combination varied depending on business type and supply chain. Consolidation and last mile are terms and types of operation that have become more and more prominent in the last 10 years particularly related to urban logistics and the rise of online purchasing and increasing service levels i.e. next day, same day delivery.

What are key influences on your current location choice – transport, workforce, historical, cost, branding?

5.2.11 Proximity to market / customers and accessibility, primarily road access, were the two key factors influencing location choice for all stakeholders. There was some variation on proximity / distance from suppliers and end customers depending on sector i.e. manufacturing versus parcel delivery versus construction supplies and where the 'sweet spot' was in terms of actual location. Last mile delivery operations by definition need to be centrally located and have a slightly unique operating model relying on using bases in not so typical locations i.e. railway arches and disused car parks.

5.2.12 One stakeholder commented it was as important to provide easy access to their suppliers as it was to be located close to their end customers and in this instance they were located almost equidistant between central London and the M25, which provided and ideal centre of gravity for their operations.

5.2.13 Several stakeholders stated that would ideally have facilities both outside and inside greater London in order to serve London efficiently in particular enabling cross docking and consolidation at the periphery.

5.2.14 All stakeholders wanted to be next to an arterial route for road freight and some wanted to be close (enough) to an airport for international movements. Locations in close enough proximity to central London were considered key to avoid unnecessary mileage and using more vehicles. Current range limitations of some EVs also influenced stakeholders thinking in terms of the need reload and recharge vehicles.

5.2.15 There was universal agreement that you couldn't pick and choose a preferred location within greater London and had to take the most suitable premises inevitably with some compromise on location, size and or specification necessary.

5.2.16 One stakeholder commented that they had seen an increase in demand in the last 2-3 years for premises around 100,000-150,000 square feet mostly linked to increasing use of last mile operations.

5.2.17 Stakeholders did not expressly mention any workforce issues. Proximity to labour was always a consideration when deciding where to locate, but not as key as some of the other factors already mentioned. The workforce appeared to adapt to where the work opportunities presented themselves. One business commented that they currently have 35 different first languages spoken highlighting the diversity and employment opportunities the industry creates.

What changes in the next 10 – 20 years will influence your business – industry, suppliers, customers, technology, legislation?

5.2.18 Feedback from stakeholders on this topic was wide ranging, but with general consensus on a number of issues including:

- The delivery market is / will potentially become saturated – numerous companies, ever increasing demand and increasing service levels i.e. next day, same day, 2-hour delivery – coupled with finite and reduced road and kerb space could mean authorities may need to regulate to reduce demand or ensure businesses collaborate;
- Likely industry trends: more online / e-commerce, more click & collect – potentially leading to more mini urban consolidation i.e. small scale central warehousing, potentially shared facilities where delivery vehicles can re-stock and go again;
- New delivery methods will keep coming forward i.e. peer-to-peer delivery, delivery bots and drones – although there is some scepticism on the role of drones in dense urban areas. Likely more use of EVs and cycle logistics depending on sector and products;
- General thought that there will be more IT integration and simplified systems – 'Uber' style functionality being adopted by the logistics industry enabling slicker supply chains and fulfilment;
- Legislation such as ULEZ and DVS standards will have a bearing on fleet renewal. Stakeholders felt clarity was needed as it was creating uncertainty in the industry and timescales were relatively short and not necessarily in tandem with fleet renewal cycles;
- Autonomous vehicles were generally thought to be on their way and could bring benefits i.e. safety, emissions (if electric) and will help with driver shortage issues. However, it was thought the freight and logistics operations will still require a human element in order to make the final delivery or provide a supervisory role. It was also thought likely that platooning vehicles on the strategic road network would come first before fully autonomous vehicles making deliveries; and
- Also likely to see more automation of manufacturing processes and warehouse operations across the board. It was thought this would increase order fulfilment and productivity leading to intensification of operations, potentially requiring more vehicles movements. It was thought this could happen across a range of sectors and any location type.

Any relocation / expansion / contraction being considered or considered in the past?

5.2.19 Stakeholders provided a number of examples of relocation within Greater London over the last 5-10 years and this was spread across all sector types. A variety of reasons were behind the moves including businesses growth, efficiency gains, need for new facilities, consolidating businesses / operations and existing sites being redeveloped.

5.2.20 There was a general trend that businesses wanted more premises within London in order to be able to serve growing demand from their customers. A number of stakeholders stated that when they did relocate they struggled to find land / premises in their preferred location and of the right size and had to compromise. A number of stakeholders stated that they ended up further out of London than they wanted due to a lack of available facilities and this had implications in terms of vehicle mileage and the numbers of vehicles needed to fulfil demand. However, one stakeholder stated that relocating and consolidating their supply chain to a hub

outside of London had in fact provided benefits to their operation serving London.

5.2.21 An overall pattern of relocation opportunity began to appear with stakeholders indicating that it was likely that west London would be maintained and strengthened as an industrial location mainly due to the position of Heathrow and Park Royal. There was significant potential for growth in the north and east of London in particular up through the Lea Valley and along the Thames around Barking and Dagenham. It was felt that opportunities were more limited south of the river due to the constraints in availability of land / premises, although there was some potential out to the south east.

What investments have you made or plan to make to your business – infrastructure, plant, equipment, vehicles, refuelling, staff?

5.2.22 Stakeholders were seen to be making a range of investments in their businesses including:

- Developing entirely new Regional Distribution Centres (RDCs) outside of London or moving to bigger premises to accommodate anticipated business growth inside the M25, although land & premises are limited;
- Some businesses are seeking to buy their own vehicle fleet rather than lease or subcontract. Most stakeholders are considering EVs and other alternative fuelled vehicles in this process;
- Installing or upgrading vehicle refuelling / recharging infrastructure – better, smarter and more rapid charging points;
- Installing solar roof panels to help anticipated electricity requirements; and
- Seeking to identify vehicle holding areas / available land within Greater London – considered very difficult to find.

Any issues past or present with your status / security of tenure at your location – lease, contract, T&Cs, costs?

5.2.23 Some businesses own the land / premises they operate from – this is generally either due to purchasing power or historical reasons, this therefore means they have no issues with tenure. However, there can still be pressure to redevelop land for housing and businesses have done so if it works for them.

5.2.24 One stakeholder indicated that their business rates were increasing by 130% from April 2017 and this was coupled with constant pressure to redevelop their premises with a number of adjacent areas already redeveloped for housing. A number of other stakeholders commented on significant business rate increases that they were not happy about, but had to be absorbed by the business.

5.2.25 Another stakeholder involved in logistics stated that they were forced to leave their premises in a relatively central location south of the river as it was sold for redevelopment, however they managed to move to a nearby premises vacated by a competitor who had gone out of business. Another stakeholder indicated that as a land / premises owner they had sold certain industrial sites for housing redevelopment if the land in question appeared more suited to that land use and it made sense for them as a business to do so.

5.2.26 Other stakeholders indicated no issues with tenure with many stating they had a good relationship with their landlord. This predominantly occurred when a business had a long running mutually beneficial relationship with the landlord and had been located in the same area for a significant period of time.

Thoughts on potential changes to industrial land use – intensification, mixed land uses, warehouse / depot sharing?

5.2.27 There was a general consensus that intensifying the use of industrial land would happen naturally, most likely due to land scarcity. It was thought that this was most likely to occur in industrial locations in north and east London, although anywhere within the M25 had potential.

5.2.28 The potential for mixing land uses received a mixed reaction. Some believed there were opportunities for mixing land uses both horizontally and vertically with careful attention to design needed in particular in relation to noise and health and safety. An example of vertical mixing put forward was for a small / medium sized logistics operation at ground or basement level, retail or similar land use on the ground or first floor and residential or office above. One example of mixing land uses was provided by a stakeholder whose existing depot had been re-provided (still at ground floor level), but on a slightly smaller scale as part of a wider redevelopment and now had student accommodation above it. It was also noted that this approach is already coming forward in Paris through 'logistics hotels'.

5.2.29 Others believed it was not workable with the needs of each land use being too different and conflict likely in particular in relation to 24-hour operations. It was also mentioned that co-locating industrial land with lower cost housing could be beneficial in terms of providing a local workforce.

5.2.30 Warehouse / depot sharing is already happening to some extent, mainly between businesses and customers where their needs are complimentary. It is thought this practice will become more common as pressure on land increases and stakeholders look to maximise the use of premises. Sharing between competitors is thought to be much less likely, although it may happen in the future especially if the commercial case is compelling. This is most likely to occur in more central London locations due scarcity of premises.

5.3 Transport Intensity Framework

5.3.1 This section sets out a framework by which the transport intensity of a given site or locations can be systematically considered. The purpose of this is to provide a structured approach to the consideration of how any specific land release could have transport impacts. This Framework could be used directly to inform future release decisions at the site level.

5.3.2 There are three basic components of this:

- Workforce Issues;
- Movement of physical goods on and off site; and
- Movement of people on and off site / location.

5.3.3 Each of these aspects is considered further in the tables which follow. The purpose is to highlight how different attributes of the firms involved could impact on local and strategic transport networks.

Table 5.1: Transport Intensity Framework - Workforce

Aspect of Operation - Workforce	Implication for Transport Networks
Volume of commuting	
Total employment levels, part time / full time	Determines the number of commuting trips on a typical day.
Employment density, employment / hectare or square metre etc.	Sites with a higher employment density are likely to create concentrations of transport demand at local pinch points.

Aspect of Operation - Workforce	Implication for Transport Networks
Home address of employees	
Local	Transport demand concentrated within a close distance of the site - low vehicle-kilometres but may be impacts at local pinch points.
Dispersed	Transport demand dispersed over a wider area so less focussed impact on traffic & congestion - higher vehicle-kilometres.
Modes Used in Commuting	
Car dominated	Potential impacts on local and area wide traffic congestion depending on location.
PT Dominated	Potential impacts on local and area wide train / underground / bus crowding depending on location.
Operating hours of site	
Regular office hours	Transport impacts concentrated in peak hours therefore higher potential for impact at peak periods.
Shift based	Transport impacts potentially dispersed between peak and off peak periods depending on shift pattern - shift based work may imply higher car dependency though.
24-hour	Transport impacts potentially dispersed across the 24-hour period - shift based work may imply higher car dependency though.

Table 5.2: Transport Intensity Framework – Movement of Goods

Aspect of Operation – Movement of Goods	Implication for Transport Networks
Number of vehicle movements	
Absolute number of movements per day	The volume of vehicle movements associated with the movement of goods generated by the activity across the day is clearly a key issue. Lower volume of vehicle movements likely if rail and water transport is utilised.
Movements / e.g. metre squared	The trips / land area will determine the level of local impact, in combination with road traffic conditions in the locality and access points between the site / location and the wider network. Lower volume of vehicle movements likely if rail and water transport is utilised depending on location and access to inter-modal facilities / rail and water network.
Type of Movement of Goods	
None - basic supplies on and off site only	No significant impact on transport networks locally or area-wide, transport intensity would be based on commuting and movement of people only.
Materials in - product out - adding value, implies some manufacturing	Highly volume dependent, also whether it is small numbers of large items or large numbers of small items will impact on traffic levels and type of vehicles used. Potential for one or both movements to be carried out by rail or water transport.
Goods in - goods out -no added value	Implies a distribution operation - highly volume dependent, also whether it is small numbers of large items or large numbers of small items will determine traffic volumes and vehicles used. Potential for one or both movements to be carried out by rail or water transport.
Goods distribution locations	
Many in - many out	Likely high impact in terms of vehicle-kilometres, but potentially lower impact on congestion as traffic is distributed over a larger area. Impact reduced if rail and water transport is utilised depending on location and access to facilities / rail and water network.
Many in - limited or single out	Mixed impact due to dispersed / concentrated nature of these movements -

Aspect of Operation – Movement of Goods	Implication for Transport Networks
	potentially larger impact than many in - many out. Impact reduced if rail and water transport is utilised depending on location and access to facilities / rail and water network.
Limited or single in - many out	Mixed impact due to dispersed / concentrated nature of these movements - potentially larger impact than many in - many out. Impact reduced if rail and water transport is utilised depending on location and access to facilities / rail and water network.
Limited or single in - limited or single out	Vehicle movements will be concentrated on a small number of routes and key junctions etc. potentially maximising the impact on congestion. Impact reduced if rail and water transport is utilised depending on location and access to facilities / rail and water network.
Local origins / destinations	Vehicle type dependent but impacts will be concentrated in the local area. Lower vehicle-kilometres. Use of rail and water transport less likely due to localised nature of movements.
Dispersed origins / destinations	Vehicle type dependent but traffic will be dispersed across a wide area. Higher vehicle-kilometres. Impact reduced if rail and water transport is utilised depending on location and access to facilities / rail and water network.
London focus	
Solely serving the city	Any firm which operates in full to service the central London market will use one or more radial corridor and will therefore have a concentrated impact in that area. If wider London locations are also served, impacts will be more dispersed. All traffic impacts will be in London, except potentially inbound supplies.
Part serving the city	Any firm which operates in part to service the central London employment market will use one or more radial corridor and will therefore have a concentrated impact in that area, albeit in this case, not all movements will fall in this corridor with some orbital movements. If serving non-London markets, traffic impacts will likely spread to the wider motorway and trunk road network.
Not serving the city	Movements likely to be focussed on orbital patterns or between London and the wider south east / rest of UK etc. impacting on the wider motorway and trunk road network.
Vehicles used in undertaking business	
Cargo Bikes	Lowest impact courier and final mile operations.
Cars	Impact would be lowest but will depend on fuel used – electric vehicles / petrol / diesel.
LGV	Depends on fuel used – electric vehicles / diesel.
OGV1 (larger rigid 2-3 axles)	Increasing issues of noise / vibration / pollution / intimidation with vehicles size depending on routes used.
OGV2 (4-axle rigid and all articulated vehicles)	Increasing issues of noise / vibration / pollution with vehicle size depending on routes used.
Train	Low impact noise / vibration / pollution depending on locomotive, routes used and railhead / terminal location.
Boat, barge	Lowest impact noise / vibration / pollution depending on routes used and wharf / dock location.
ULEZ (Ultra Low Emission Zones)	Any regulatory change based on emissions could be transformative in terms of the vehicle fleet and hence transport impacts.
Operating hours of site	

Aspect of Operation – Movement of Goods	Implication for Transport Networks
Regular office hours	The impact of vehicular movements will be focussed on the working day therefore maximising the impact on the transport networks.
Shift based	Transport impacts potentially dissipated between peak and off peak periods depending on shift patterns.
24-hour	Transport impacts potentially dissipated across the 24-hour period-shift based work may imply higher car dependency though.
Scope of movements across the day	
Movements concentrated at peak periods of the day	Highest potential impacts.
Movements concentrated at other periods of the day	Lower potential focus if movements are focussed in the off peak periods.
Movements dispersed across the day	Lowest potential impact on congestion.

Table 5.3: Transport Intensity Framework – Movement of People in Work

Aspect of Operation – Movement of People	Implication for Transport Networks
Does the site have a public facing role?	
Public facing site	If the site is public facing (i.e. the public access the site for retail or other purposes) this provides a different dimension to transport intensity. Would open up issues associated with volume of access, modes used and distribution across the day.
No public access	No issues.
Travel on business	
Significant staff travel - car (excluding delivery of goods / distribution)	May create local traffic issues but volumes unlikely to be high enough to be significant.
Significant staff travel – Public Transport	Volumes unlikely to be high and therefore network issues not likely to be significant.
No significant staff travel	No issues.
Locations travelled to / from	
Local destinations	May create issues on the local network.
Dispersed destinations	Low volumes of travel dispersed across the network are unlikely to create significant issues.
Operating hours of site	
Regular office hours	The impact of any staff movements will be focussed on the working day therefore maximising the impact on the transport networks.
Shift based	Any transport impacts potentially dissipated between peak and off peak periods depending on shift pattern.
24-hour	Any transport impacts potentially dissipated across the 24-hour period-shift based work may imply higher car dependency though.

5.4 Summary

5.4.1 This table demonstrates that there is a very wide range of transport-related activity which can be associated with an individual organisation or a group of organisations located on the same site. In order to provide some structure to this, this chapter has set out a framework which can be used to systematically consider at a strategic level the likely range of demands, defined as

'transport density' in terms of three key aspects: (i) employees commuting to and from the site; (ii) the movement of physical goods and products on and off sites; and (iii) the movement of people on and off site (excluding commuting).

5.4.2 This framework has been developed in part from a range of findings drawn from engagement with industry concerning current and future trends in how businesses organise their transport related activities, and a wider range of issues surrounding the location and operation of their business.

5.4.3 This framework could be applied in the context of any give location where industrial land release is being considered to provide a structured approach to an analysis of the likely implications of any redistribution of this activity.

6 What Sort of Transport is Associated with these Sites?

6.1 Introduction

6.1.1 In order to determine the scope and scale of travel associated with industrial land sites, three main sources of empirical data have been analysed:

- 2011 Census Travel to Work Data for labour market catchments;
- TfL LoHAM (London Highway Assignment Model) model data for 2011 and 2031 for all travel split by car and goods vehicles; and
- TRICS database of observed flows by site.

6.1.2 The analysis of Census and LOHAM data has focussed on the top 12 SIL sites by employment based on the earlier BRES analysis. These sites are shown in the figure below and it can be seen that they provide a reasonable geographical coverage across London.

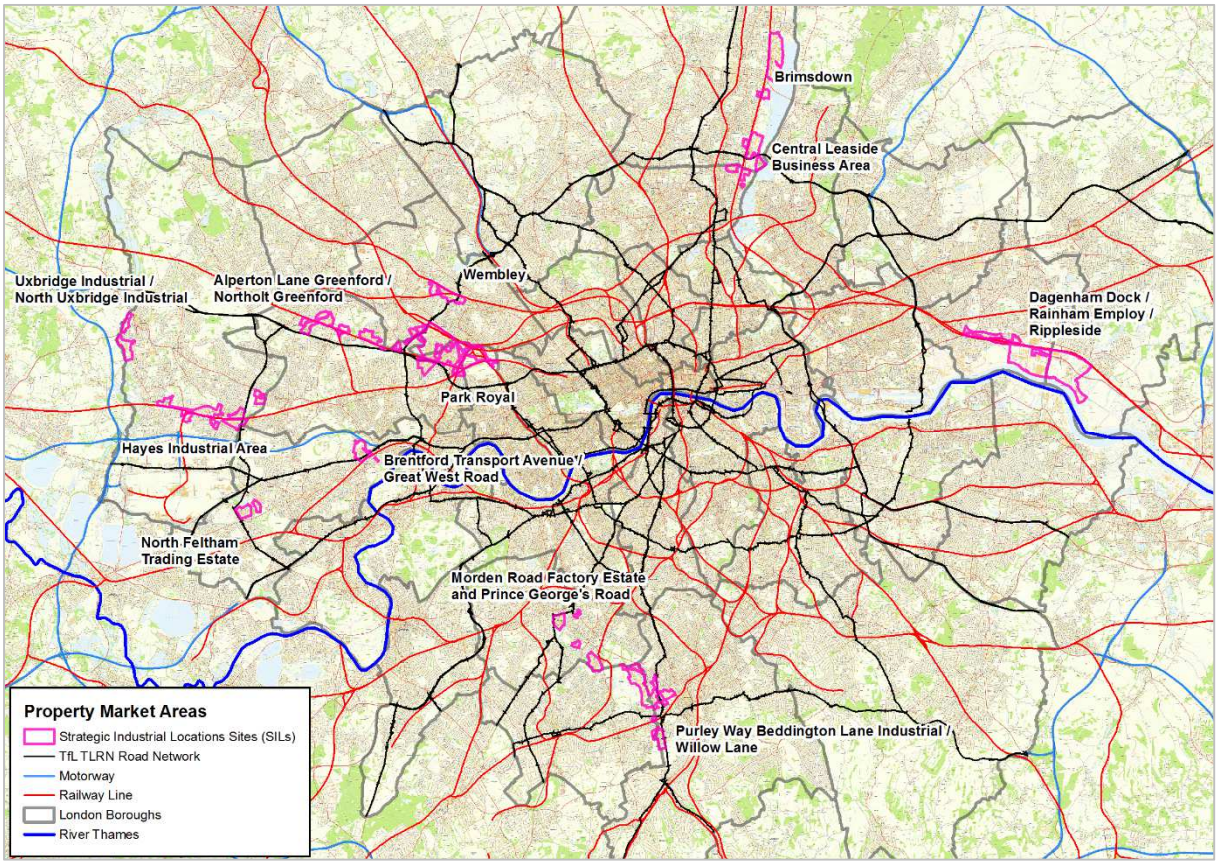


Figure 6.1 Top 12 SILs used in Census and LOHAM Analysis

6.2 Labour Market Analysis

6.2.1 Census travel to work data from the 2011 Census was downloaded from the UK Data Service. This data classifies residents aged 16 and over in employment by method of travel to work and shows the movement between their place of residence and workplace. The data is available at a variety of geographic levels and for the purposes of this analysis, the most detailed level of spatial geography available for the destination zones was utilised namely

Workplace Zones (WZ), while the origin data was mapped to LSOA level. At this spatial geography, the following data is provided on the method of travel to work:

- All categories: Method of travel to work;
- Work mainly at or from home;
- Driving a car or van; and
- Other method of travel to work.

6.2.2 In order to identify the travel to work trips associated with journeys to the SILs, ArcGIS software was used to identify the WZ destinations corresponding to each SIL. In general, a reasonable match could be achieved between the WZ and the SIL. Where the WZ extended significantly beyond the SIL boundary a visual assessment of the underlying land use was undertaken. Where the remainder of the WZ was mostly residential and / or parkland, it was assumed that the travel to work trips to the WZ could be attributed to the SIL. Where there were employment uses evident which fell outside of the SIL boundary and the WZ covered only a small section of the SIL, the WZs were excluded from the analysis. Having identified the WZ destinations corresponding to each SIL, it was then possible to identify all of the origin zones associated with commuting trips to each SIL.

6.2.3 In order to provide a visual indication of the labour market catchment of each SIL, three catchment maps showing the origin points of trips made to each SIL by mode (all modes, driving, other) were produced for each site. A sample is shown in the figure below for travel to work by all modes to the Park Royal SIL.

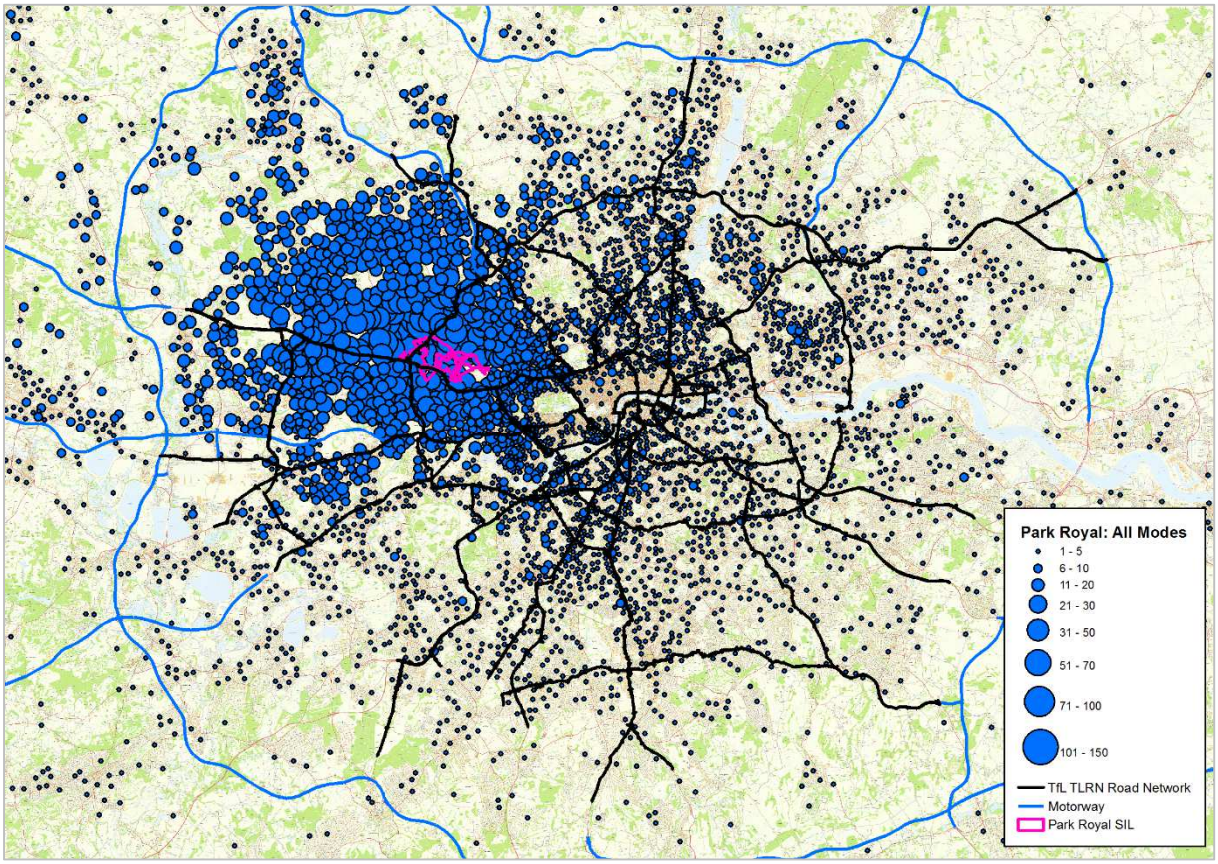
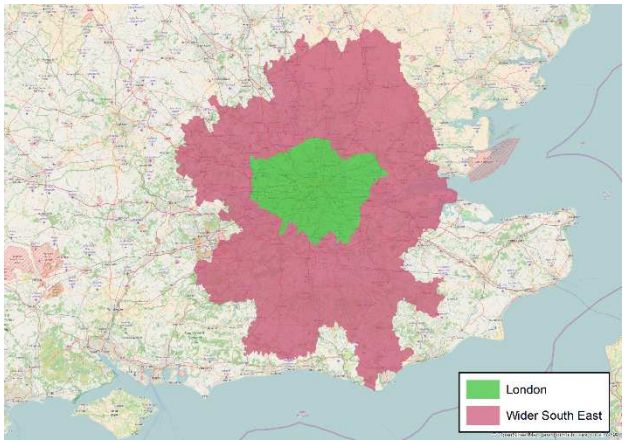


Figure 6.2: Census Travel to Work Sample, Park Royal, All Modes

6.2.4 A full set of 36 graphics can be found in the accompanying PowerPoint file showing all modes, car and non-car separately. The purpose of these graphics is to demonstrate the spatial

distribution of commuting trips to each site. The potential impact on commuting patterns of any relocation out of the SIL in question can then be qualitatively assessed depending on the new location of that activity. In this case, a large majority of the Park Royal workforce live in a wedge between the M1 and the M4 corridors. Any move south or east would therefore have the effect of increasing commuting distances, based on the current workforce's residential locations.

6.2.5 In addition to these graphics, the Census travel to work data has been analysed at the PMA level for each SIL. Outwith London, two geographies have been specified - 'Wider South East' and 'External Area'. The former is defined as all merged local authority areas which share a border with London and the merged local authority area which share a border with these areas - effectively forming two concentric rings around the capital as shown in the figure opposite. The latter is defined as locations falling outside of London and the outside 'Wider South East' area as defined here.



6.2.6 The figure below shows the percentage breakdown of commute trips to each SIL by PMA for all modes. The 'home' PMA for each SIL is shown in brackets for reference.

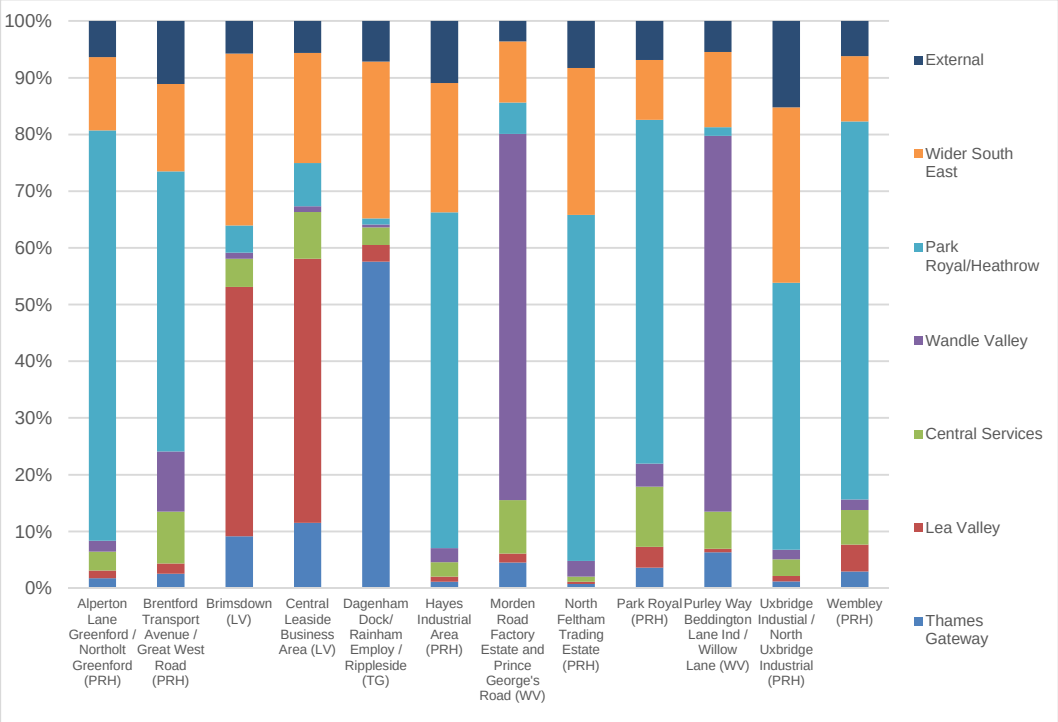


Figure 6.3 Census TTW to Top 12 SIL by PMA, All Modes

6.2.7 These figures would allow an estimate to be made of the impact of the relocation of a site from one PMA to another. For example, if an organisation moved from Central Leaside Business Area to a location in Park Royal / Heathrow PMA, the data suggest that the 47% of employees who currently live in Lea Valley PMA would have to travel further to any new location in Park Royal.

6.2.8 As well as showing the distribution of commuting to each SIL by PMA, this analysis also demonstrates the quantum of commuting into London from the areas immediately adjacent to London and beyond. The largest 'in commuting' is associated with Uxbridge and Hayes in the west and Brimsdown in the north, the locations closest to the edge of London. Even for more central sites though, the level of in-commuting is around 20%. When travel by mode is considered, around 1/3 of all car-based commuting trips to these SILs originates outside London, a figure which falls to 11% for non-car based commuting. For reference, equivalent figures splitting out car based and public transport based commuting are shown below.

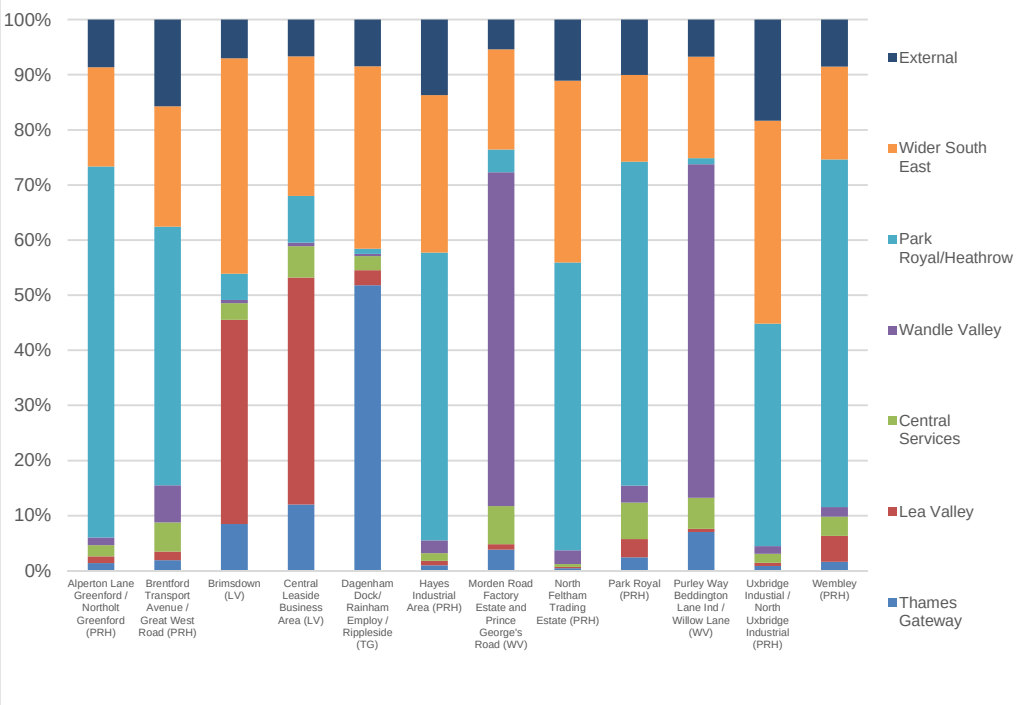


Figure 6.4 Census TTW to Top 12 SIL by PMA, Car Based

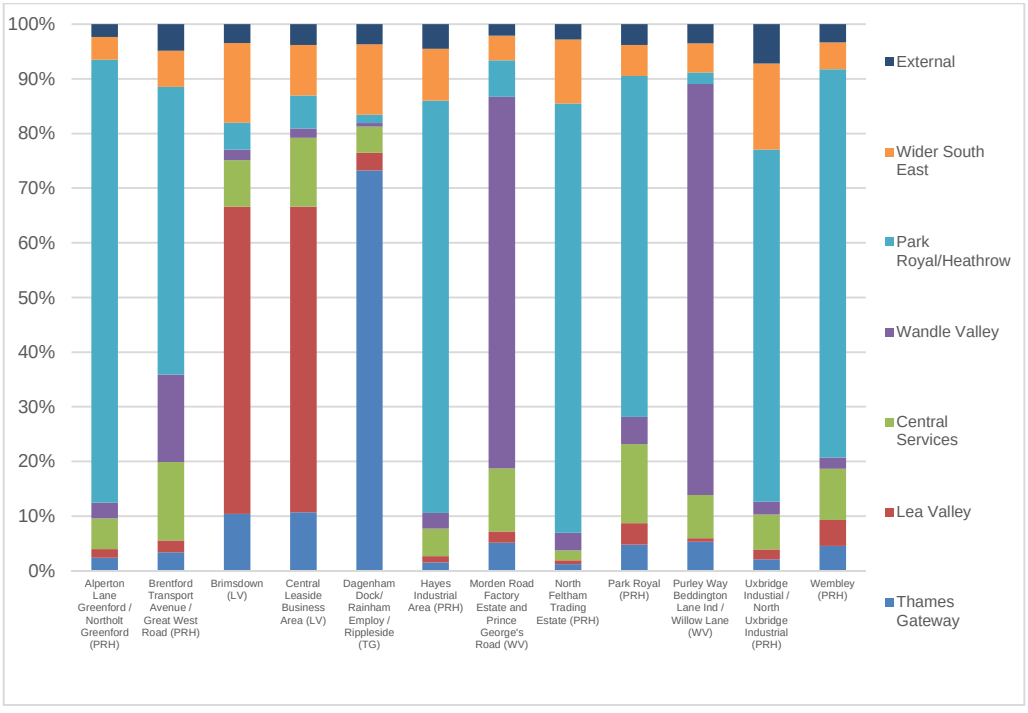


Figure 6.5 Census TTW to Top 12 SIL by PMA, Public Transport Based

6.2.9 In general, it can be seen that there is far less use of public transport from the wider south east and areas beyond and commuting by public transport is therefore far more locally based.

6.2.10 Finally, the census data was analysed in terms of the number of trips by crow fly distance to each of these 12 SILs to provide an indication of the pattern of commuting to these sites.

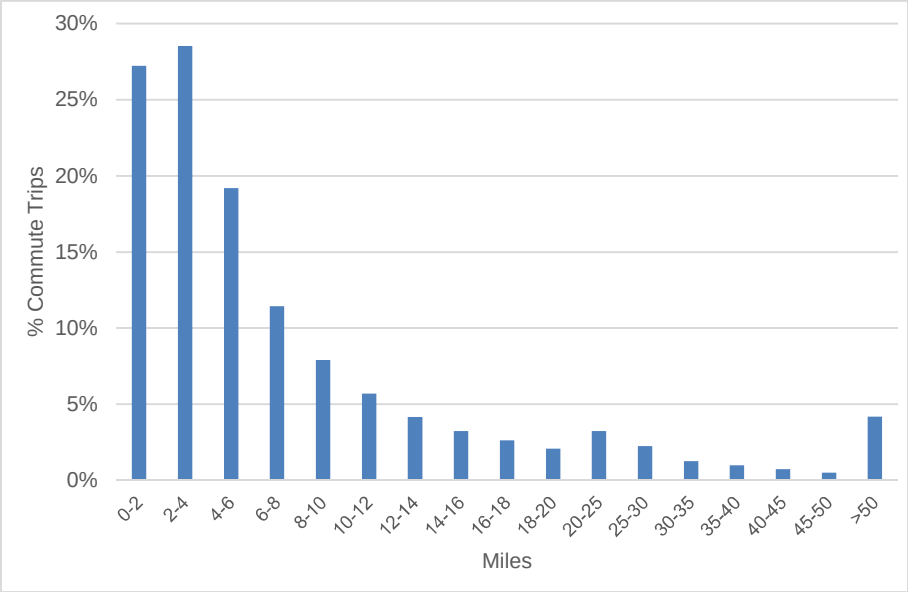


Figure 6.6: Travel to Work by Crow Fly Distance, Top 12 SILs by Distance Band

6.2.11 This figure underlines the 'local' nature of much of this employment, with over 50% of employees travelling less than four miles as the crow flies to work. Any relocation of activity away from these local labour markets would have a significant impact on commuting patterns and / or employment retention.

6.2.12 Overall the average crow-fly commute distance is estimated at 8.8 miles ranging from highs of 12.7 and 11.2 miles at Uxbridge and Brentford to lows of 7.3 miles at Purley and North Feltham.

6.3 LoHAM Analysis

6.3.1 LoHAM is a strategic model which has been developed to provide a consistent basis for highway modelling and planning across London. This section focuses on the modelled data associated with the LoHAM zones corresponding to each of the top 12 SIL sites and provides an indication of the quantum and distribution of *modelled traffic* generated by each SIL, in both the base and future year.

6.3.2 The purpose of undertaking this analysis is to use the tools available to establish the scope and scale of car and goods vehicle based travel to these major SILs. It provides a benchmark which would allow a qualitative assessment of the likely traffic distribution impacts of relocating activity away from these key SILs.

6.3.3 It is acknowledged that the LoHAM data is modelled and forecast, and should be seen in this context. In addition, the modelling of goods vehicles in any transport model of this nature tends not to be a strength, and the outputs should also be seen in this context. Nevertheless, given the high level nature of this study, it was felt appropriate to use LoHAM outputs as one part of the overall evidence base in relation to industrial land.

6.3.4 Trip matrices from the LoHAM model were provided by TfL as follows:

- *Modelled year:* 2012 (Base Year) & 2031;
- *Modelled time periods:* AM Peak (08:00–09:00) & Inter Peak (10:00–16:00 average hour); and
- *User classes:* Car (In Work Time); Car (Out of Work Time); Light Goods Vehicle (LGV) & Other Goods Vehicle (OGV).

6.3.5 As with the Census analysis, in order to identify the car and LGV / OGV trips associated with each of the SILs, ArcGIS software was used to identify the LoHAM zones which corresponded to each SIL. Again, a reasonable match could be achieved between the LoHAM zones and the SIL. The total number of modelled trips to each of the zones corresponding to each SIL were then summed to provide an overall level of modelled traffic demand for each site both in 2012 and 2031.

6.3.6 In order to provide a visual indication of the traffic generated by each SIL, two maps showing the origin points of trips made to the LoHAM zones corresponding to each SIL have been produced for each site. These cover:

- Car trips to each site in the IP period; and
- LGV / OGV trips to each site in the IP period.

6.3.7 A sample of the forecast 2031 inter-peak traffic demand maps for the Park Royal SIL for both car and LGV / OGV are included below as a sample. The forecast year has been chosen as the most appropriate given the forward looking focus of this study and the inter-peak has been taken, since peak flows will be dominated by commuting and commuting has been analysed above. Also the inter-peak is the best representation of traffic across the majority of the day so best represents typical travel conditions.

6.3.8 These graphics are also included within the accompanying PowerPoint along with copies of the corresponding maps for the remaining 11 SIL sites.

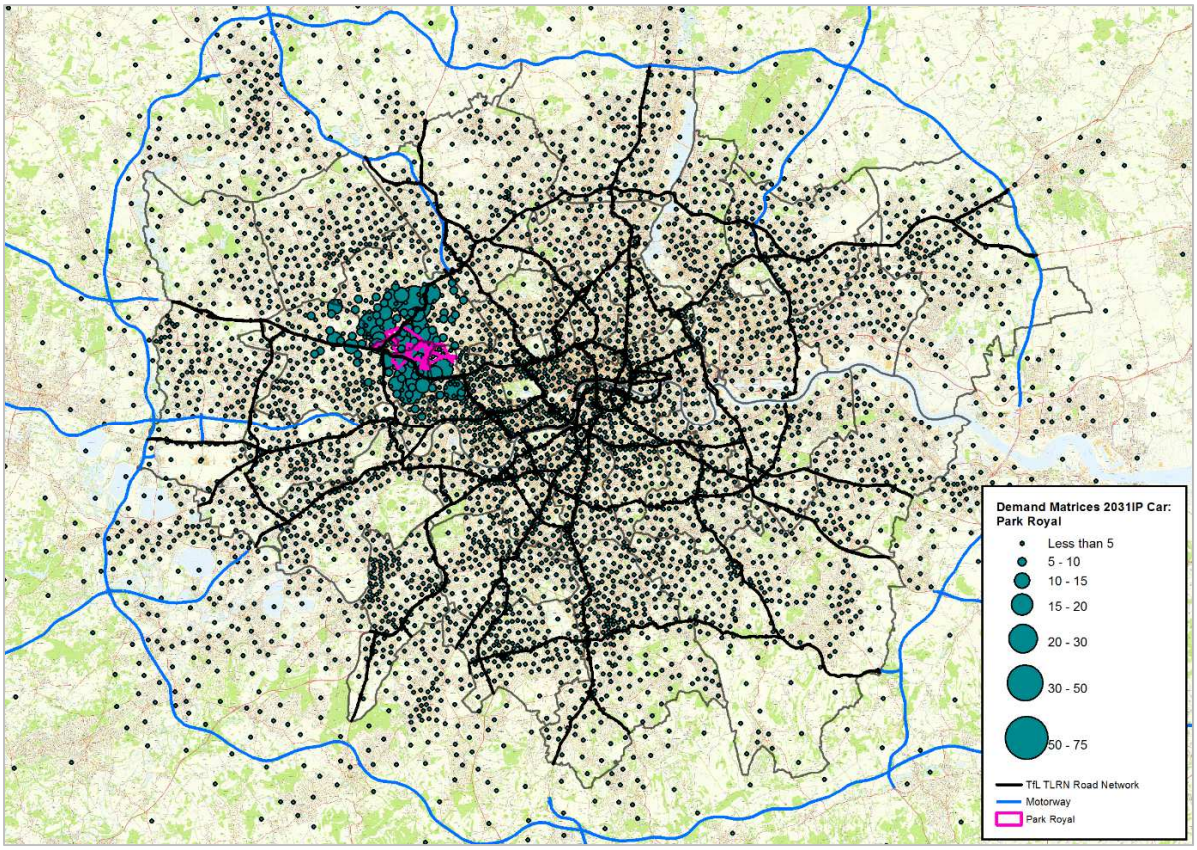


Figure 6.7: Car Trips to Park Royal 2031 IP

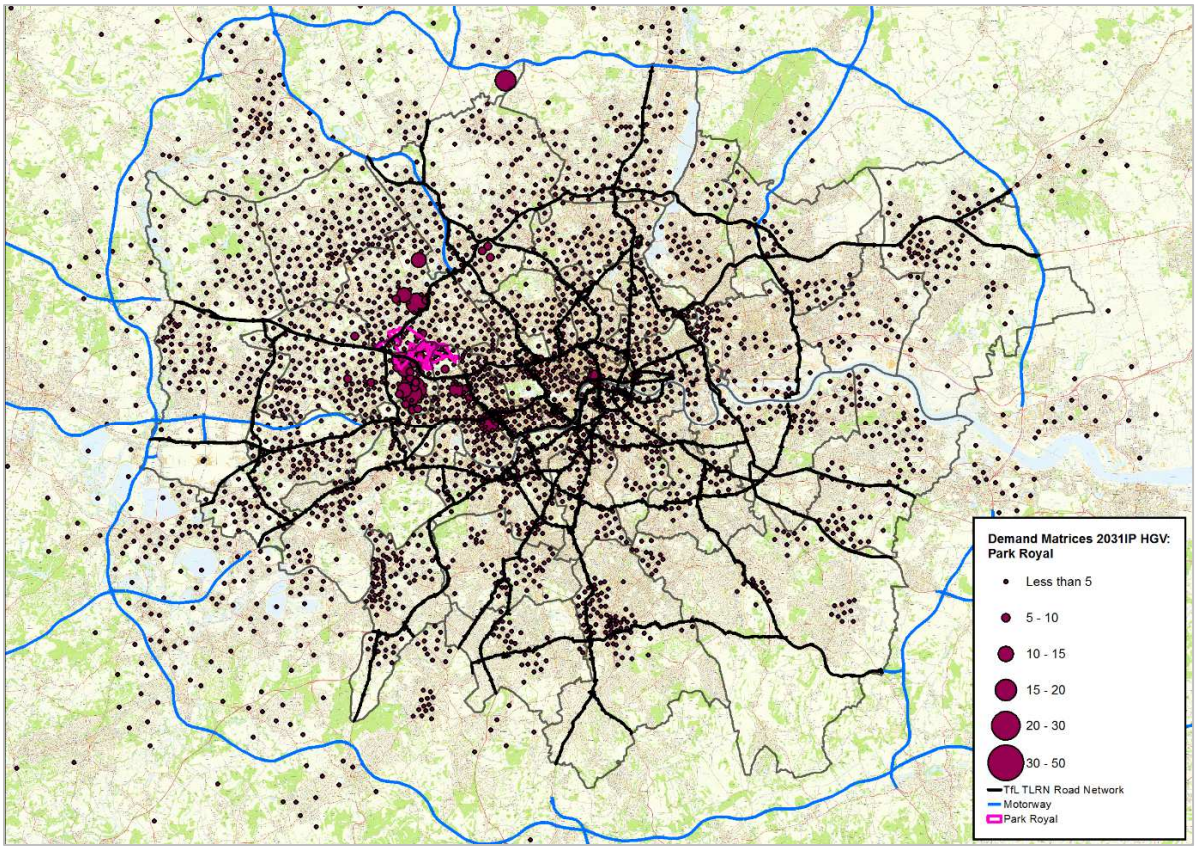


Figure 6.8: LGV / OGV Trips to Park Royal 2031 IP

6.3.9 The pattern revealed here is far more dispersed than that seen in the census travel to work data analysis. This reflects the forecast of all travel purposes to and from the SIL contained in LoHAM. Beyond a local cluster of car trips around Park Royal, the pattern is very dispersed across London reflecting the scale and scope of the activities at this site, although there are more origins on the London side of the site.

6.3.10 HVG movements are perhaps concentrated in fewer origins with a cluster around the western section of the North Circular, and are almost all contained with a sector from the north west to the south west and the city centre.

6.3.11 All of these graphics can be used to visualise the impact of activity moving away from Park Royal (or any of the other 11 SILs). It can easily be envisaged for example that any move of economic activity west from Park Royal would lead to an overall increase in vehicle kilometres.

6.3.12 Again, the forecast travel demand associated with each SIL has been aggregated to PMA level for car and LGV / OGV separately and this is shown in the figures below.

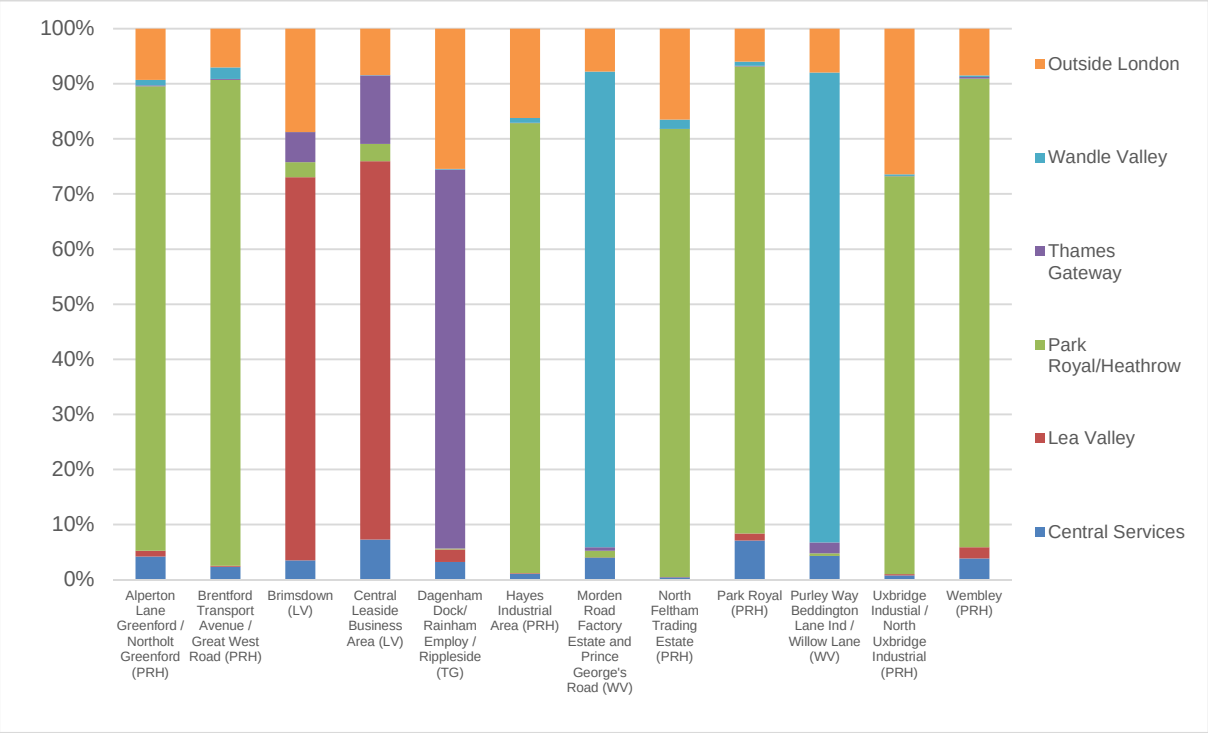


Figure 6.9 LoHAM Travel Demand Data, 2031 IP, Travel to Top 12 SIL by PMA, Car

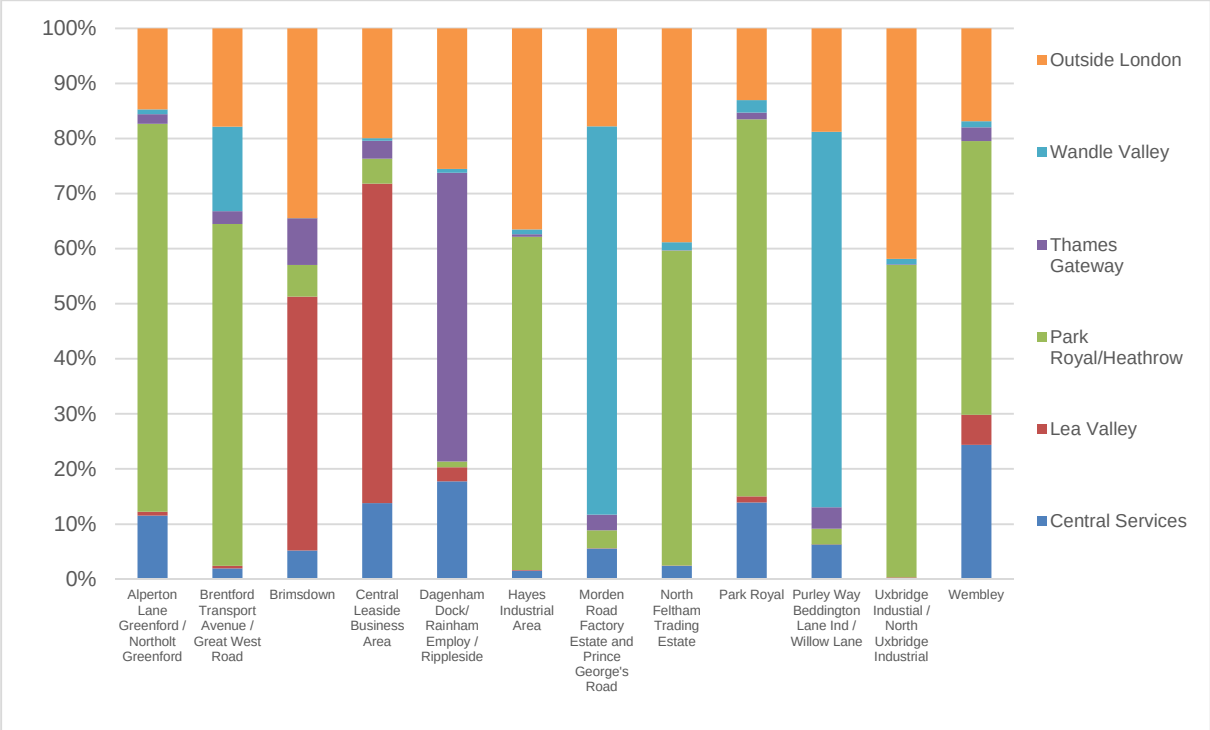


Figure 6.10 LoHAM Travel Demand Data, 2031 IP, Travel to Top 12 SIL by PMA, LGV/OGV

6.3.13 Again, this analysis would allow a judgement to be made on the impact of an activity moving between PMAs where the proportion of SIL traffic likely to be displaced could be estimated. For car trips, 70%-85% of trips are made within the PMA in which they are located, reflecting the presence of commuting trips. For LGV / OGV, this figure reduces to 50%-70%.

6.3.14 A key difference emerges in this analysis between car and LGV / OGV forecast demand. Taking all 12 SIL sites together, travel from the Central Services area and outside London accounts for 14% and 28% of LGV / OGV traffic respectively but only 5% and 14% of car traffic. Any displacement of activity further from the Central Services area would see these LGV / OGV trips lengthen.

6.3.15 The modelled distribution of trip length (crow fly) by SIL is shown in the figures below, firstly for car trips then LGV / OGV trips.

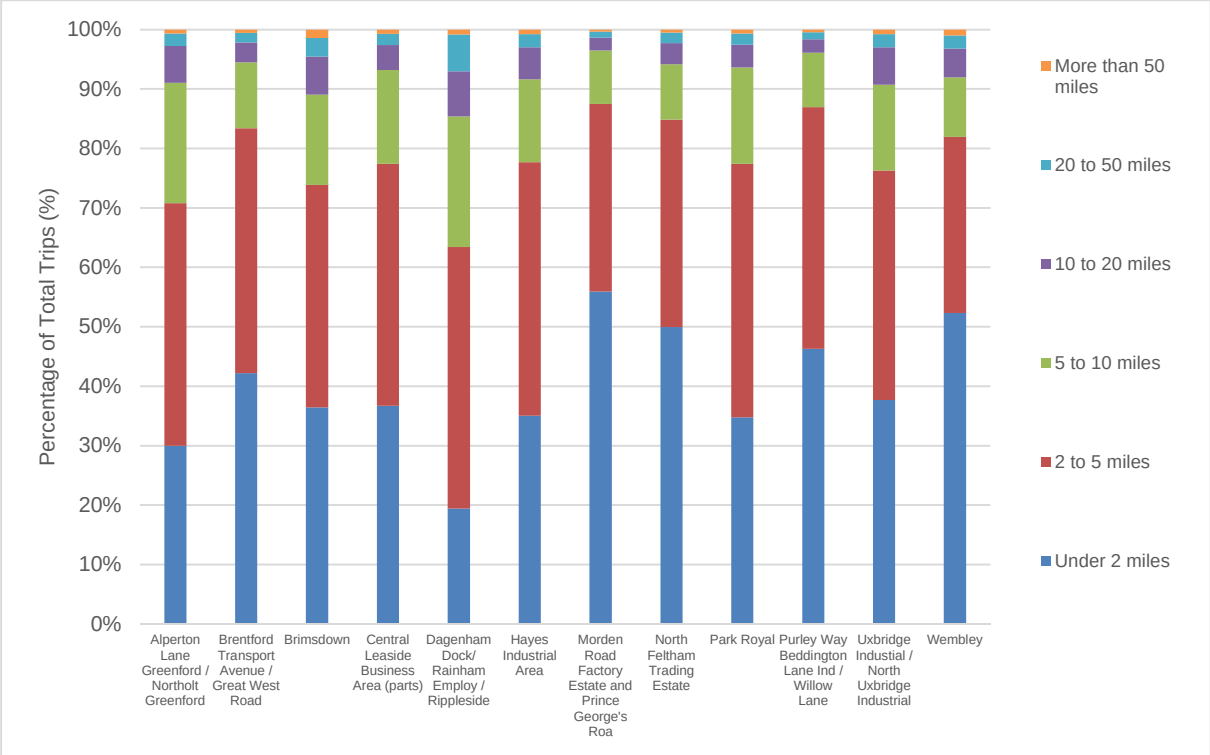


Figure 6.11 LoHAM Travel Demand Data, 2031 IP, Trips by Distance Band, Top 12 SIL, Car

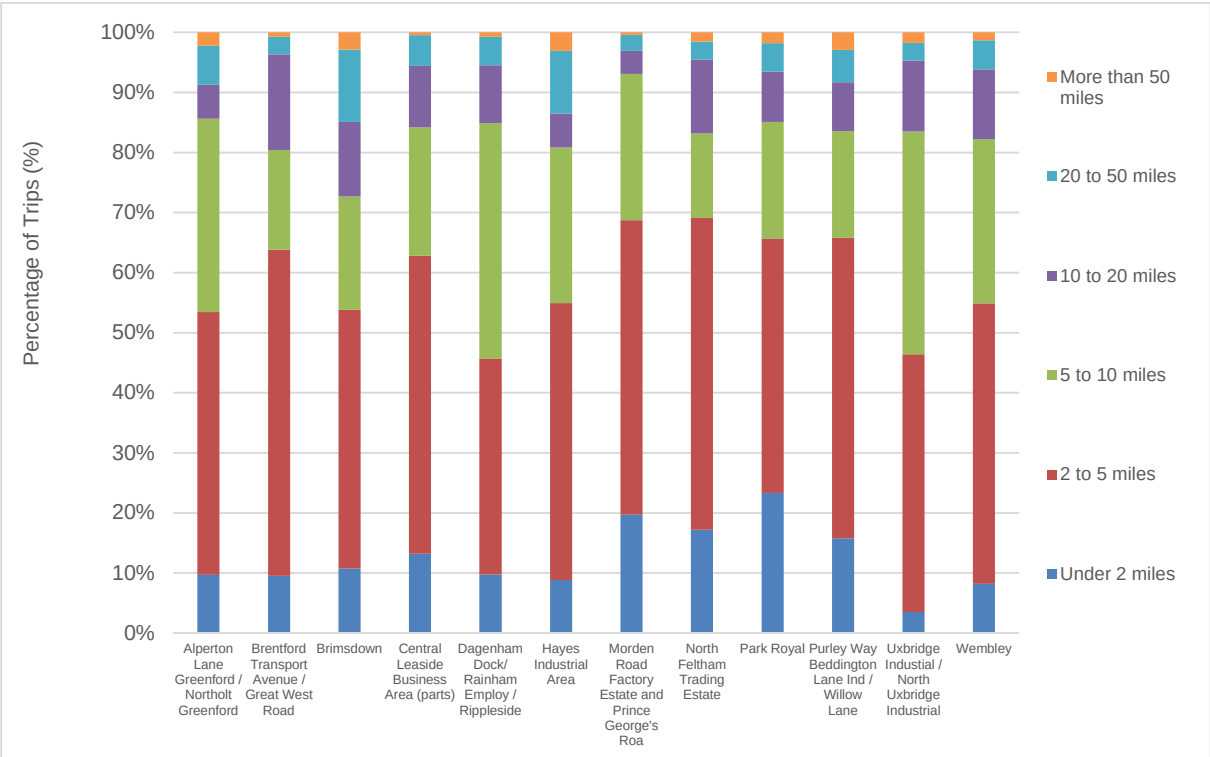


Figure 6.12 LoHAM Travel Demand Data, 2031 IP, Trips by Distance Band, Top 12 SIL, LGV / OGV

6.3.16 Overall, only 8% of car trips are forecast to be greater than 10 miles as the crow flies compared to 17% for LGV / OGV trips, underling the very different nature of these trips. Each SIL displays a slightly different profile reflecting the geography and forecast demand at these sites.

6.4 TRICS

6.4.1 TRICS is an online database of vehicular and multi-modal traffic surveys, which covers over 100 land uses and is aimed at assisting the calculation of development trip generation. This database was interrogated to obtain trip generation and development data for industrial land uses. This section discusses the trip generation data available from TRICS Version 7.3.4 in this context.

6.4.2 In the first instance this search was conducted on the basis of sites located within Greater London; however, due to the small number of surveys available[9], it was decided to also look at similar sites outside London, but within areas of high population density. The tables below highlight the criteria applied to both searches of the TRICS database and the survey availability for each of the industrial land uses defined by the study.

Table 6.1: TRICS Selection Criteria

Criteria	London Surveys	Wider UK Surveys
Land Use	As per fourth column of Table 6.2	
Region	Greater London	All regions except those in Ireland and Greater London
Date range	Default (i.e. 01/01/08)	
Day of the week	Monday to Friday	
Location Types	Suburban area, Edge of town or Neighbourhood centre	
Population < 5 miles	No restriction	> 125,000

Table 6.2: TRICS Survey Availability

No.	Category	Sub-Category	TRICS Land Use	No. Sites in Greater London	No. Sites in Wider UK (Popn.>125k)
1	Industry	Light Industry	Single Industrial Unit (B1/B2)	3	14
		General Industry	Industrial Estate (B2)[10]	4	17
			Vehicle Repair Garage (Slow fit) (B2)	0	4
			Motorist Centre (Fast fit) (B2)	3	7
2	Storage and warehousing	Warehouses	Warehousing (Commercial) (B8)	3	4
		Self-storage	Warehousing (Self-store) (B8)	1	8
		Open Storage	n/a	-	-
3	Waste management and recycling	-	Civic amenity site	0	3
4	Utilities	-	n/a	-	-

[9] TRICS advise that users aim for a minimum sample of five to six surveys and this number could not be met for any of the land uses, so search criteria had to be broadened.

[10] The term industrial estate refers to a number of industrial buildings at the same site.

No.	Category	Sub-Category	TRICS Land Use	No. Sites in Greater London	No. Sites in Wider UK (Popn.>125k)
5	Land for transport functions	Land for rail	n/a	-	-
		Land for buses	n/a	-	-
		Airport elated land and freight	n/a	-	-
		Docks	n/a	-	-
6	Wholesale markets	-	Cash and carry (wholesale & clubs) (Sui generis)	0	4
		-	Builders merchant (A1)	0	1
7	Other industrial	-	Parcel distribution centre (B8)	2	2
8	Land with vacant building(s) with prospect of re-use	-	n/a	-	-
9	Vacant industrial land	Vacant cleared sites	n/a	-	-
		Vacant sites with derelict buildings	n/a	-	-

Comparison of London and Wider UK Samples

6.4.3 As a first step, Greater London survey data were compared with Wider UK data to identify how representative Wider UK sites are of London trends. The table below illustrates how much more / less traffic is generated by sites within Greater London, relative to those in the Wider UK.

Table 6.3: Comparing Daily Trip Generation

Land Use	London Trip Generation vs. Wider UK
Industrial Unit (B1/B2)	+131%
Industrial Estate (B2)	+154%
Vehicle Repair Garage (Slow fit) (B2)	n/a
Motorist Centre (Fast fit) (B2)	+90%
Warehousing (Commercial) (B8)	+145%
Warehousing (Self-store) (B8)	-57%
Civic amenity site	n/a
Cash and carry (wholesale & clubs) (Sui generis)	n/a
Builders merchant (A1)	n/a
Parcel distribution centre (B8)	+4%

6.4.4 Based on the survey data available, it appears that trip generation is more intensive for the majority of industrial land uses within London. However, the above statistics are based on very small samples of data, and so cannot be viewed as wholly representative without further supporting data.

6.4.5 The following sections compares trip generation characteristics of industrial land uses with each other, to provide a broad indication of the relative impacts of one land use over another on a Gross Floor Area (GFA) basis. Again however, these findings are based on very small samples sizes and must be viewed as such.

Greater London

6.4.6 The figure below illustrates trip generation per 100m² Gross Floor Area (GFA), for those industrial land uses in Greater London for which TRICS 7.3.4 holds vehicular traffic survey data.

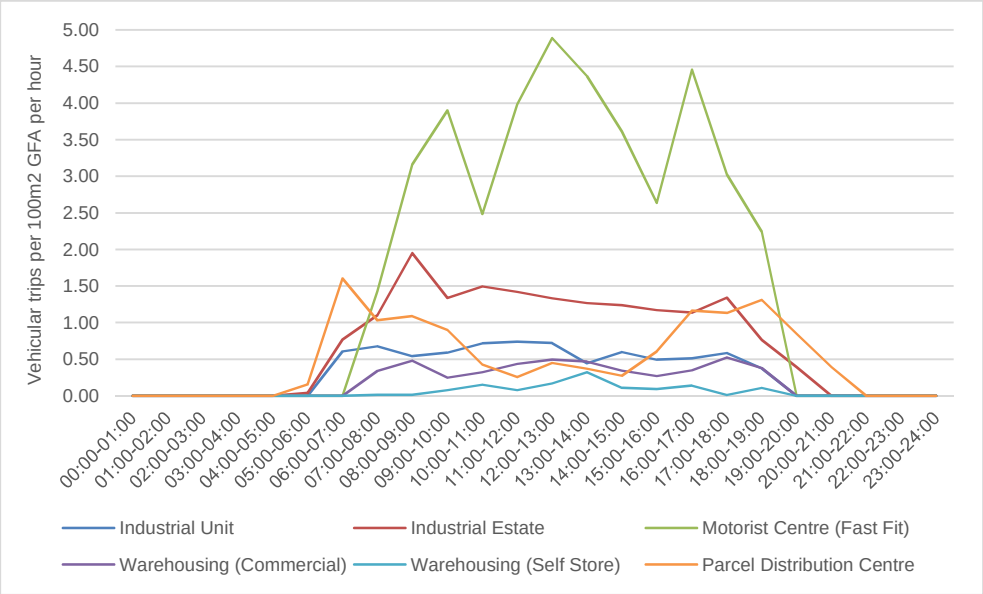


Figure 6.13: Greater London Industrial Trip Generation

6.4.7 The following key observations can be made:

- Vehicular traffic survey data is available for six industrial land uses in Greater London;
- By far the most intensive is the Motorist Centre, which is essentially a fast fit vehicle garage. Movements are focussed around lunch time and the start and end of the working day. TRICS data indicates these sites are often located in areas of good to high accessibility;
- Industrial estates are the second highest generator of traffic, at up to two trips per hour per 100m² GFA. With industrial estate surveys indicating an average GFA of 9,300m², this equates to circa 186 trip per estate. Trip generation is at its highest between 08:00 and 09:00;
- Interestingly, individual industrial units generate traffic at circa half the rate of industrial estates, looking at trip generation per 100m². This may be because industrial estates comprise a number of smaller operators for whom space is at a premium and so more intensively used; and
- Parcel distribution centres appear to generate trips over the longest period, with peaks at the start and end of the working day; however, it must be noted that TRICS surveys do not always cover the entirety of a site's opening hours, instead focussing on the period 07:00-19:00. For example, parcel distribution centre HO-02-G-03 (TRICS ref) remains open 24 hours a day, seven days a week.

Wider UK (Population within 5 miles >125,000)

6.4.8 Given the small sample of sites available within Greater London itself, it was necessary to widen the criteria applied to TRICS. It was decided to also look at industrial sites in mainland UK, with high surrounding population density. The figure below illustrates trip generation per 100m² GFA for industrial land uses in Wider UK included within the TRICS 7.3.4 database.

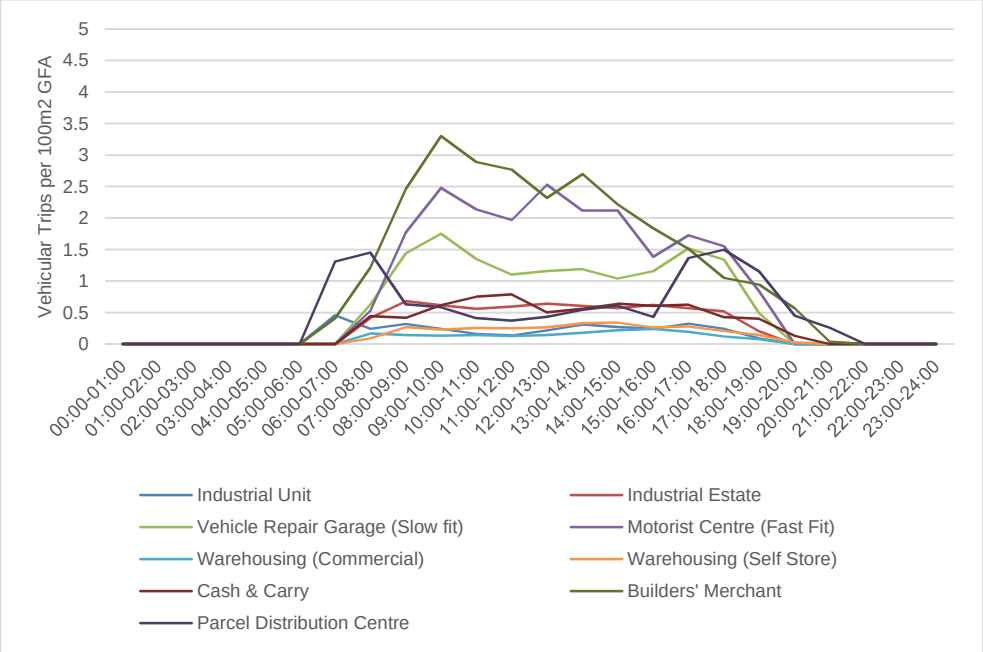


Figure 6.14: Wider UK Industrial Trip Generation per 100m² GFA (excl. civic amenity site)

6.4.9 Being largely unenclosed, TRICS provides trip rates for civic amenity sites in terms of trips per hectare, rather than trips per 100m² GFA. The figure below illustrates trip generation over a weekday. Industrial estate trip generation is provided on a per hectare basis also for context.

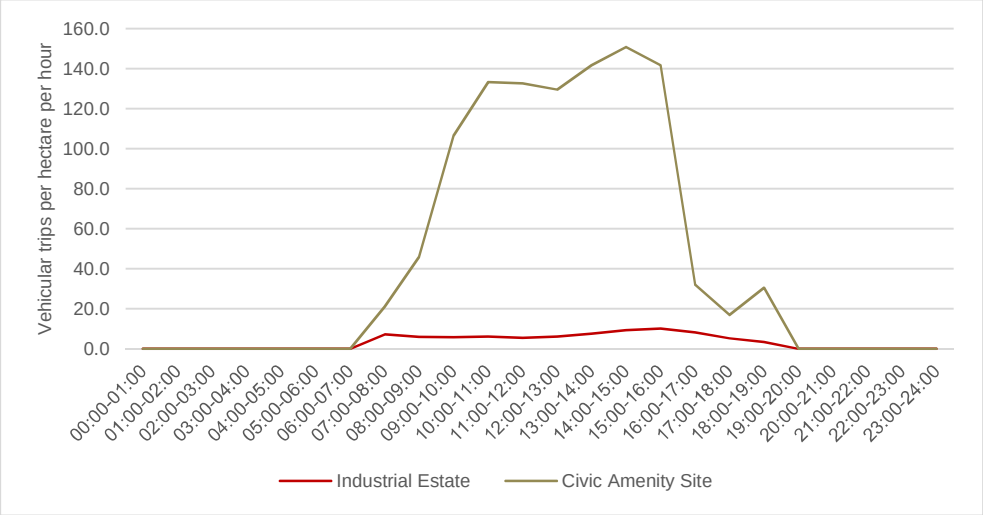


Figure 6.15: Wider UK Industrial Trip Generation per Hectare (Civic amenity site)

6.4.10 The following key observations can be made:

- Land uses which have a comparatively small site area typically generate traffic more intensively (e.g. civic amenity site, builders' merchant, motorist centre (fast fit), vehicle

repair centre (slow fit)). Additionally, it is considered unlikely that many copies of each of these land use types will be located in close proximity given their competitive nature;

- Assuming that the other industrial uses shown above share a similar GFA to site area relationship, then civic amenity sites generate considerably more traffic per hectare than any other industrial use studied; and
- Builders' merchants generate the second highest amount of daily trips, with peaks during 09:00-10:00 and then to a lesser degree at 13:00-14:00.

Mean UK

6.4.11 The figure below illustrates mean trip generation for all Greater London and Wider UK surveys obtained from TRICS. Again, given that civic amenity site trip generation is only available on a per hectare basis, two separate graphs have been produced with industrial estate appearing on both to provide context.

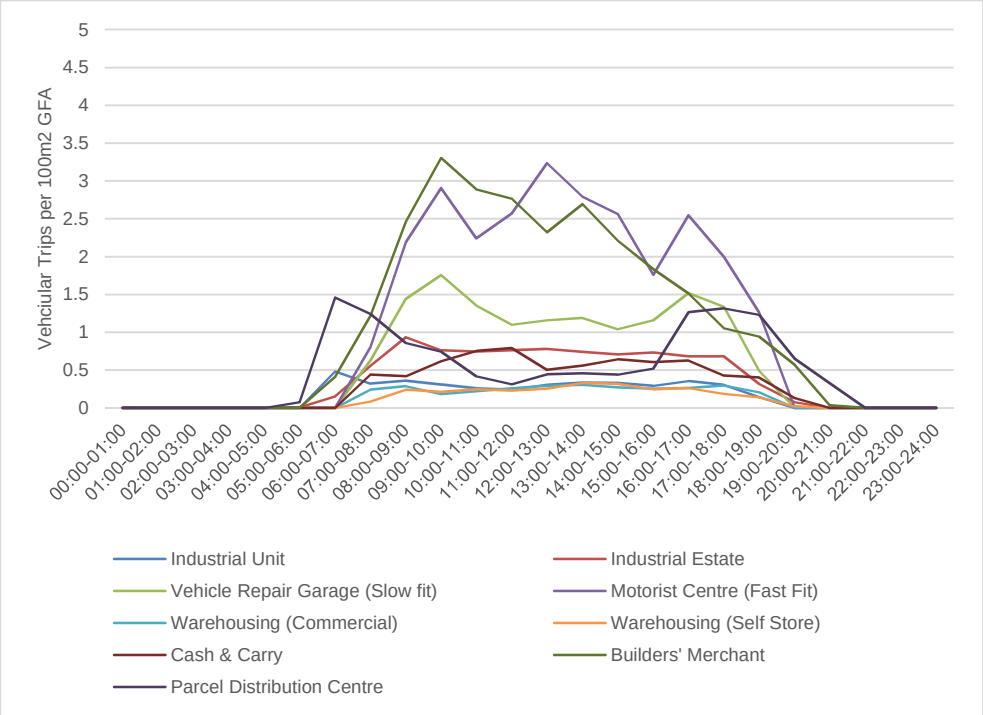


Figure 6.16: Mean Industrial Trip Generation per 100m² GFA

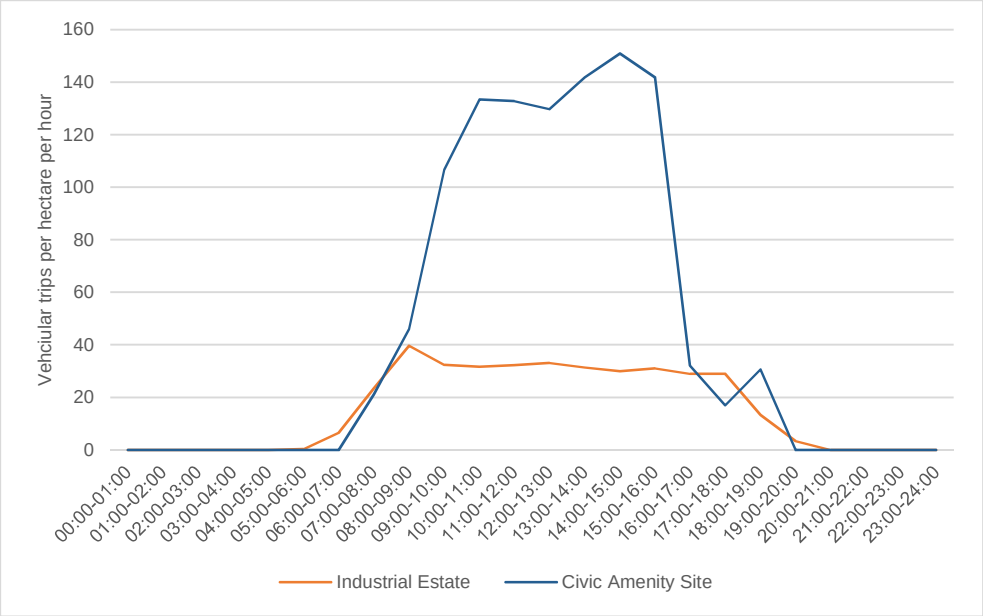


Figure 6.17: Mean Industrial Trip Generation per Hectare (Excl. Civic amenity site)

6.4.12 The following key observations can be made:

- The graphs above illustrate mean trip generation only for those sites for which TRICS data was available for both Greater London and Wider UK. Trip generation for civic amenity sites, vehicle repair garages, cash and carry and builders' merchants only reflect data for sites outside London;
- At this level, peak trip generation from Motorist Centres is approximately equal to that of Builders Merchants, illustrating the strong upward pull of London sites; and
- Similarly, at peak trip generation civic amenity sites generate 15 times the amount of traffic per hectare generated by industrial estates in the Wider UK; however, following the inclusion of London sites this margin reduces to less than three times.

6.4.13 In summary, the TRICS database was interrogated to obtain traffic surveys for industrial land uses in Greater London; however, only some land uses were covered by the database and, where data was available, samples were too small to make reliable inferences.

6.4.14 As such search criteria were broadened, and consideration also given to trip generation at other industrial sites within mainland UK where population density was high. This yielded data for a wider range of industrial sites, and this data was compared with that available for Greater London sites to identify how relevant these sites may be to the London context.

6.4.15 The main findings of this review are highlighted below:

- For four of the noted industrial land uses TRICS could not provide any data for Greater London sites and for six industrial land uses TRICS provided 1-4 traffic surveys. However, TRICS recommends a sample size of at least five or six surveys;
- The very small samples of London data present difficulties in reliably forecasting trip generation within London and also identifying how representative surveys from Wider UK may be of London traffic characteristics. Nevertheless, data from both sources was reviewed, and the below findings are caveated as such;
- In four of six cases trip generation at Greater London sites is substantially higher than at Wider UK sites. At parcel distribution centres, trip generation was comparable and at self-store warehouses substantially lower;

- Larger peaks were seen within data from Greater London sites, and at Industrial Estate and Commercial Warehousing sites these peaks intersect with typical wider network peaks of 08:00-09:00 and 17:00-18:00; and
- The greatest generators of traffic on a GFA / site area basis are civic amenity sites, builders' merchants and car garages (fast or slow fit). These sites are typically smaller, and so it may be the case that trip generation is more intensive where industrial areas comprise a number of smaller operators, particularly those where they interact directly with the public. It was similarly found that industrial estates generate trips at approximately twice the rate of individual industrial units, when considering trips based on GFA.

6.5 Summary

6.5.1 This chapter has presented the available observed and modelled evidence concerning the scope and scale of transport demand associated with the key SIL sites in London. Analysis of census data provides a definitive guide to commuting patterns to the top 12 SILs which has revealed a mix of very local catchments at some sites and much more dispersed patterns at others. This analysis would allow a qualitative assessment to be made of the impact on commuting patterns of any relocation of activity out of the SIL. For all but the most local moves, the likelihood is that any relocation would lead to increased commuting distances or the potential loss of local staff.

6.5.2 TfL's LoHAM model has been used to provide a high level assessment of the totality of road based transport associated with the same top 12 SILs. In the main, the modelled travel patterns show a more local pattern for car traffic (as it includes commuting) and a more dispersed pattern for LGV / OGV traffic. Interestingly, for most sites the percentage of LGV / OGV traffic associated with London Central Services PMA and destinations outside London is similar.

6.5.3 Analysis of TRICS survey data has provided limited insights given the relatively small number of relevant entries in the database. Nevertheless, the analysis has provided some insights into the trip generation rates at individual sites and also the pattern of traffic across the day.

7 What Happens when Industrial Land is Released?

7.1 Introduction

7.1.1 When industrial land is released for housing, there are a range of behavioural responses available to occupiers of these sites. In short they can either:

- cease operating altogether;
- intensify activities on their current site (if any remains);
  - this would have the effect of concentrating activities and may create local transport issues if for example the number of site accesses is reduced. There would be limited area wide impacts as the same quantum of travel is being generated with the same origin-destination pattern.
- co-locate with housing and industrial land on the same site;
  - this outcome would depend on wider cohabitation issues depending on the nature of the industrial activity being undertaken and its suitability for proximity to residential development; and
  - this outcome should also focus on sites with a high degree of present and forecast connectivity by public transport. This is explored further later in this report where we have determined which areas have the best access to jobs and population by public transport.
- relocate to a new site or intensify activity at an existing site away from the area affected by land release.

7.1.2 The impact of this latter effect will depend on where the relocated operating moves to when displaced off of its current site. This is explored further in the next section.

7.2 Postal relocations data

7.2.1 This section explores the net impact of industrial businesses entering and exiting the current SILs, and also looks at where the departing businesses are moving to. Whilst there is not a central dataset which tracks business relocations, through their Business Mail Redirection service, the Royal Mail has compiled an extensive record of original and forwarding business addresses. TfL provided a copy of this dataset, which included records of 94,500 business mail redirections which occurred within the UK between January 2005 and May 2016. The dataset provided the following information:

- origin and forwarding destination postcodes;
- business type (Limited Company, Partnership, Sole Trader, Club, Society, Charity or Voluntary Organisation, Liquidator, Receiver or Trustee in Bankruptcy); and
- number of employees.

7.2.2 Although mail redirection data indicates that a business is no longer likely to be operating out of one address any longer, it cannot confirm that the business has physically moved to the redirection address in the same form, or at all. For example, a significant proportion of business moves from the Park Royal SIL have destination addresses in central London, but it is expected that the majority of these represent a forwarding address only, rather than the actual relocation of the industrial activities.

7.2.3 The data is also restrictive in that it does not note which relocations relate to industrial

businesses, and so it has been assumed that those businesses that have moved to or from a SIL are indicative of wider trends in industrial land use.

Approach

7.2.4 ArcGIS was used to plot origin and destination postcodes for each business move, and these were categorised according to the SIL, London Borough and PMA they fell within. This data was then used to identify where those leaving each SIL were moving to, and where new arrivals were coming from, in addition to quantifying net business movements at SIL, borough and PMA levels.

7.2.5 The full dataset contained 94,563 business move records. In order to make the analysis manageable, a second dataset was created which only included records relating to business relocations **where either origin or destination fell within a SIL** (excluding those where both origin and destination within same SIL). This second dataset was considered to reflect businesses with an industrial function and included a still substantial 4,810 records.[11]

Net impact of business relocations

Property Area Level

7.2.6 In the first instance, relocations to and from SILs were considered at a PMA level, and net flows per PMA are illustrated in the figure below. For the purposes of comparison, net flows for the entire sample (all business types whether located in a SIL or not) are also shown via the dashed green line for context.

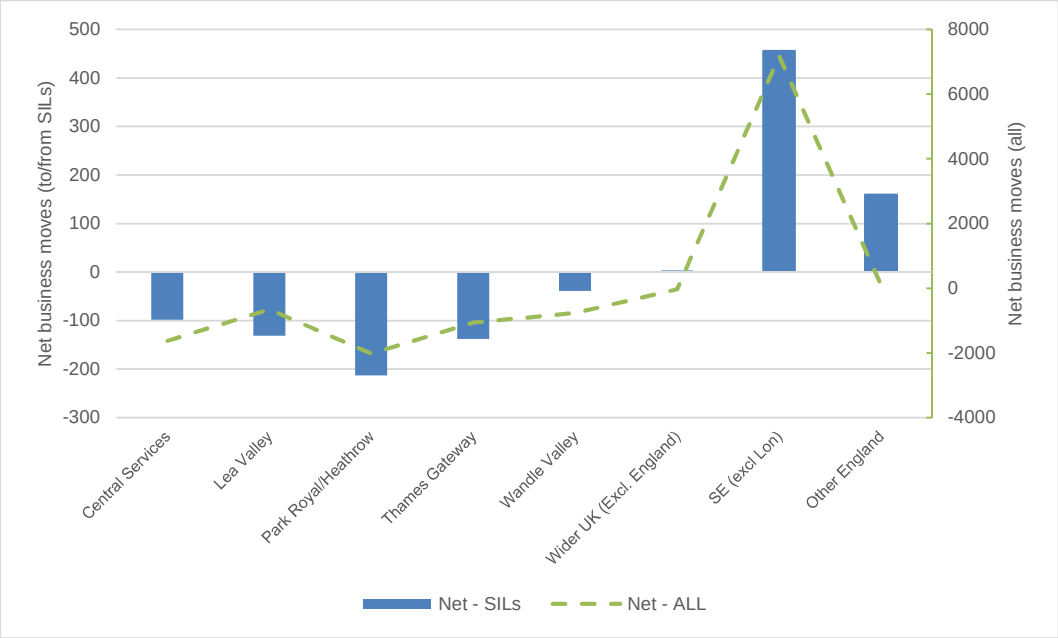


Figure 7.1: Net Relocations at a Property Area Level, 2005-16

7.2.7 This data indicates net SIL losses within all London property areas (i.e. more firms moved out of SILs than into SILs) and gains outside of London. Trends identified in the SIL area data broadly reflect those seen in the entire dataset; however, a smaller proportion of industrial businesses appear to be leaving Central Services and Wandle Valley areas. This confirms that at the SIL level and across all London, there is a net outflow of businesses.

7.2.8 Also, it appears that SIL-based businesses are more likely to move further afield (beyond

[11] Data for LSISs could conceivably also be analysed, but resources here had to be focussed on the main SILs.

London and SE) than the average business. This may reflect the sensitivity of industrial business types to increasing rental costs.

London Borough Level

7.2.9 The figure below shows the same data (net business relocations) at a London Borough level. The bar chart indicates trends in relocations of industrial businesses (to / from SILs) and the line graph provides the context of full sample. **Bars are shaded blue where boroughs contain SILs and red where there are no SILs in that borough**.

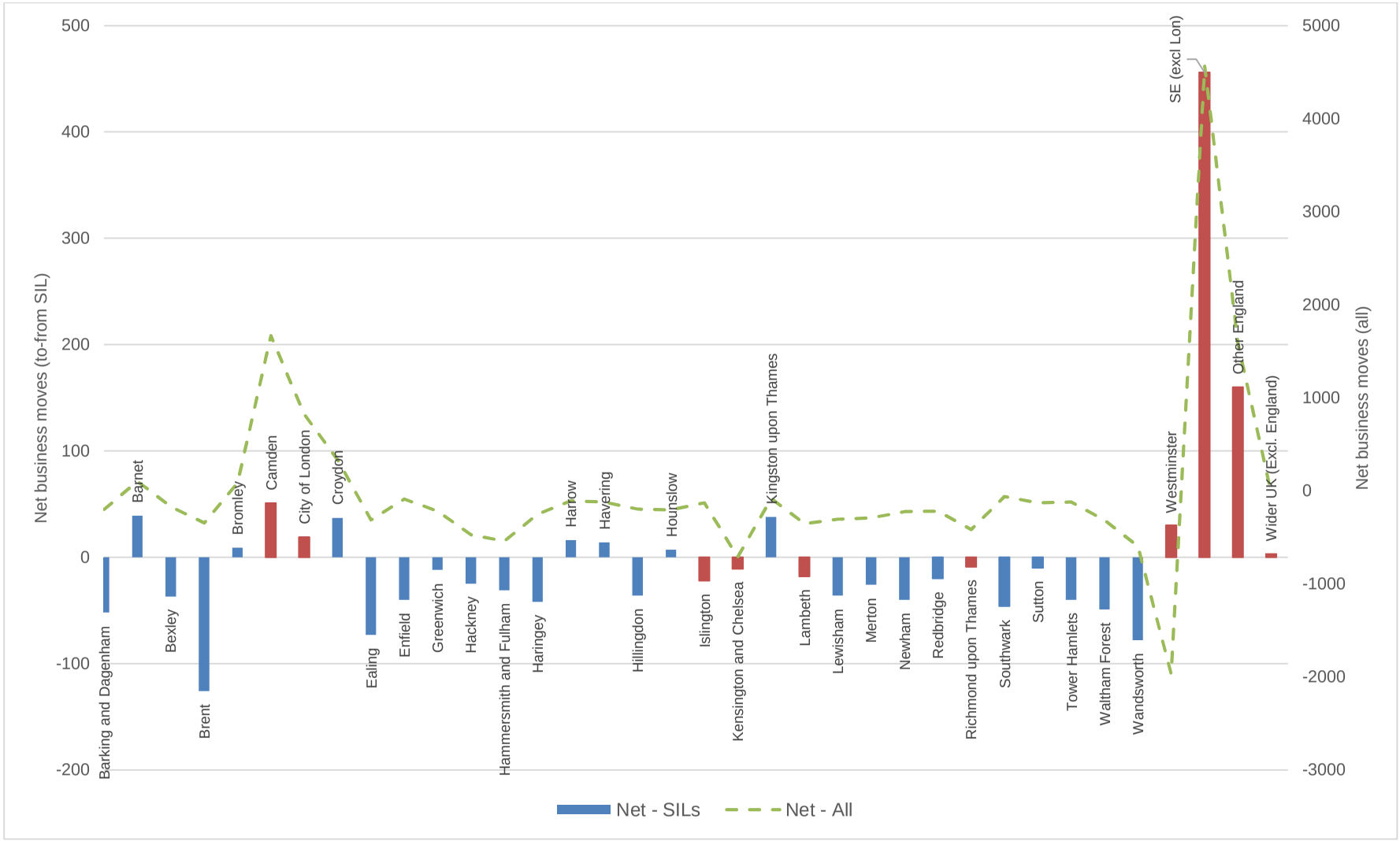


Figure 7.2: Net Relocations at a Borough Level

7.2.10 The majority of London Boroughs (23) show a net loss in terms of industrial / SIL businesses, with net losses being most pronounced in Brent, Ealing and Wandsworth. Losses are also noted from some boroughs that do not contain SILs, indicating that industrial businesses have left these areas to move to SILs.

7.2.11 Industrial gains have been identified in 10 London boroughs, with these being most pronounced in Barnet, Camden, Croydon and Kingston upon Thames. Some of these areas (e.g. Camden, City of London and Westminster) do not contain SILs at present and are considered unlikely to host industrial uses in the future; therefore, it is assumed that these relocations more likely to be representing forwarding addresses than the physical relocation of industry.

7.2.12 At a London Borough level, there is less of a similarity between the bar graph indicating trends in net SIL relocations and the line graph illustrating trends in all business relocations.

SIL Level

7.2.13 Focussing on the SILs themselves, there is significant variation in terms of net business relocations between sites:

- 33 SILs show a net loss of businesses;
- 3 SILs show no impact (no business relocations were found in the Hackney Wick and North Circular Road SILs); and
- 20 SILs show a net gain.

7.2.14 The figure below categorises each SIL by the net number of business relocations (note that the -10 to +10 category has been included to represent no real change).

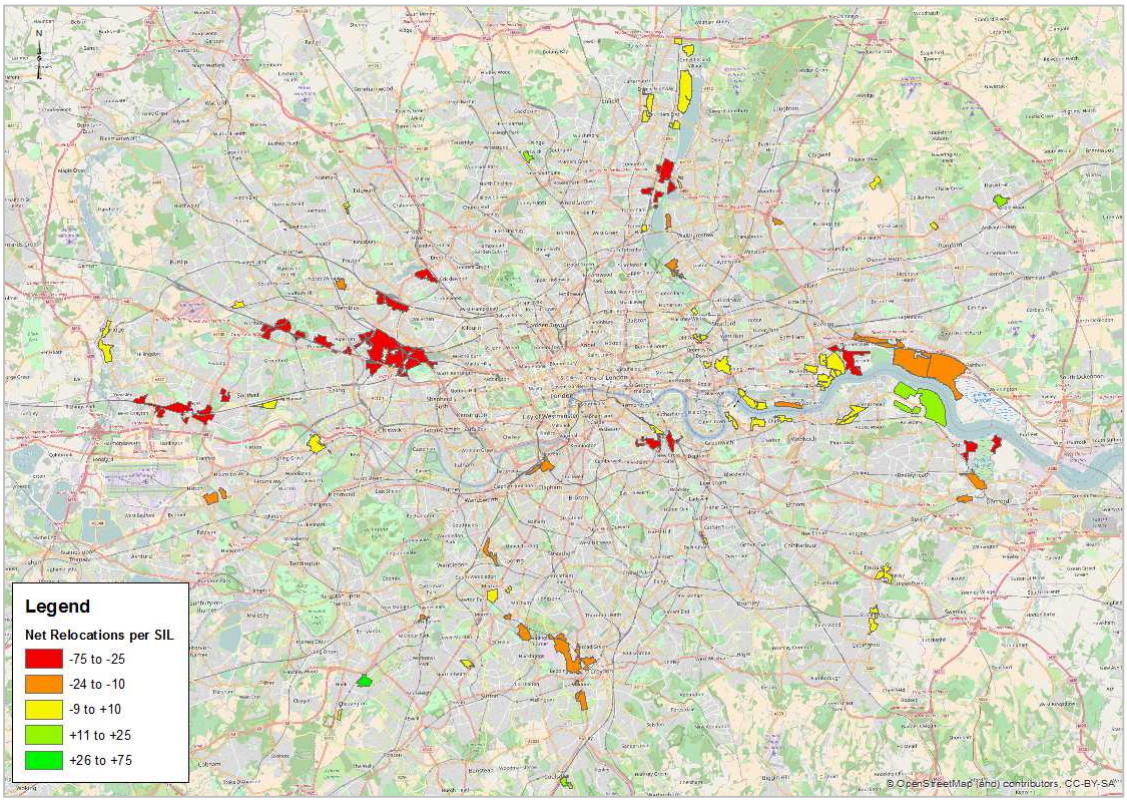


Figure 7.3: Net Relocations per SIL

Spatial Distribution of Relocations from Industrial Areas

7.2.15 In total 4,810 business address relocations were recorded where a business entered or exited a SIL[12]:

- 52% relate to businesses moving **from** a SIL to a new location not contained within a SIL – this suggests some industrial businesses may be moving to undesignated sites or LSISs;
- 7% of records relate to businesses moving **from** one SIL to **another**, a very small proportion suggesting limited supply options; and
- 41% of records relate to businesses moving **to** a SIL from outside.

7.2.16 Therefore, on the whole, there has been a loss of businesses from SIL sites and when leaving a SIL, the large majority of firms do not relocate to another SIL. The question is: where are they going?

7.2.17 The figure below illustrates the varying proportions of SIL occupants who moved **from** a SIL to:

- premises in the same SIL;
- premises in the same PMA (excluding the same SIL);
- premises in a different PMA;
- premises outside London in south east England; and
- premises outwith south east England.

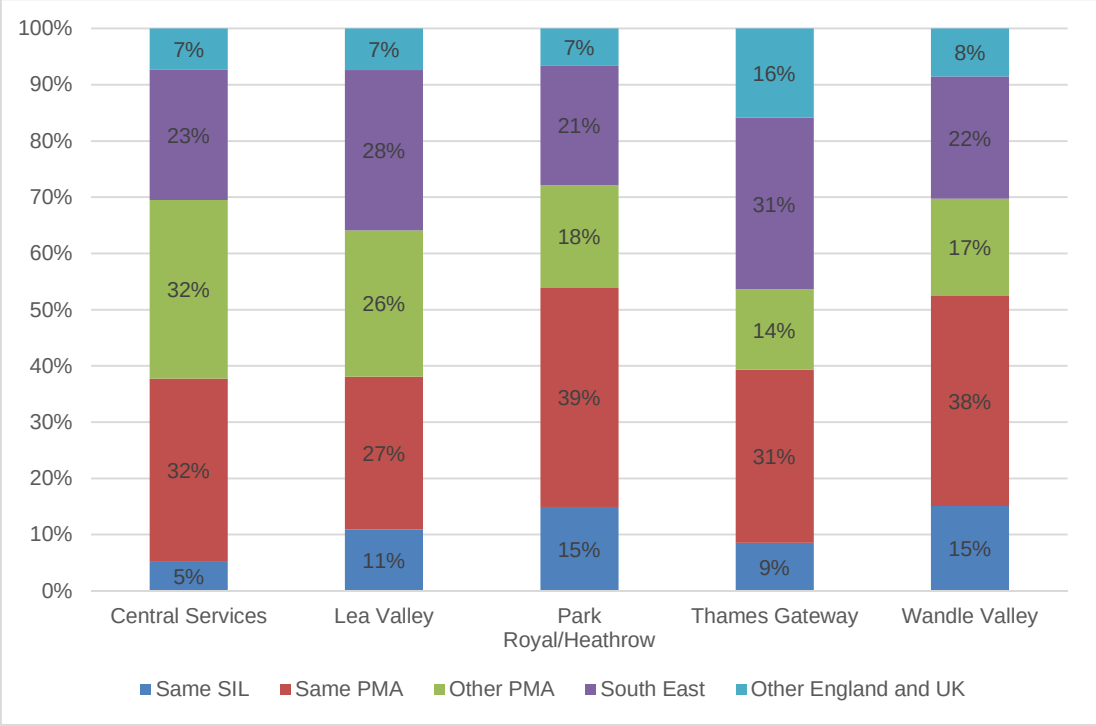


Figure 7.4: Proportion of businesses relocating from SILs to various area types, by property area

[12] Excluding those records where a business moved from one location to another within the same SIL site, a total of 405.

7.2.18 Those in Park Royal / Heathrow and Wandle Valley areas are most likely to have remained within the same property area, and those within Central Services and Lea Valley are most likely to have moved out of their PMA. Those in Thames Gateway are most likely to have left London with circa 47% moving to South East or wider UK. This may be a function of the close proximity to large industrial and port areas to immediate east, such as Grays and Tilbury.

7.2.19 It is notable that in all cases except central Services, 'south east' is the most popular destination, if moving outwith their current PMA. This would suggest that if a local alternative location cannot be found, the most frequent course of action is to move out of London but remain close to London.

7.2.20 In more detail, the figure below provides a breakdown of the destinations of firms moving out of SILs to other PMAs within London. Of the 600 observed moves from SILs to other PMAs in London, 372 provided a forwarding address in the Central Services area. As these can primarily be regarded as forwarding addresses only, these have been excluded from this chart.

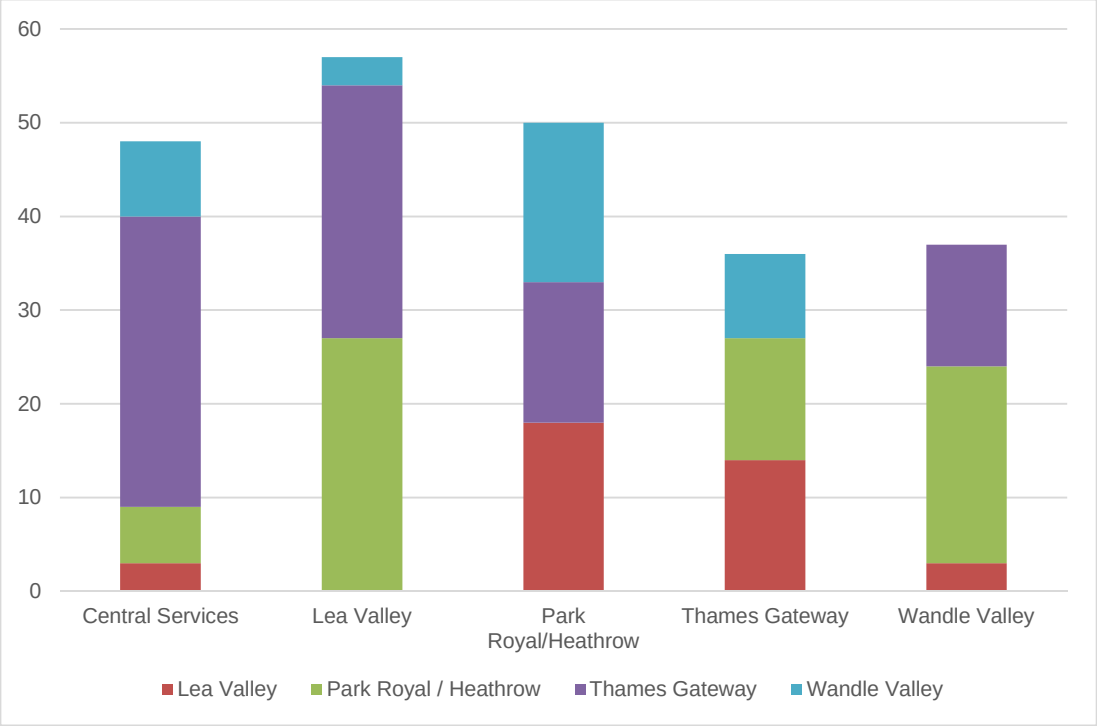


Figure 7.5: Businesses relocating from SILs to locations in London (outwith current SILs)

7.2.21 Wandle Valley and Lea Valley see the lowest number of outward moves of this nature, with Thames Gateway hosting the largest number of these moves. It can be seen that it is not always the case that a move of this nature is made to a neighbouring PMA.

7.2.22 Similarly, notable variability can be seen at a borough level as is shown in the figure below. The figures in brackets indicate the number of firms relocating from SILs within each borough. For example, all of the businesses moving from SILs in Barnet appear to have remained in London, but 60% of those in Bromley have left.

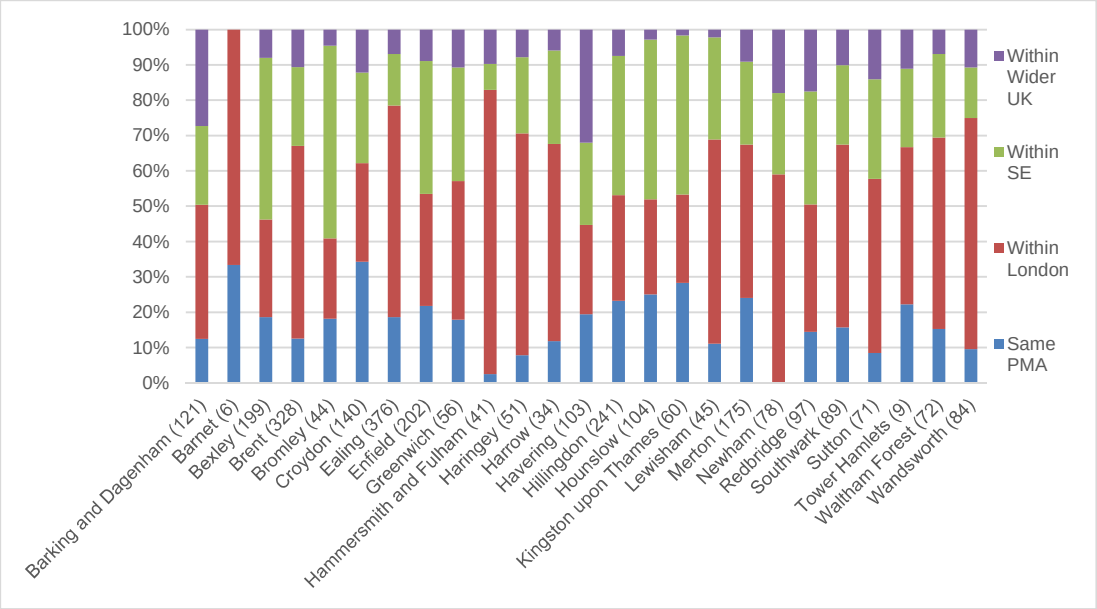


Figure 7.6: Proportion of businesses relocating from SILs to various area types, by London Borough

7.2.23 Circa 2,800 business relocated **from** SILs over the data collection period. The figures below illustrate firstly the origin locations of these businesses, by borough, and secondly the destination locations of these businesses, where they fell within London.

7.2.24 So for example, in the first graphic below, the largest number of relocations **from** SILs were in Brent and Ealing with between 251-400 relocations each.

7.2.25 The second graphic shows that that numbers relocating **to** destinations within London are far lower overall. Note that moves within the same SIL are excluded here.

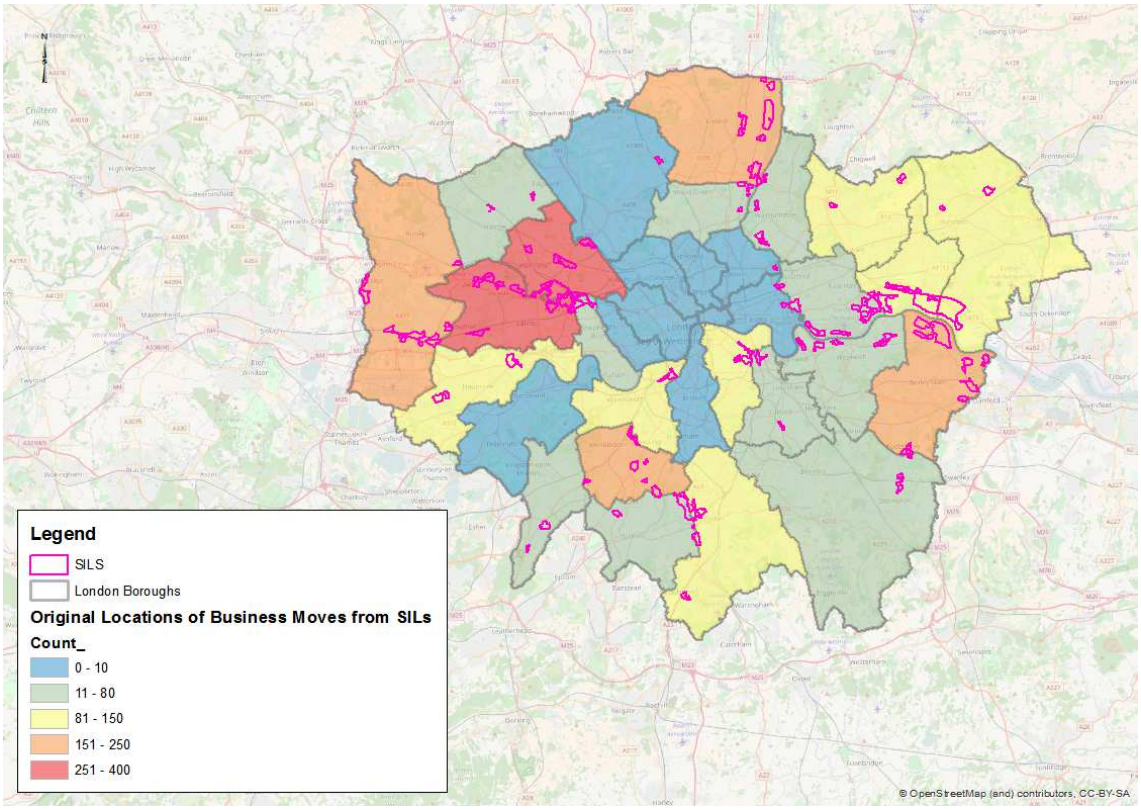


Figure 7.7: Original locations of businesses relocating from SILs

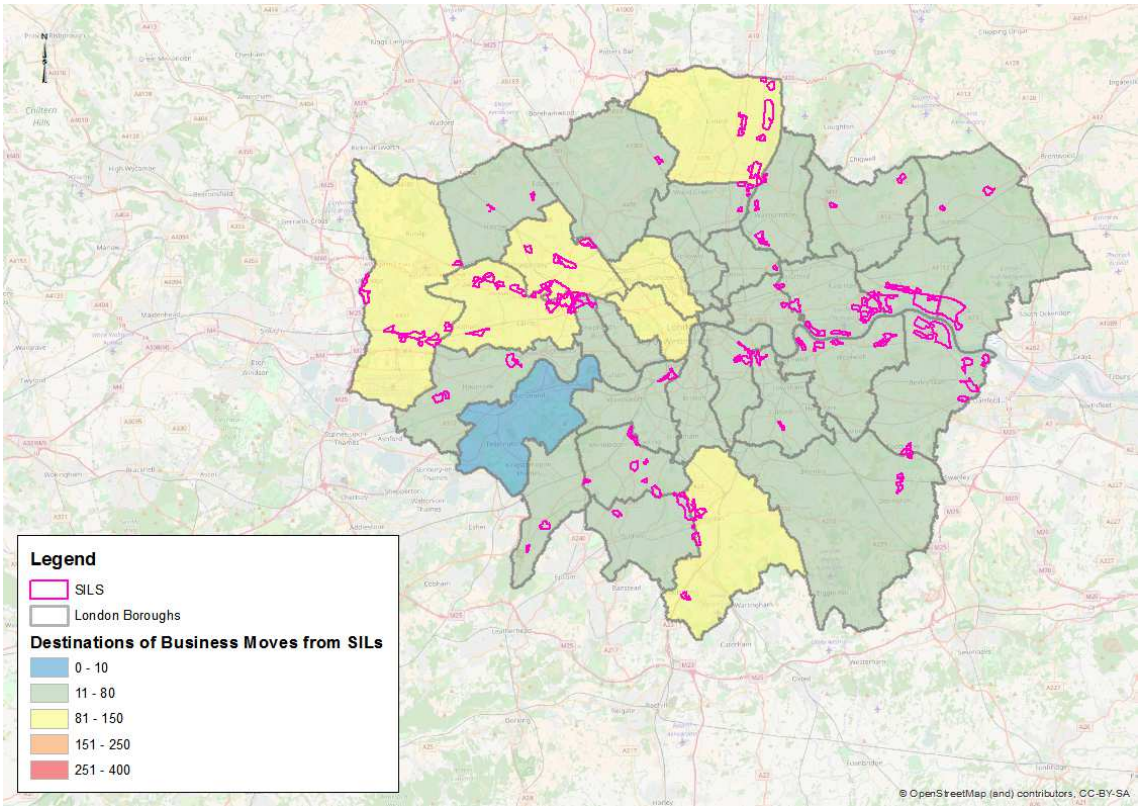


Figure 7.8: Destinations of businesses relocating from SILs

7.2.26 Clearly, many businesses previously located in SILs have left London all together, and many boroughs have seen a net loss of businesses based in SILs.

Impacts on Key SILs

7.2.27 Detailed analysis was undertaken to look at the net impacts of businesses moving into and out of the largest 12 SILs and also review the most common origins and destinations of these businesses. Key findings are summarised below:

- Alperton / Greenford, Central Leaside, Dagenham Dock, Hayes Industrial Area, North Feltham, Park Royal and Wembley SILs show a shortfall of arrivals versus departures of more than 10%. This suggests that these SILs have either become emptier or units have been merged and taken up by larger businesses. Impacts are particularly pronounced at Central Leaside and Wembley, where arrivals made up less than 50% of departures.
- Brentford, Brimsdown, Purley Way and Uxbridge SILs show negligible (+/-10%) change in the number of businesses on site.
- At the Morden Road SIL, 14% more businesses have arrived on-site than departed. This suggests that the site was not previously at capacity, and / or that larger units have been broken up such that they can accommodate a greater number of businesses. Nevertheless, these sites do not appear to have suffered from current trends in industrial land use.
- Most relocations occur from SILs to adjacent boroughs, outside of SILs; however, an average of 35% of departures have destinations outside of Greater London. This loss from London is most pronounced in Brimsdown, Dagenham Dock, North Feltham and Uxbridge SILs where 50-60% of businesses leaving the estate left Greater London. These estates are located on the outer edges of the city, but there is not a simple relationship between distance from city centre and likelihood to move outside. It appears that, new sites in existing or adjacent boroughs are most attractive, but if a suitable site cannot be found in the area, then businesses appear to have a preference to leave London than move to the opposite side of the city – this point is explored further in Chapter 9.
- Also, across all SILs 8% of departing businesses have a forwarding address in central London, specifically within the boroughs of Camden, City of London, Islington, Kensington and Chelsea, or Westminster, which do not host meaningful industrial land uses. This figure reaches 20% at Park Royal, where 75 businesses departing the park had destinations in these boroughs. The reasoning for this variation across the SILs is unknown, and it can only be assumed that these industrial sites have ceased operation and relocation destination relates to a forwarding address only.

7.2.28 A graphical analysis of business moves out of SILs has been undertaken for each of the top 12 SILs. The resulting images can be found in the accompanying PowerPoint. A sample image is included below for Park Royal showing forwarding addresses of businesses moving out of Park Royal but staying within London. A further image shows relocations to destinations outside London in south east England.

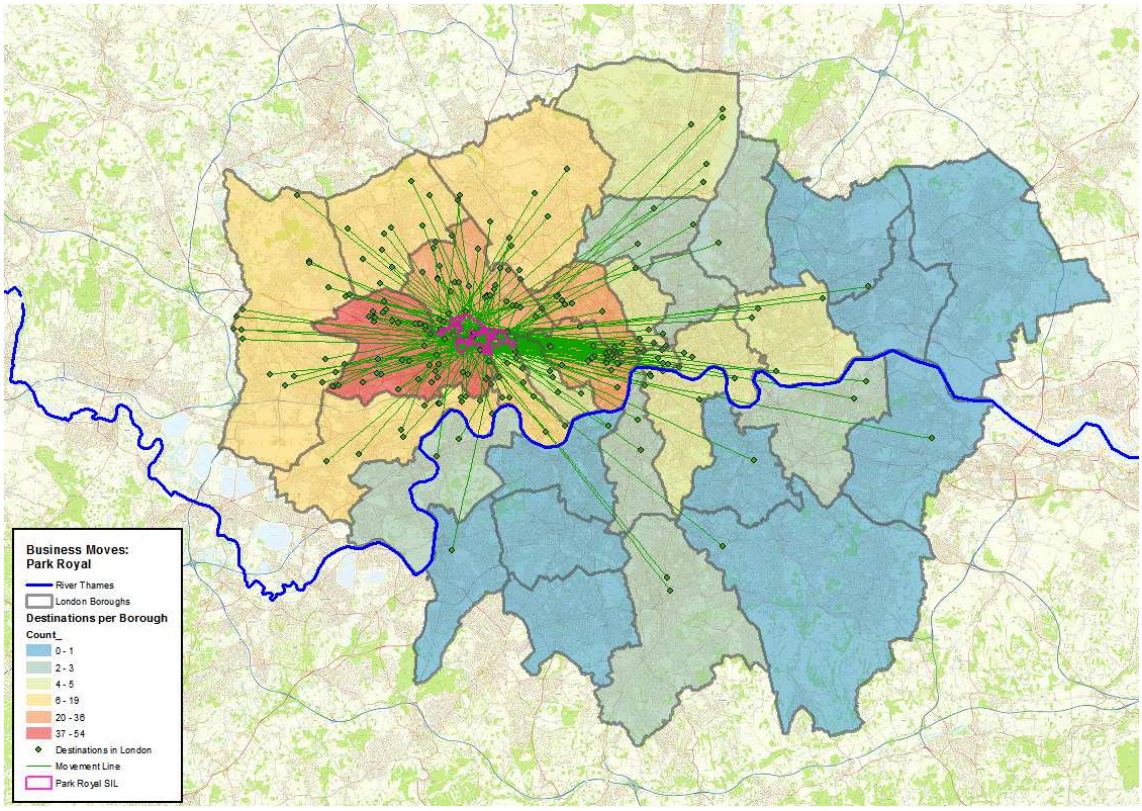


Figure 7.9: Postal Relocations Data – Moves out of Park Royal SIL (destinations within London)

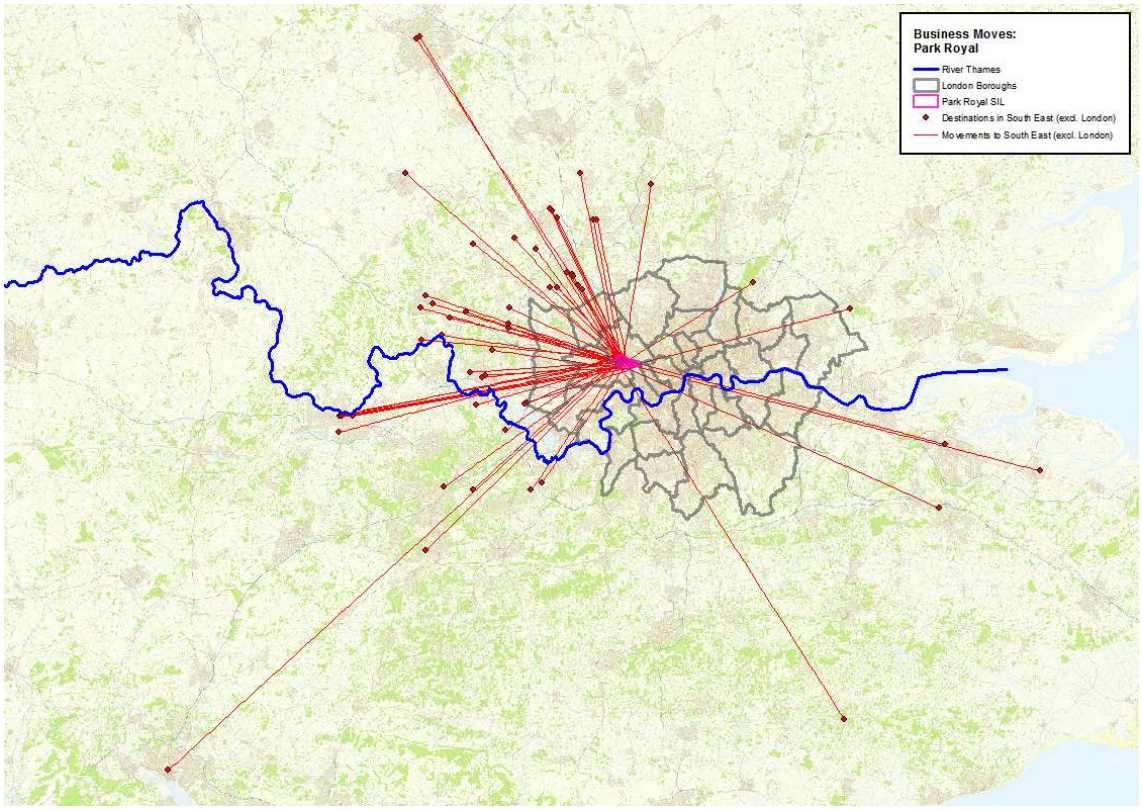


Figure 7.10: Postal Relocations Data – Moves out of Park Royal SIL (to South East England)

7.2.29 These two figures illustrate two key behaviours: (i) where moves are made within London, they tend to be relatively short distance; and (ii) from Park Royal SIL, moves out of London

are typically made to the north west quadrant of south east England.

7.3 'Out' Commuting

7.3.1 The section above has determined that movements from SIL areas to locations outside London but in the south east are common. The degree to which staff currently resident in London would 'out commute' would determine the potential impact of such a move on staff retention.

7.3.2 To investigate the level of out-commuting from London to key employment centres around the south east, the '*Datashine*' website was used to extract commuting patterns to selected illustrative towns around the area.

7.3.3 The images captured below provide a visual representation of the origin of commuting trios to (clockwise from top left): Harlow, St Albans, Crawley and Thurrock.

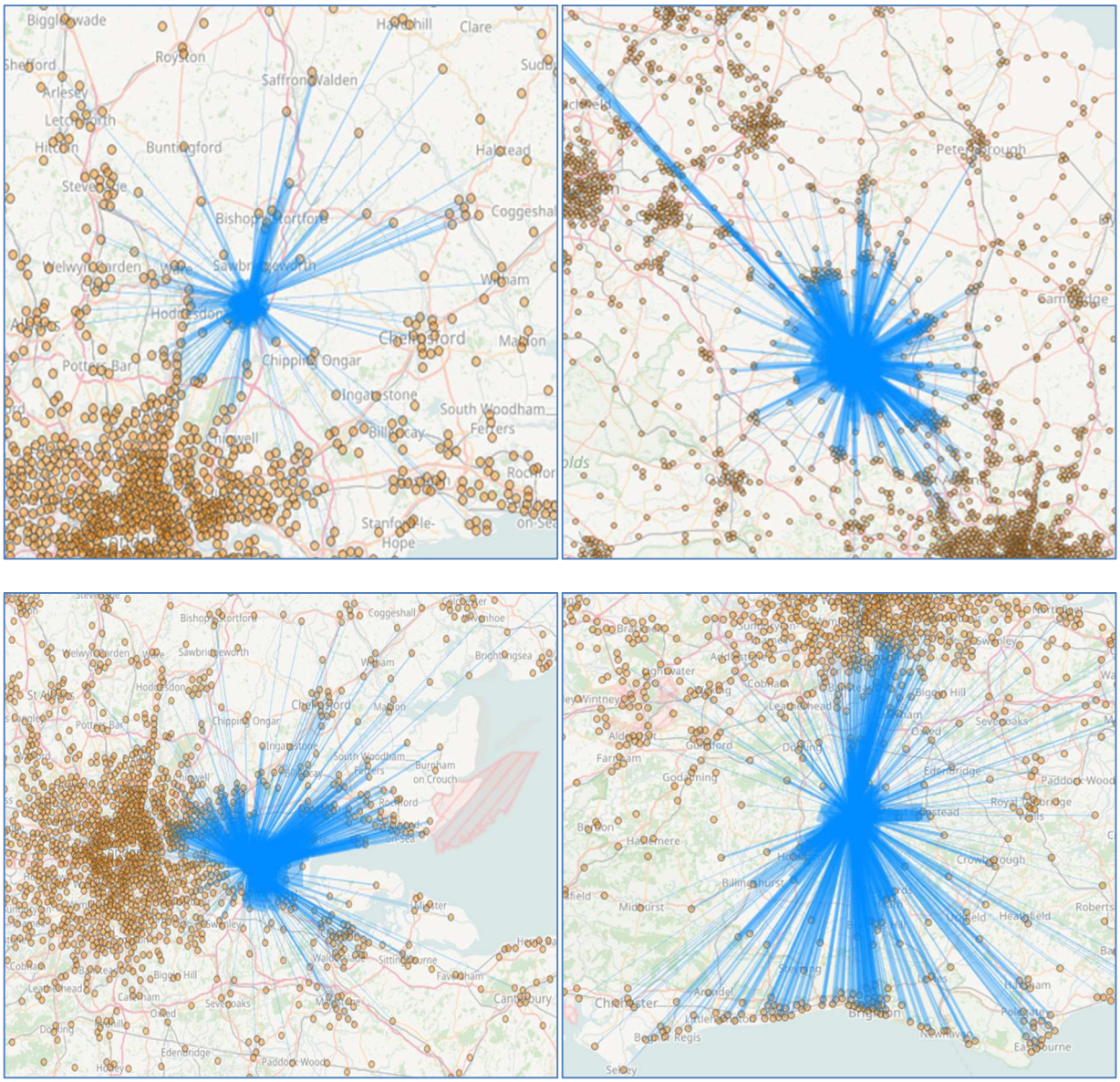


Figure 7.11: Commuting Patterns into Sample Towns in the South East (Datashine)

7.3.4 These figures suggest that there is limited 'out commuting' from London to these towns,

particularly in the north and west of London. Where this is the case, it would suggest that there may well be staff retention issues associated with moving out of London, if there are other employment opportunities locally. Alternatively, perhaps in the medium term, staff with specialist skills in particular may choose to follow the employment and move out of London.

7.4 Summary

7.4.1 This chapter has set out the range of behavioural responses potentially resulting from the release of an industrial land site for housing. The analysis of postal relocations data provides valuable insights into the destination location of those companies moving out of SILs. The two main responses are:

- (i) move within the same PMA, maximising the potential to retain labour and minimising any transport impacts – this may reflect those for whom access to central London is important; and
- (ii) move out of London to the wider south east – potentially reflecting those for whom access to central London is less important. This clearly implies a much bigger change for the firm, as the evidence from census data suggest that the amount of out-commuting from London to typical industrial sites in the wider south east is limited.

8 Where Should Industrial Activity be Located?

8.1 Overview

8.1.1 The impact of any redistribution of economic activity currently based on industrial land will depend on where that activity is subsequently sited. In order to provide an evidence base to inform any discussions regarding the future location of these activities, two further pieces of analysis were undertaken:

- A series of connectivity indicators were developed to illustrate the **most suitable locations** in terms of providing access to London's jobs and London's population – these provide guidance as to where to locate industrial land in future to ensure good connectivity to commerce and population in London; and
- A corridor-based analysis of increases in traffic congestion over the present day – locating activities in or within the sphere of influence of congested corridors would have a greater impact on traffic and congestion than in less congested corridors.

8.2 Connectivity Indicators

8.2.1 This section examines the level of transport connectivity at the SIL sites relative to all other locations in the capital. The analysis utilises journey time outputs from LoHAM highway model and TfL's public transport assignment model (Railplan) to develop a series of connectivity indicators across London.

Data Sources

8.2.2 Road and public transport journey time data was taken from the LoHAM and RailPlan models which were provided by TfL. The models provide a detailed representation of the London area and beyond comprising nearly 5,200 zones. This data provided covered the following:

LoHAM

8.2.3 Road based travel times between all zones in London & south east England and all zones in London for the following:

- Modelled year: 2012 (Base Year) & 2031;
- Modelled time periods: AM Peak (08:00–09:00) & Inter Peak (10:00–16:00 average hour);
- User classes: Car, representing road based travel; and
- Population and employment data by LoHAM zone in the base and forecast years.

RailPlan

8.2.4 Public transport travel between all zones in London & south east England and all zones in London for the following:

- Modelled year: 2011 (Base Year) & 2031;
- Modelled time periods: AM Peak (07:00–10:00) & Inter Peak (10:00–16:00); and
- Population and employment data by RailPlan zone in the base and forecast years.

8.2.5 These data were used to develop connectivity indicators as set out below.

Approach

Hansen Indicators

8.2.6 'Hansen' Connectivity Indicators provide a measure of the relative connectivity (based on travel times) of a set of 'origins' to all possible 'destinations' in a defined study area, weighted by a chosen destination 'criteria' (typically employment or population), with resulting high scores indicating good connectivity and low scores suggesting poorer connectivity. A weighting is applied in the calculation such that opportunities at more distant locations (i.e. with a longer travel time) are 'worth' less than opportunities closer by, much in the fashion of a gravity model. The weightings in this case were developed from analysis of National Travel Survey journey purpose by distance data. Each calculation produces a single value for each model zone reflecting its connectivity to all other zones (the so called 'Hansen' value). These values are unitless and are primarily intended to show the connectivity of zones relative to one another, rather than in any absolute sense.

8.2.7 These values have been calculated for all LoHAM and RailPlan zones in London allowing the relative connectedness of all areas of London and the south east to be compared on the same basis. The following connectivity indicators have been developed:

- Access to all employment within London – representing **business to business connectivity**, important for organisations whose primary purpose is to serve other businesses for:
  - Road vehicle based & public transport based on an average of AM peak and Inter-Peak travel times; and
  - 2011 and 2031, using travel times by mode and base and forecast year **employment**.
- Access to all population within London – representing **business to people connectivity**, important for organisations whose primary purpose is to serve London's population for:
  - Road vehicle based & public transport based on an average of AM peak and Inter-Peak travel times; and
  - 2011 and 2031, using travel times by mode and base and forecast year **population**.
- The indicators developed for 2031 therefore account for modelled forecast increases in traffic congestion and also committed improvements in public transport services.

8.2.8 These indicators then allow us to:

- determine the relative connectivity of **all London zones relative to one another** for any single measure (employment or population), year and mode;
- view the connectivity of all SILs in the context of all locations in London;
- determine the change in this relative connectivity between 2011 and 2031 based on forecast employment / population and travel time data; and
- determine the relative connectivity **within London boroughs** – this allows us to establish which areas within boroughs are well and less well connected to London's jobs and population based on road vehicle and public transport journey times – this would be helpful in determining where within a given borough activity would most efficiently be located in order to access London's population and jobs. This is important in the context of the borough release figures in the ILDS scenarios, where both the release and potential allocation of new sites – i.e. locations within a borough with relatively poor connectivity could be prioritised for release over locations with better connectivity.

8.2.9 A full set images is available in the accompanying PowerPoint files and the following sample images are produced below (the same calculations have been undertaken for public transport travel times):

***Figure 8.1**: Car-based connectivity to forecast employment (in London only[13]) in 2031 based on 2031 forecast car travel times – all LoHAM zones are split into 10 equal groups based on their Hansen score, representing best (dark green) to poorest (red) connectivity. Current SIL sites are shown in outline for reference.*

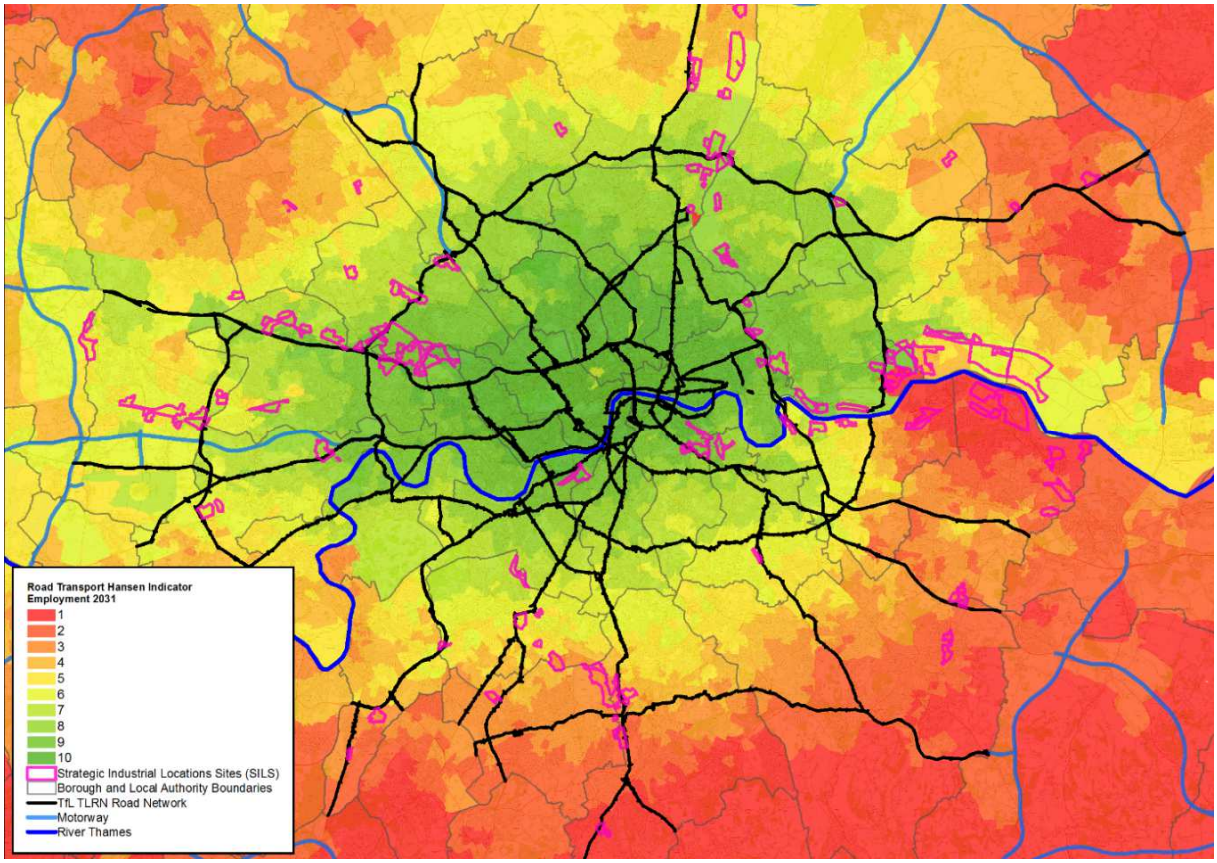


Figure 8.1: Relative Connectivity to London's Jobs by Car, 2031

8.2.10 As would be expected, the general pattern is that connectivity to jobs (as a proxy for economic activity) deteriorates with distance from central London. However, it can be seen here that, in this 2031 forecast the darker shades of green, indicating the best connectivity are mainly in the north-west sector of London. The North / South Circular marks a clear transition in many locations, and areas to the east, particularly south of the River have the poorest relative connectivity to employment. In general south London sees a lower level of connectivity with some the locations with the poorest connectivity out towards the M25 on the south side of the city.

8.2.11 The River Thames clearly acts as a major barrier in east London with the south east quadrant having by far the poorest levels of road based connectivity. By this measure the SILs located in these areas are at a significant competitive disadvantage in terms of providing a location with good connectivity to London's employment centres, and this evidence would support the case for additional river crossings in this area to improve connectivity south of the River.

8.2.12 This analysis therefore provides a detailed indication of where in London a business should best be located if it needs good access to all jobs across London, i.e. business to business connectivity using road-based transport. Conversely this analysis also highlights which SILs have the best access to other employment, therefore which ones would be the most attractive locations for housing development, although the accompanying public transport based

[13] Jobs in London only have been considered at this stage as serving the London economy this forms the focus of the study. Similar analysis could be undertaken in the context of employment across the south east.

graphics would provide a better indicator of this.

***Figure 8.2**: The percentage change in absolute car-based connectivity to jobs between 2011 and 2031. This is intended to show how levels of connectivity to jobs in London is forecast to change as traffic congestion and the location of employment changes. Current SIL sites are shown in outline for reference.*

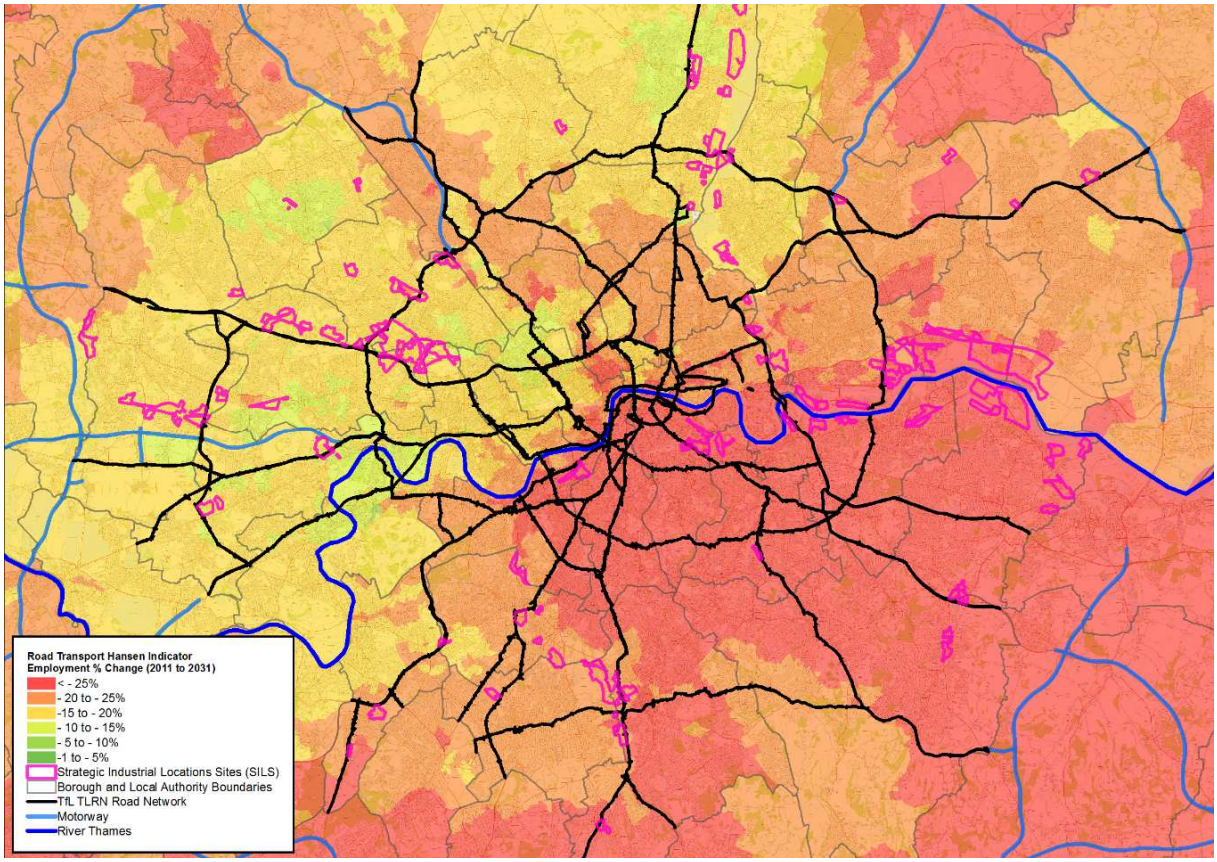


Figure 8.2: Change in Connectivity to Jobs, Car-based, 2011-31

8.2.13 This analysis shows the percentage change in the Hansen score for connectivity to employment over time. It is immediately clear that when road based transport is considered, increases in traffic congestion mean that all locations see their level of connectivity reduce. This is in contrast to the same graphic for public transport (see the accompanying PowerPoint), where significant improvements in connectivity are seen, reflecting the major investments in public transport in London such as Crossrail.

8.2.14 It is again notable though that areas to the south and east see the highest rates of decline with connectivity by this measure reducing by 20%-25%. The changes over time seen here would also be expected to have an impact on the relative attractiveness of SIL sites, with increased congestion making some SILs much less attractive options for those looking to locate in an area with good connectivity.

8.2.15 This provides further evidence in terms of where businesses should be sited who need effective connectivity to London's jobs, i.e. sites where present day connectivity will be affected the least by forecast traffic congestion.

***Figure 8.3**: Car-based connectivity to forecast employment (in London only) in 2031 based on 2031 forecast car travel times – an average Hansen score has been determined for each of the 32 boroughs and the Hansen score for each zone within each borough is thematically mapped as a percentage of the average borough score. Zones are mapped as better than borough average (green) to worse than borough average (red), so each borough will contain a mix of red and green areas. Current SIL sites are again shown in outline for reference.*

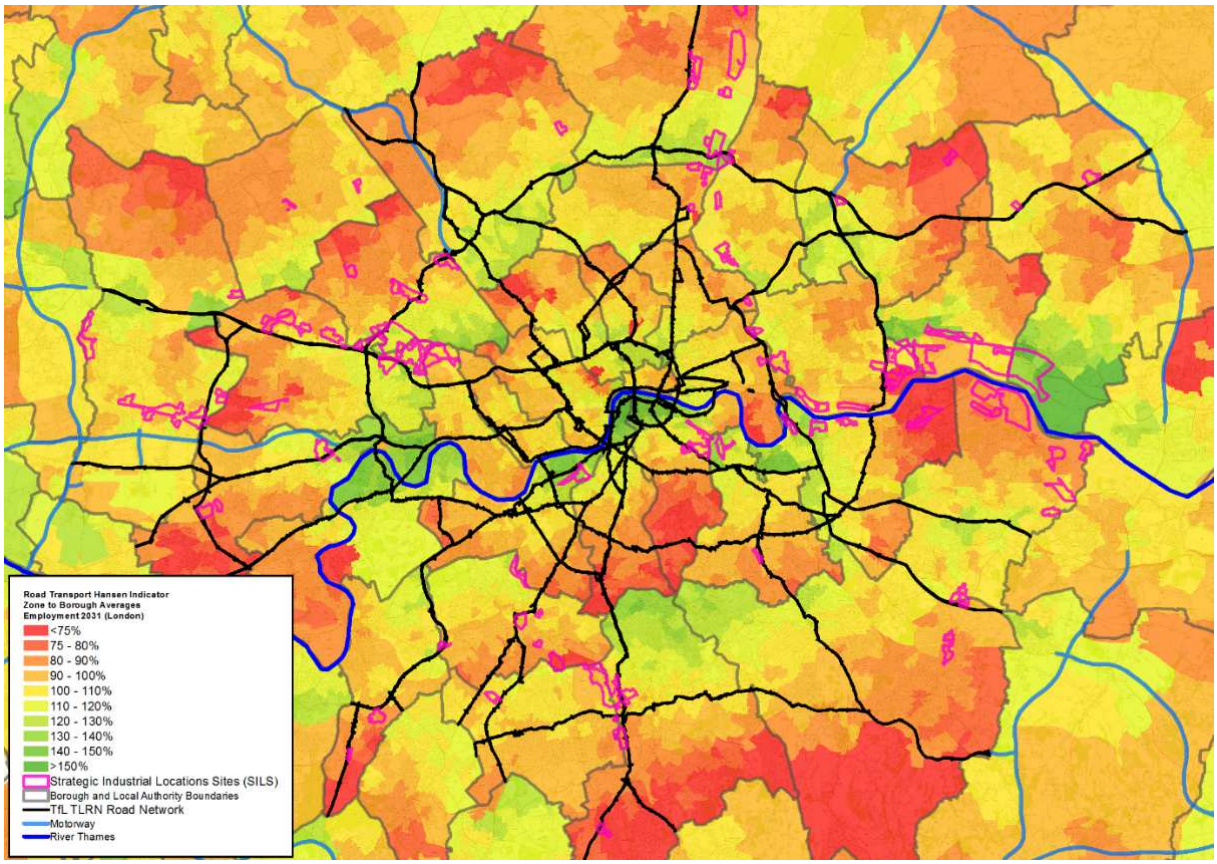


Figure 8.3: Connectivity to London's Jobs by Car, 2031, Relative to Borough Average (London)

8.2.16 This calculation has also been undertaken outside London (included in Figure 8.4), where the average is taken at the local authority district level. This is intended to indicate the locations outside London which provide better relative connectivity to London's jobs from the perspective of a firm considering relocating out of London.

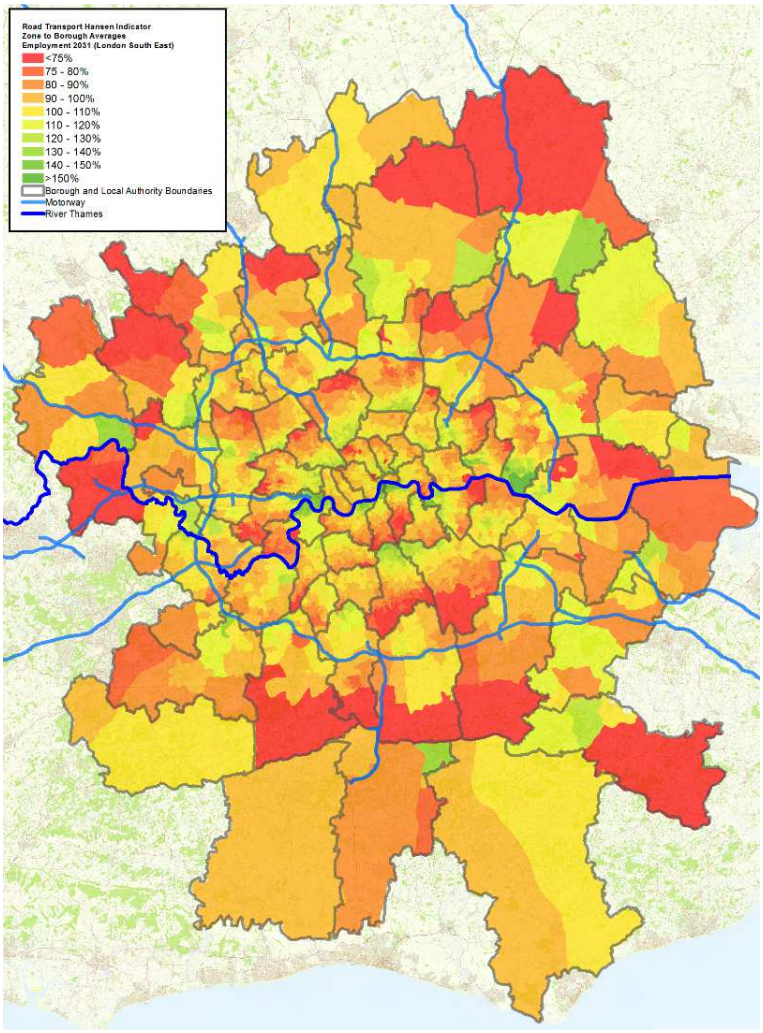


Figure 8.4: Connectivity to London's Jobs by Car, 2031, Relative to Borough Average (London & South East)

8.2.17 These two graphic provide additional differentiation in terms of the relative connectivity of locations with London boroughs and local authority districts outside London, identifying locations with relatively good and poor forecast connectivity to London's jobs in 2031 at the borough level.

8.2.18 The purpose of including the area outside London is to illustrate the best locations for organisations potentially moving outside London and remaining in the south east, but wishing to serve London markets, a trend evidenced in the analysis of Post Office address forwarding data.

8.3 Congestion by Corridor

8.3.1 In addition to developing connectivity indicators to determine connectivity at each SIL site and across London, it is also useful to explore and illustrate how road journey times within the key strategic road corridors in London are predicted to change over the modelled period. The level of congestion by corridor will be a factor in determining the impact of economic activity moving out of current sites to outer London or outside London.

8.3.2 ArcGIS software was used to identify a set of LoHAM model zones which correspond to a range of strategic transport corridors within the capital. The main road corridors identified and the geographic extent of the corresponding LoHAM zones are shown in the figure below, representing a total of 32 corridors. As shown, the roads identified were broadly classified into two sections as follows:

- Outer section – M25 to North / South Circular; and
- Inner section – North / South Circular to Inner Ring Road.

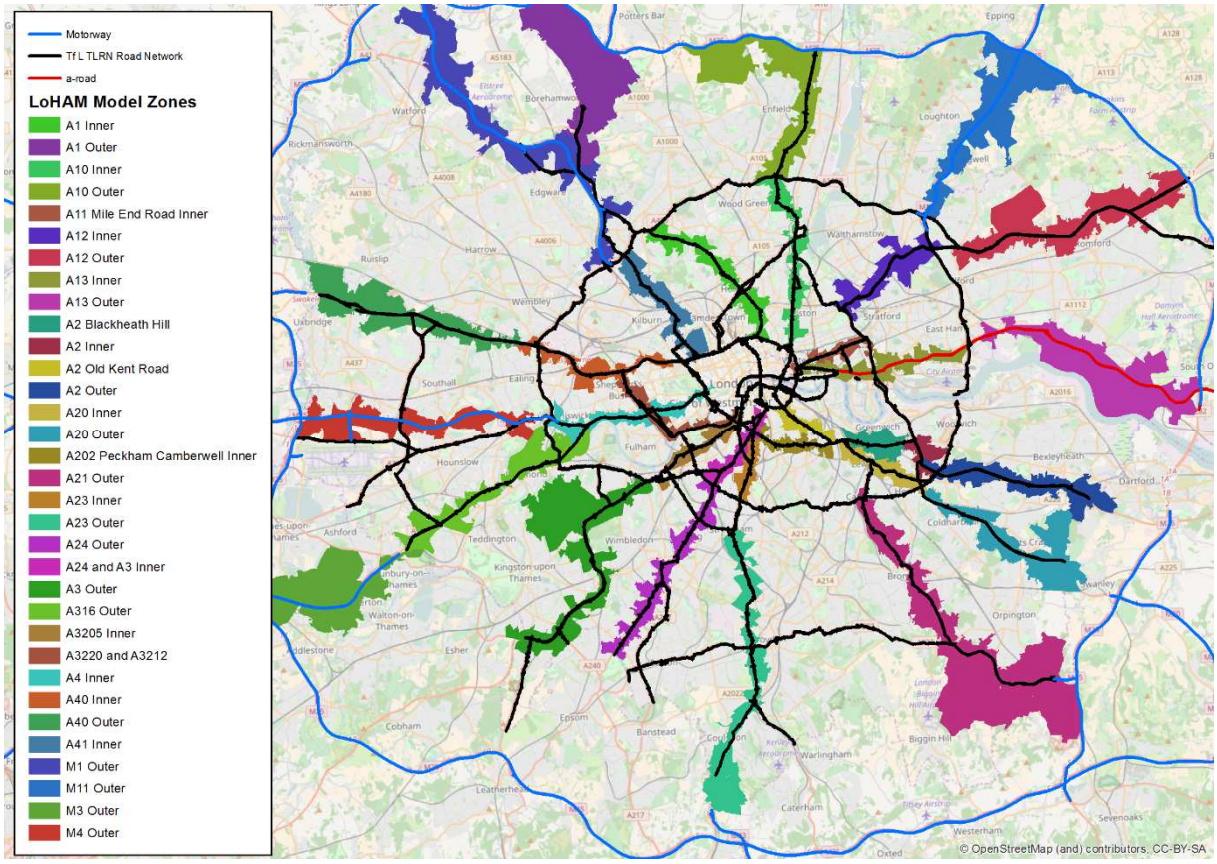


Figure 8.5: Selected Transport Corridors and corresponding LoHAM Model Zones

8.3.3 Having identified the model zones in each corridor, the modelled journey times for all zone combinations within each corridor were isolated and averaged across each road section for both 2012 AM and 2031 AM. This provides an average modelled journey time within each corridor representing traffic conditions within each.

8.3.4 The figures below show the percentage change in forecast travel times within each corridor (for outer and inner London respectively) between 2011 and 2031, illustrating which corridors are forecast to see the biggest increases in travel time and hence traffic congestion over the forecast period, and therefore potentially least suitable as locations for activities with high degrees of transport intensity.

8.3.5 It can therefore be inferred that if additional industrial activity of a highly transport intensive nature is located in such a way that the main corridors used from that location are projected to see a high growth in congestion, there would be significant transport implications in terms of congestion, air quality etc.

8.3.6 Conversely, if additional industrial activity of a light transport intensity is located in such a way that the main corridors used are projected to see a low growth in congestion, there would be no significant transport implications in terms of congestion, air quality etc.

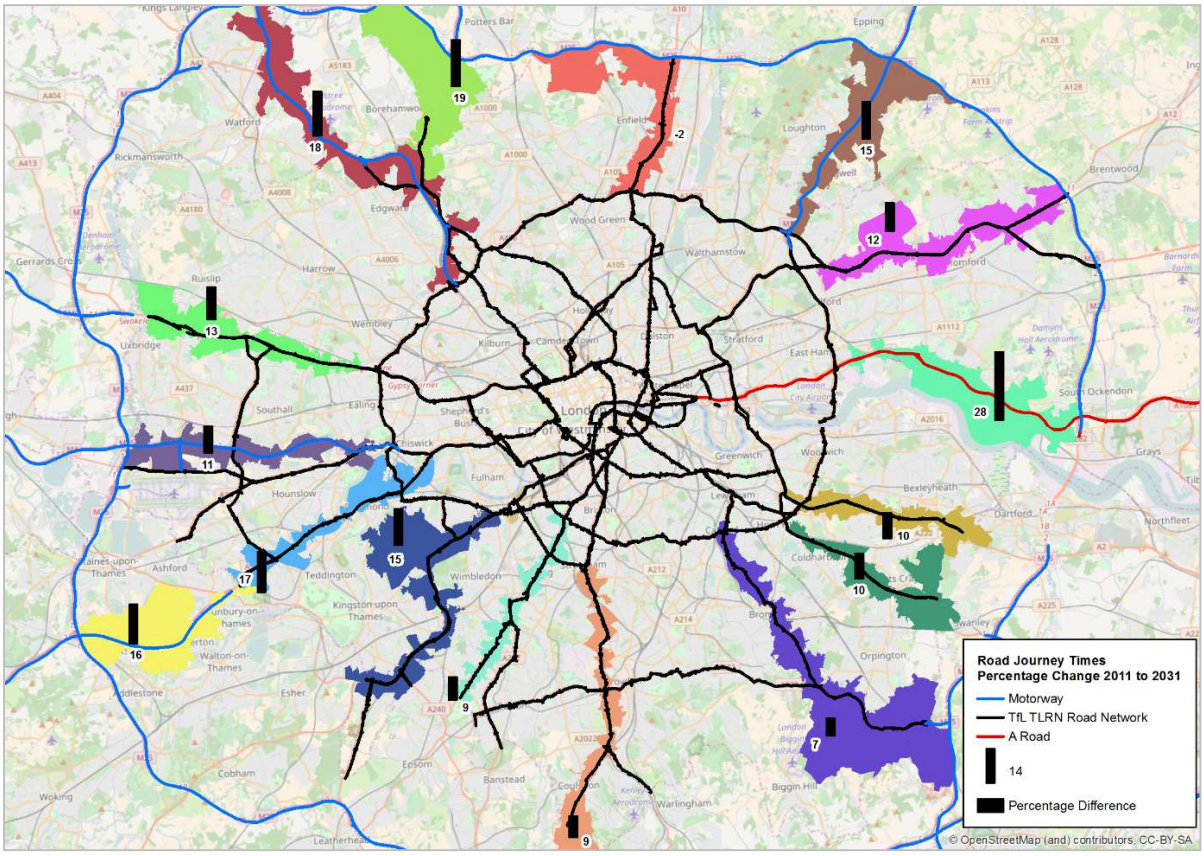


Figure 8.6: Outer London–Forecast Increase in Corridor Journey Times/Congestion (2011-2031 AM Peak)

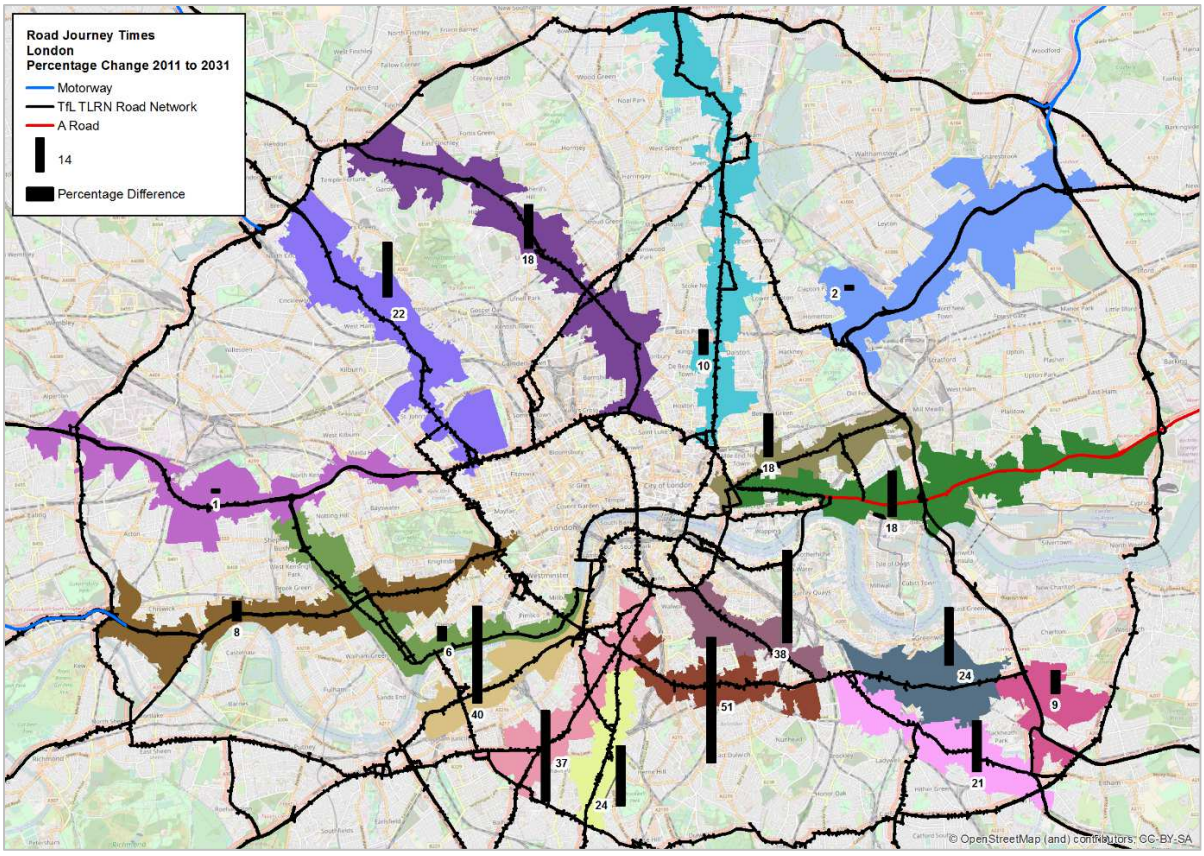


Figure 8.7: Inner London–Forecast Increase in Corridor Journey Times/Congestion (2011-2031 AM Peak)

8.3.7 Focussing on the outer corridors, the biggest increase in congestion by this measure is forecast in the A13 corridor, where journey times are forecast to increase by 28%. The M1 and A1 corridors are also forecast to see significant increases at 18% and 19% respectively. Lower rates of growth are seen in the south east of London at nearer 10%. The A10 corridor is the only one to see modelled journey times falling.

8.3.8 Larger increases in journey times are typically seen within the North / South Circular with several corridors in the south west of inner London in particular forecast to see journey times increase by over 30%.

8.4 Summary

8.4.1 This chapter has presented evidence of how the future distribution of employment (and population) in London, combined with forecast travel times and volumes would influence the future level of car (and public transport based) connectivity to all employment across London.

8.4.2 The analysis has demonstrated a differential impact across London, whereby some parts of London are forecast to see their level of connectivity deteriorate to a greater extent than others. A recurring result is the relatively poor connectivity in east and south London, a situation which is being exacerbated over time. All of these issues would have a bearing on the potential impact on London's transport networks of any further redistribution of industrial activity caused by the release of industrial land.

8.4.3 The analysis also provides a reference guide as to locations within and outwith London which would provide relatively good and relatively poor connectivity to London's evolving population and employment locations, which can be used to inform the planning of industrial land locations in the future.

9 ILDS Scenarios – Commentary & Conclusions

9.1 Introduction

9.1.1 This chapter reflects on the ILDS Scenarios reported in Chapter 3 in the light of the evidence presented in Chapters 4-8. To recap the land release in each of the five potential scenarios is shown below by PMA in the figure below.

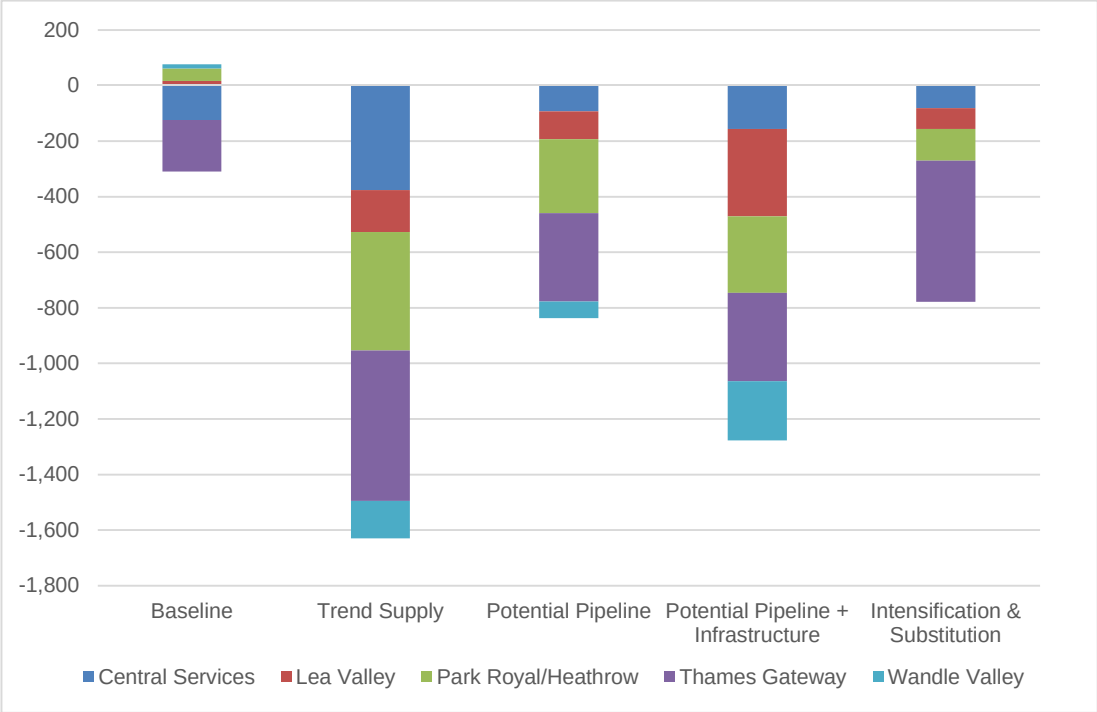


Figure 9.1 ILDS Land Release Scenarios 2016-41

9.1.2 Overall therefore, these scenarios imply releases of:

- Scenario 1. **Baseline**: 233 ha, **3% reduction** in stock: a very modest reduction in stock focussed primarily in the Central Services and Thames Gateway PMAs;
- Scenario 2. **Trend Supply**: 1,630 ha, **23% reduction** in stock: the largest reduction in stock with a 58% reduction in Central Services and around a 20% reduction in Lee Valley, Park Royal / Heathrow and Thames Gateway. In absolute terms. Thames Valley and Park Royal / Heathrow would see the biggest reduction;
- Scenario 3. **Potential Pipeline**: 837 ha, **12% reduction** in stock: reductions of 12%-14% in all PMAs except Wandle Valley. In absolute terms; Lea Valley, Park Royal / Heathrow and Thames Valley would see similar reductions;
- Scenario 4. **Potential Pipeline + Infrastructure**: 1,277 ha, **18% reduction** in stock: as per 'Potential Pipeline' with substantial increases in releases in Lea Valley and Wandle Valley; and
- Scenario 5. **Intensification & Substitution**: 777 ha, **11%** reduction in stock: focussed very much on Thames Gateway -substantially lower levels of release in Park Royal / Heathrow, Lea Valley and Wandle Valley than Scenarios 2-5.

9.1.3 Note that the PMA level is adopted throughout this chapter in order to keep the commentary and analysis manageable.

9.2 Commentary on Scenarios

9.2.1 Each of the five ILDS Scenarios would have different potential implications for each PMA and hence London's transport networks. Each scenario implies a different quantity and pattern of land release and the likely locational behavioural response of firms affected by release of land can be implied from the analysis presented in Chapter 7.

Impacts of Relocation

9.2.2 In Chapter 7 it was seen that when firms are relocating from SILs, if moves to Central Services are discounted as misleading, the main behaviours across all the SILs analysed are:

- 54% of moves were made within the same PMA, i.e. a relatively local move, although the majority of these moves will imply a move further away from central London;
- 8% moved across London to another PMA; and
- 38% moved outside London.

9.2.3 Outwith intensification, these are the primary distinctions which would determine the scope and scale of the impact on the transport network of different industrial land release policies.

9.2.4 Chapter 5 set out a potential framework to determine 'transport intensity' under three main headings: (i) workforce issues; (ii) movement of physical goods on and off site; and (iii) movement of people on and off site / location. These would form the key transmission mechanisms by which any release of industrial land would feed through into a transport impact when a firm intensifies its activity on site or moves to a new location.

9.2.5 The implications of the three main relocation types (plus intensification) in relation to these three transport intensity characteristics is summarised in the table below in general terms.

Table 9.1: Summary of Implication of Type of Movement

Transport Characteristic	Intensify On Site	Local Move within PMA	Move to other PMA	Move to South East, outside London
Workforce Issues	No significant issues likely, unless there is extensive car based commuting where there could be very local impacts.	It is assumed that a move within the same PMA would allow retention of staff. However, it is likely to lead to longer commuting journeys in general as people will have made employment decisions on the basis of the previous location.	A move to another PMA will almost certainly lead to longer commuting journeys and potentially a more car dependent workforce. There would likely be a degree of staff turnover from such a move as some staff seek other opportunities within their current commute pattern.	This could lead to staff turnover and a loss of employment by London residents. Census data revealed little in the way of out commuting from London and potentially only key staff would remain at the operation. Any out commuting would not pose a major problem from a transport perspective as flows would be counter to peak inbound commuting flows associated with jobs in London.
Movement of goods on and off site	Local traffic issues possible if movements are concentrated at fewer access points. Severity would depend on local traffic conditions	A supply and distribution chain will have been built around the firm's operation from an existing site. A very local move should not materially affect this, unless a move tips some aspects of the business over an operational threshold requiring for example additional vehicles or drivers. Highly time sensitive operations could be affected in this way, for example final mile delivery.	A move to another PMA could potentially disrupt existing supply chains and distribution networks. The impacts would be similar to the 'local move' although this would depend on the distance of the move.	If serving the London market, a move outside London will have a material impact on supply and distribution. Whilst the supply line may be reduced, there may be significant implications for serving existing markets. There would be potentially significant additional traffic on the main radial routes into London, depending on the balance of inbound and outbound vehicles to the site.
Movement of people to and from site	No significant issues likely unless the site is a major attractor of car based traffic and access to the site is being concentrated at fewer locations. Severity would depend on local traffic conditions	There is likely to be a modest increase in car based travel to the site. However, if public facing, existing customers may shift to another existing facility. Unless the site is a major generator of staff business travel, the impact of such a move would be very local.	Moving to a new PMA would likely increase staff travel on business as the previous location will have played a role in determining the spatial scope of the firm's operation from the previous address. If public facing, unless a specialist offering, it would seem likely that a new customer base would be formed, reducing any impact on the network.	If the business involves personal travel to the London market, there would be added pressures on the key radial routes and public transport services, but this would only be significant for a large scale operation. If public facing, unless a specialist offering it would seem likely that a new customer base would be formed, reducing any impact on the network.

9.2.6 It is clear from the above that, whilst it is possible to generalise on the impacts of land release on transport to some extent, the impact of any individual land release will vary widely on a case by case basis depending on the nature of the companies affected and the decisions they make. The Framework set out in Chapter 5 provides more details on how a case by case assessment could be made in the context of a prospective land release decision.

9.2.7 In recent years therefore, over half the moves from SILs have been accommodated at a relatively local level as evidenced in the Post Office data. It is not known (other than anecdotally), but could be assumed that firms are finding it more difficult to make a local move of this type due to lack of supply. Over time therefore a higher proportion of firms may be being forced to move further away in their own London PMA or outside London. These are the key moves which would have the potential to have the biggest impact on London's transport networks. We have seen that over the last 16 years, 38% of firms moving from SILs have gone outside London. This is a significant figure and would be expected to increase should the supply of industrial land continue to be constrained.

9.3 PMA Assessment

9.3.1 In this section, the potential impact of industrial land release is considered for each PMA in general terms. Bringing together the analysis presented in the previous chapters, it considers:

- The composition of the businesses occupying SILs in each PMA, in terms of the share of employment associated with the types of economic activity most likely to involve the physical movement of goods, as determined in Chapter 4;
- The relocation decisions made by firms moving out of SILs by PMA, as determined in Chapter 7; and
- The transport corridors likely to be affected by businesses moving out of the PMA to south east England, and the growth in congestion forecast in these corridors to 2031 (excluding the impact of further land release), as determined in Chapter 8.

9.3.2 In Chapter 4, the proportion of employment associated with the industrial sectors typically associated with the movement of goods was identified by borough. The figure below shows the same data at the PMA level.

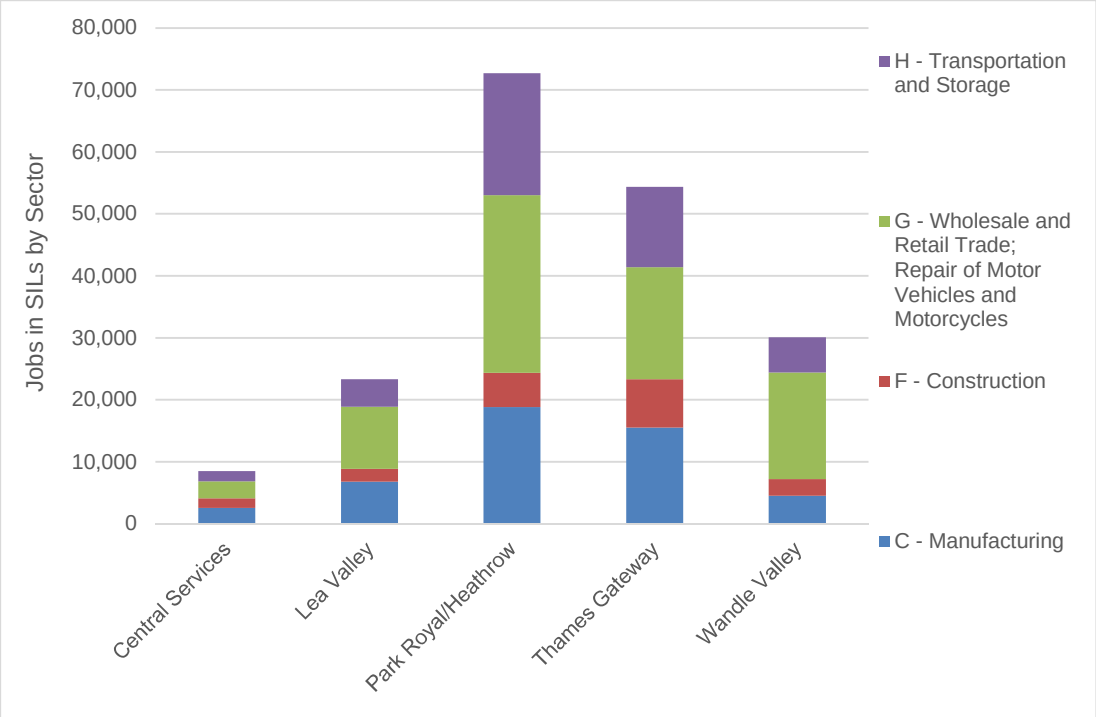


Figure 9.2: Transport Intensive Industry by PMA (employment)

9.3.3 In percentage terms, the figures are:

- Central Services: 44% (SIC C, F, G and H as a percentage of all employment);
- Lea Valley: 65%;
- Park Royal / Heathrow: 51%;
- Thames Gateway: 60%; and
- Wandle Valley: 56%.

9.3.4 The following sections consider each PMA in turn from three key perspectives:

- *What sort of activity takes place at the SILs in each PMA?*
- *What happens when firms move from SILs within each PMA? and*
- *What are the potential implications on the transport network of these moves?*

Central Services

What sort of activity takes place on SILs in Central Services?

- Low volumes of activity overall, focussed around the Old Kent Road SILs[14]; and
- A relatively low proportion of 'transport intensive' activity at 44%.

What happens when firms move from Central Services?

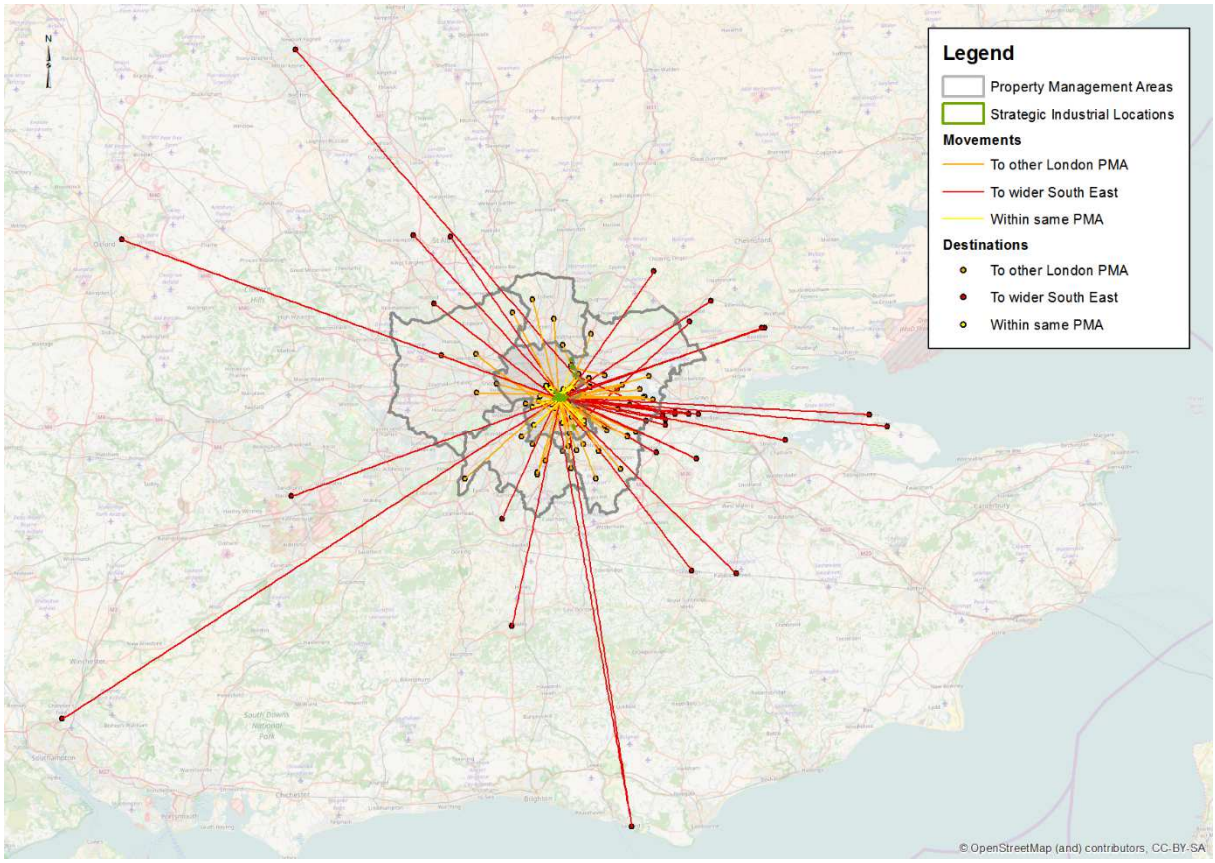


Figure 9.3: Relocations from SILs (Central Services)[15]

- 5% remained in their 'home' SIL, the lowest of the PMAs with 32% of moves remaining in Central Services, the combined figure of 37% is the lowest of the PMAs reflecting the limited supply in this area;
- 30% of moves left London;
- Local moves within Central Services have mainly moved to the south and east in the PMA; and
- Moves from Central Services are predominantly to destinations to the east.

What are the transport implications of these moves?

- Main corridors affected would be A2 and A20 inside London where congestion is already forecast to increase by 10% outside the South Circular and 20% inside the South Circular.

[14] Note that the results for Central Services are dominated by Old Kent Road and should be seen from this perspective.

[15] Here and in the similar graphics which follow, moves to addresses in the City of London, Westminster, Camden and Islington boroughs have been excluded as these will likely be forwarding addresses only.

Lea Valley

What sort of activity takes place on SILs in Lea Valley?

- The highest proportion of transport intensive sectors of any PMA at 65% means that significant goods vehicle traffic will be associated with these sites.

What happens when firms move from Lea Valley?

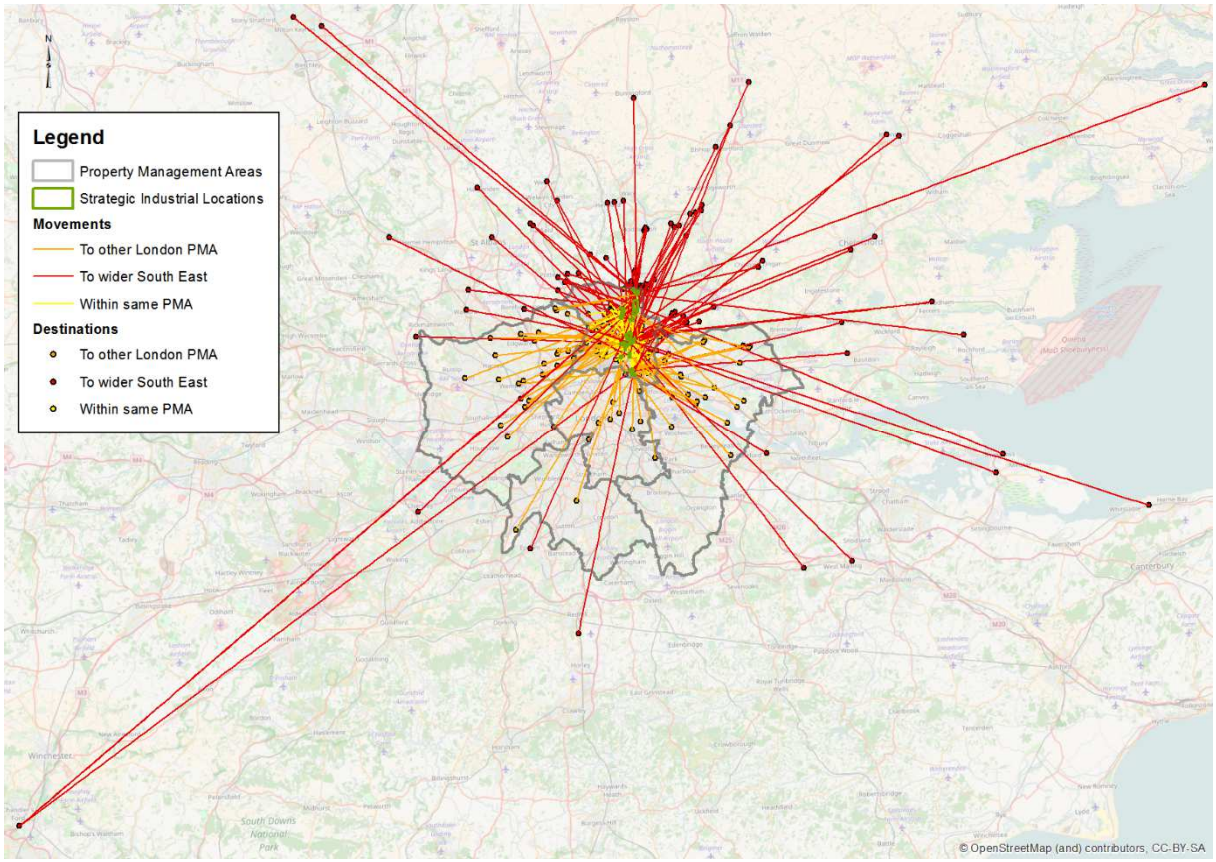


Figure 9.4: Relocations from SILs (Lea Valley)

- 11% remained in their 'home' SIL with 27% of moves remaining in Lea Valley;
- 35% of moves left London, the second highest of the PMAs; and
- Moves from Lea Valley are predominantly to destinations to the east / west and north – relatively few move south.

What are the transport implications of these moves?

- Increased pressure on M11, A10 and A1 corridors – these corridors are already forecast to see changes in congestion of +15%, -2% and +19% between the M25 and the North Circular, and 2%, 10% and 18% between the North Circular and the Inner Ring Road.

Park Royal / Heathrow

What sort of activity takes place on SILs in Park Royal / Heathrow?

- This PMA is the largest in terms of SIL employment; and
- There is a wide range of occupants in these SILs with a relatively low figure of 51% employed in transport intensive sectors.

What happens when firms move from Park Royal / Heathrow?

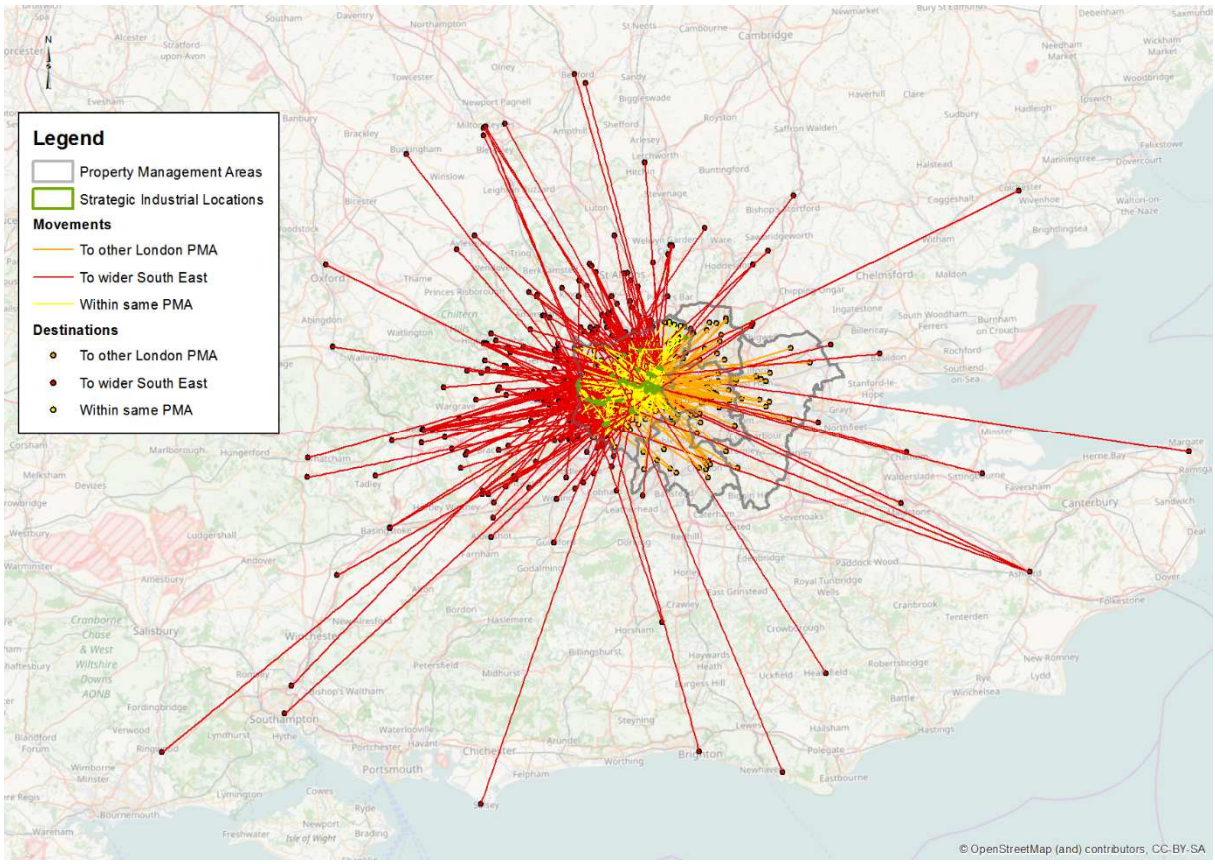


Figure 9.5: Relocations from SILs (Park Royal / Heathrow)

- 15% remained in their 'home' SIL with 39% of moves remaining in Park Royal / Heathrow – this combined figure of 44% is the highest of the PMAs reflecting the historic high levels of supply in this area;
- 28% of moves left London, the lowest of the PMAs; and
- Moves from Park Royal / Heathrow are predominantly to destinations in a south west to north west arc.

What are the transport implications of these moves?

- All major corridors in an arc from the M1 to the M3 could be affected by firms moving north west to south west from Park Royal / Heathrow; and
- In this area, congestion is typically forecast to increase by around 20% between the M25 and the Inner Ring Road.

Thames Gateway

What sort of activity takes place on SILs in Thames Gateway?

- This PMA is the second largest in terms of SIL employment; and
- It also has the second highest share of employment in transport intensive industries at 60%.

What happens when firms move from Thames Gateway?

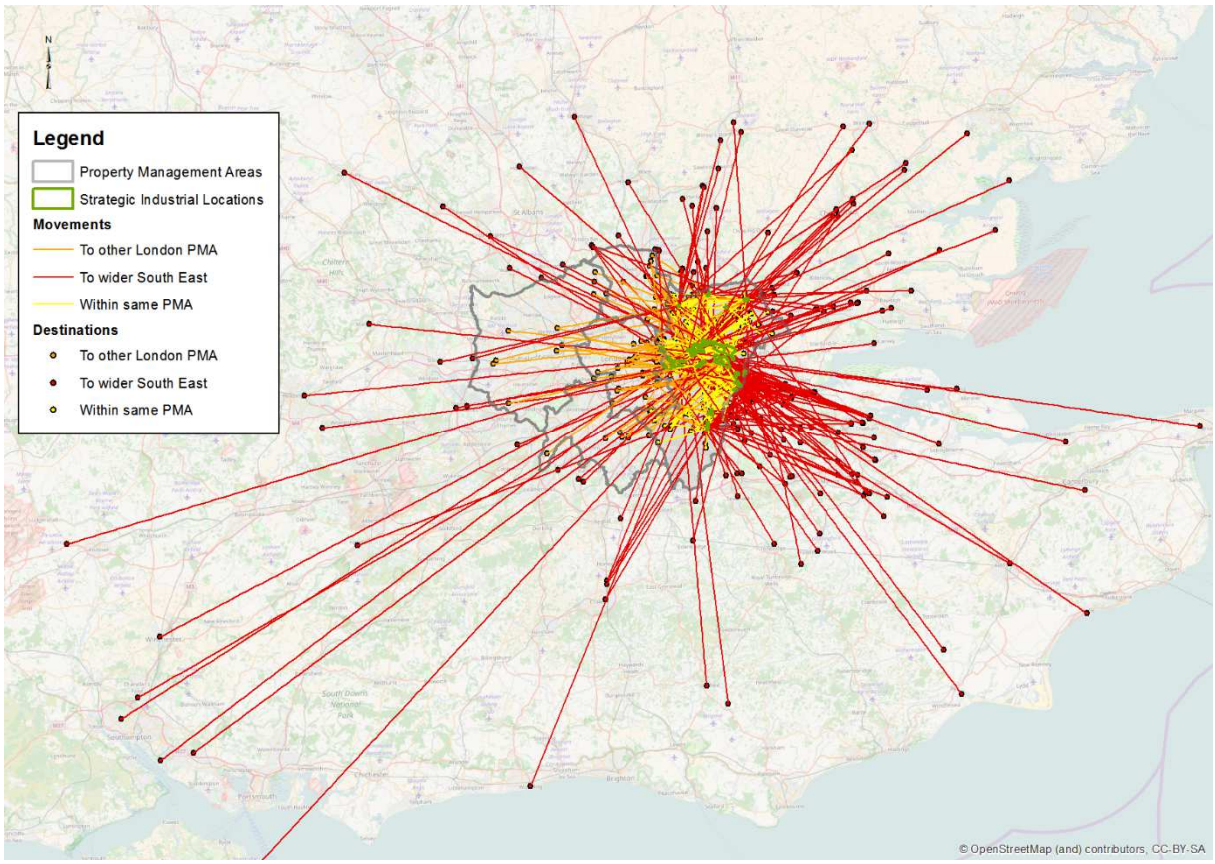


Figure 9.6: Relocations from SILs (Thames Gateway)

- 9% remained in their 'home' SIL with 31% of moves remaining Thames Gateway;
- 47% of moves left London – the highest of any PMA; and
- Moves from Thames Gateway are predominantly to destinations in a south east to north east arc.

What are the transport implications of these moves?

- The main corridors affected by these moves would be in an arc from the M11 to the A20 / M20;
- This includes the A13 corridor where significant additional congestion is forecast at 28% and 18% in the outer and inner London sections respectively. The Inner A2 section is also forecast to see a significant increase in journey times of 24%-38%; and
- The areas in the south east quadrant of London were also identified as having poor levels of connectivity to London's jobs and population making these relatively unsuitable locations for industrial firms.

Wandle Valley

What sort of activity takes place on SILs in Wandle Valley?

- 56% of employment in Wandle Valley SILs is associated with transport intensive industry sectors.

What happens when firms move from Wandle Valley SICs?

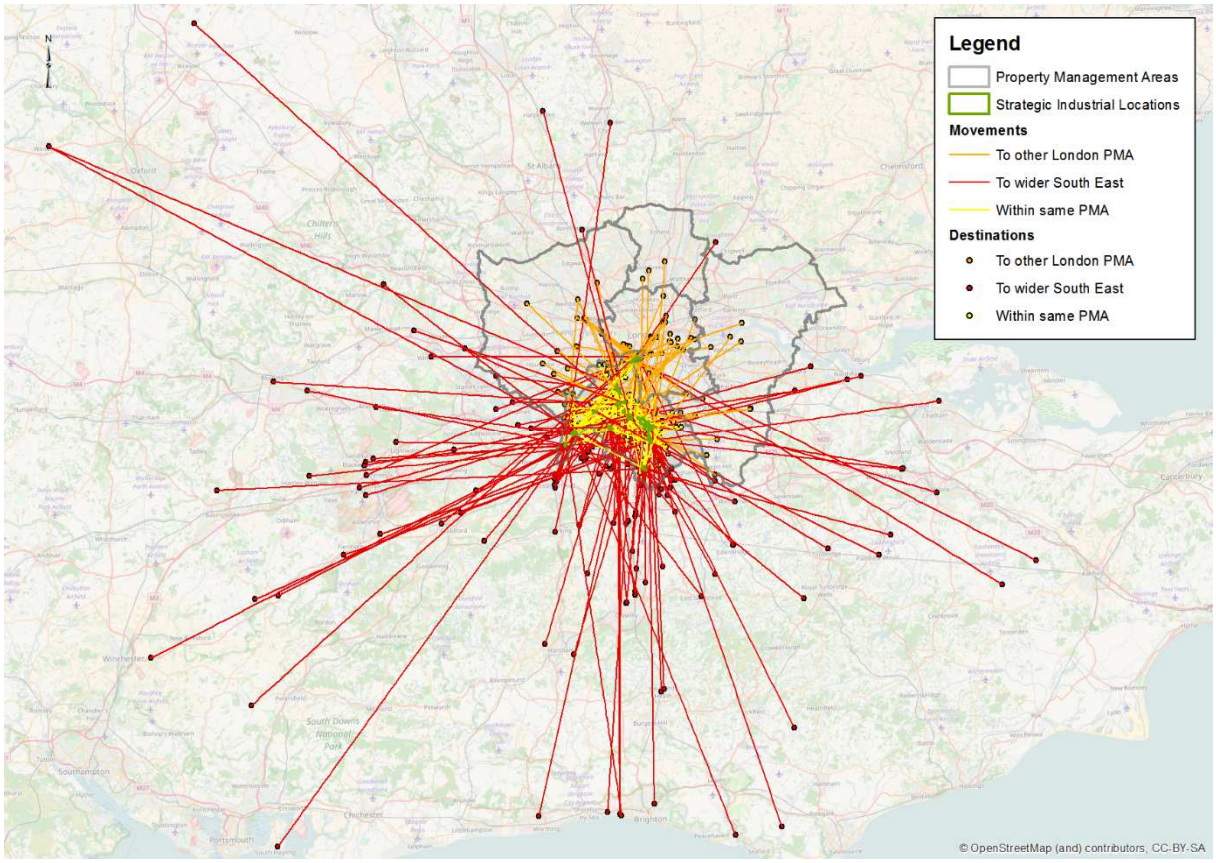


Figure 9.7: Relocations from SILs (Wandle Valley)

- 15% remained in their 'home' SIL with 38% of moves remaining in Wandle Valley PMA;
- 30% of moves left London; and
- Moves from Wandle Valley are predominantly to destinations in a south west arc with concentrations directly south and west. There are virtually no moves from the Wandle Valley to areas east and north of London.

What are the transport implications of these moves?

- The impact of relocations from Wandle Valley would be seen in the A23 and M3 corridors;
- Congestion in this area is forecast to increase significantly with travel times in inner London typically increasing by 20% to 40%; and
- There are smaller increases in outer London where increases are more typically in the range of 15% to 20% within these corridors.

9.4 Impacts by ILDS Scenario by PMA

9.4.1 The table below outlines the potential impacts of each ILDS scenario in the context of each PMA. It draws on the previous analysis where the impacts on strategic transport corridors of relocations out of each PMA was discussed. This table therefore provides an indication of the likely scale of impact by PMA for each ILDS scenario.

Table 9.2: Potential Transport Impacts of ILDS Scenarios by PMA

	Property Market Area				
ILDS Scenario	**Central Services[16]**	**Lea Valley**	**Park Royal / Heathrow**	**Thames Gateway**	**Wandle Valley**
Relative % Transport Intensive Industries[17]	*Low – 44%*	*High – 65%*	*Mid – 51%*	*High – 60%*	*Mid – 56%*
1. Baseline	*Land Release: 125 Ha* Modest release compared with other scenarios *Potential Impact on A2 / A20 Corridors:* **Low** - Potentially a greater impact than the relatively low release figure suggests if proximity to city centre means a high level of interaction with the city	*Land Release: 0 Ha* None, small new allocation *Potential Impact on A1 to M11 Corridors:* **None** - New allocation too small to have a significant impact	*Land Release: 0 Ha* None, small new allocation *Potential Impact on M1 to M3 Corridors:* **None** - New allocation too small to have a significant impact	*Land Release: 185 Ha* Largest release in this scenario although low in absolute terms relative to other scenarios *Potential Impact on M11 to A20 / M20 corridor:* **Moderate** - industry in this PMA is transport intensive	*Land Release: 0 Ha* None, small new allocation *Potential Impact on A23 to M3 Corridors:* **None** - New allocation too small to have a significant impact
2. Trend Supply	*Land Release: 376 Ha* The largest release in this PMA of all the scenarios *Potential Impact on A2 / A20 Corridors:* **High** - Potentially a greater impact than the relatively low release figure suggests if proximity to city centre means a high level of interaction with the city	*Land Release: 151 Ha* The second largest release in this PMA of all the scenarios *Potential Impact on A1 to M11 Corridors:* **Moderate**: release quantum is much lower than for Park Royal / Heathrow and Thames Gateway. Economic activity in SILs in this area is very transport intensive though.	*Land Release: 426 Ha* The largest release in this PMA of all the scenarios *Potential Impact on M1 to M3 Corridors:* **High** – the largest release of land in this PMA would see economic activity move outward across a wide arc of south west to north west London incorporating some of the UK's busiest roads	*Land Release: 541 Ha* The largest release in this PMA of all the scenarios and the largest PMA release in this scenario. *Potential Impact on M11 to A20 / M20 corridor:* **High** - The largest single release in any PMA with highly transport intensive industries would mean a potentially significant impact on congestion in these corridors	*Land Release: 135 Ha* The second largest release in this PMA of all the scenarios *Potential Impact on A23 to M3 Corridors:* **Moderate**: release quantum is much lower than for Park Royal / Heathrow and Thames Gateway

[16] Primarily reflecting Old Kent Road SIL.

[17] SIC Codes C, F, G, H

	Property Market Area				
ILDS Scenario	**Central Services[16]**	**Lea Valley**	**Park Royal / Heathrow**	**Thames Gateway**	**Wandle Valley**
3. Potential Pipeline	*Land Release: 93 Ha* Modest release compared with other scenarios *Potential Impact on A2 / A20 Corridors:* **Low** - Potentially a greater impact than the relatively low release figure suggests if proximity to city centre means a high level of interaction with the city	*Land Release: 100 Ha* The second lowest release in this PMA of all the scenarios *Potential Impact on A1 to M11 Corridors:* **Moderate**: release quantum is lower than for Park Royal / Heathrow and Thames Gateway. Economic activity in SILs in this area is very transport intensive though.	*Land Release: 265 Ha* A far lower level of release than Trend Supply although still significant in absolute terms *Potential Impact on M1 to M3 Corridors:* **Moderate** – this release of land would see economic activity move outward across a wide arc of south west to north west London incorporating some of the UK's busiest roads	*Land Release: 318 Ha* A far lower level of release than Trend Supply although still significant in absolute terms *Potential Impact on M11 to A20 / M20 corridor:* **Moderate** - This PMA has highly transport intensive industries meaning a potentially moderates impact on congestion in these corridors	*Land Release: 60 Ha* Relatively low amount release *Potential Impact on A23 to M3 Corridors:* **Low**: very low level of release unlikely to have significant impact
4. Potential Pipeline + Infrastructure	*Land Release: 156 Ha* The second largest release in this PMA of all the scenarios *Potential Impact on A2 / A20 Corridors:* **Moderate** - Potentially a greater impact than the figure suggests if proximity to city centre means a high level of interaction with the city	*Land Release: 314 Ha* The largest release in this PMA of all the scenarios with an increase of 214 over the 'Potential Pipeline' scenario *Potential Impact on A1 to M11 Corridors:* **High**: Economic activity in SILs in this area is very transport intensive and this is a substantial release.	*Land Release: 276 Ha* Very small increase over 'Potential Pipeline' scenario *Potential Impact on M1 to M3 Corridors:* **Moderate** – As per 'Potential Pipeline' scenario	*Land Release: 318 Ha* As per 'Potential Pipeline' scenario *Potential Impact on M11 to A20 / M20 corridor:* As per 'Potential Pipeline' scenario **Moderate** - As per 'Potential Pipeline' scenario	*Land Release: 231 Ha* The largest release in this PMA of all the scenarios *Potential Impact on A23 to M3 Corridors:* **Moderate**: the absolute quantum of release is low relative to other scenarios and PMAs

	Property Market Area				
ILDS Scenario	**Central Services[16]**	**Lea Valley**	**Park Royal / Heathrow**	**Thames Gateway**	**Wandle Valley**
5. Intensification & Substitution[18]	*Land Release: 81 Ha* The second lowest release in this PMA *Potential Impact on A2 / A20 Corridors:* **Low** - Potentially a greater impact than the figure suggests if proximity to city centre means a high level of interaction with the city Intensification may have local impacts.	*Land Release: 75 Ha* The second lowest release in this PMA *Potential Impact on A1 to M11 Corridors:* **Low**: This quantum of release unlikely to be significant in traffic terms Intensification may have local impacts	*Land Release: 113 Ha* The second lowest release in this PMA *Potential Impact on M1 to M3 Corridors:* **Low** – This quantum of release unlikely to be significant in traffic terms in this large area Intensification may have local impacts	*Land Release: 508 Ha* The second highest release in this PMA *Potential Impact on M11 to A20 / M20 corridor:* As per 'Potential Pipeline' scenario **High** - The second largest single release in any PMA with highly transport intensive industries would mean a potentially significant impact on congestion in these corridors Intensification may have local impacts	*Land Release: 0 Ha* No release *Potential Impact on A23 to M3 Corridors:* **None** Intensification may have local impacts

[18] Note that the impacts described under this scenario will primarily reflect the 'substitution' element of this scenario.

Summary

9.4.2 This chapter has drawn on the evidence gathered in previous chapters to provide a commentary on the potential impacts on London's strategic transport networks of the different ILDS Scenarios, focussing on the PMA level.

9.4.3 It has demonstrated that the key issue associated with release is the extent to which displaced activity can be accommodated locally. The potential impact on transport will essentially increase with the distance to which the economic activity is displaced from its original location. The key corridors likely to be affected by land release in each PMA have been identified.

9.5 Conclusions

9.5.1 This study set out to gather evidence with respect to the implications for transport of the release of industrial land in London. A multi-dimensional approach has been adopted which has:

- set out the variety of factors that influence current practice in freight & logistics, including those that will increase demand for goods and services associated with increased population, urbanisation and more e-commerce. The movement of goods and service based activity will continue to be essential to underpin growth in London's economy and population. Moving any business involves considerable cost and disruption and in some cases the closure of the business altogether. In many cases, the movement of industrial firms has been driven by industrial land being converted into more lucrative alternative uses, rather than an attraction to better premises or other commercial considerations, i.e. 'push' rather than 'pull' factors. There is no 'one size fits all' spatial model for industrial land with Strategic Industrial Locations (SIL), Locally Significant Industrial Sites (LSIS) and non-designated sites all having an important role to play in supporting economic activity in London;
- presented the GLA Industrial Land Demand Study scenarios by London Borough and Property Market Area (PMA) setting out the scale and scope for potential industrial land changes in London in the coming years;
- undertaken a detailed analysis of BRES data which showed a range of activities taking place on SILs and LSISs, each with potentially widely varying requirements of the transport network. Analysis showed that much activity on industrial land is not typically 'industrial' in nature;
- found that transport intensive industrial employment occurs across all PMAs but is largely focussed in outer London;
- consulted with a range of industry stakeholders and developed a resulting '*transport intensity framework*' which provides a structured approach to considering the potential demands on the transport network of different types of economic activity, differentiated by Workforce, Movement of Goods and Movement of People. This framework can be used to define 'low' and 'high' transport intensity businesses for consideration in future proposals for the management of industrial land and floorspace in London;
- demonstrated the scope and scale of commuting to the largest SILs, which showed that commuting distances were relatively short in most cases. There is limited reverse commuting out of London;
- shown through an analysis of transport models and other databases that there is a more dispersed pattern of non-commuting trips across London for each SIL, but also a high incidence of very local vehicle trips;
- shown that the proportion of freight trips to Central London is roughly similar to beyond London for each of the largest SILs;

- analysed Post Office relocations data to determine the pattern of movements associated with relocations out of the largest SILs. This has established that the two main patterns are: (i) moving within the same Property Market Area (PMA); or (ii) moving out of London to the wider south east, generally outward within the same very broad corridor or wedge. Away from the dominating impact of the Park Royal / Heathrow PMA, the most significant movement between London PMAs is between the north and east (Lea Valley and Thames Gateway);
- undertaken a comprehensive analysis of connectivity across London by road and public transport, creating graphical representations of connectivity to jobs (business to business) and residents (ie labour). This analysis identifies locations in London and the south east which are relatively well and relatively poorly connected, and hence well or less well suited to host economic activity displaced from existing industrial land use sites. In particular, this analysis reveals relatively poor connectivity in south east London, and this would impact on the suitability of this location for businesses which require good connectivity to a range of locations across London;
- used modelled data to identify the inner and outer London transport corridors which are forecast to see the greatest increases in congestion over time, and hence the impact of displacing traffic outwards from London and into these corridors can be considered at a high level; and
- brought the above analysis together to produce a commentary with respect to the potential transport impacts of each ILDS scenario at the PMA level, detailing in each case: (i) the type of activity undertaken there; (ii) what happens when firms move out of each PMA; and (iii) the transport implications of these moves in terms of the corridors affected.

9.5.2 The study has therefore assembled a large volume of evidence to demonstrate and justify how the release of industrial land could have a negative impact on:

- the efficient operation of the firms affected by land release;
- the impact on the labour market if firms have to move a significant distance;
- the ability to achieve service level agreements which are becoming more onerous and supply chain impacts on 3rd parties more generally; and
- traffic congestion, air quality & emissions and road safety.

9.5.3 In general, any displacement of activity outwards is likely to increase vehicle kilometres overall. However, all of these impacts will vary widely on a case by case basis and the impact of any release could vary from being negligible to highly significant. Future decisions on industrial land and floorspace management should be informed by consideration of the nature of the activity being undertaken at the site in question, informed by the evidence brought together in this study and set out in both the Transport Intensity Framework and the scale of potential transport impacts by PMA.

10 Directions for Future Research

10.1 Introduction

10.1.1 This report has explored the issues surrounding transport and industrial land in London using a mixture of empirical data, modelled data, desk based research and engagement with key stakeholders.

10.1.2 It is clear that this is a multi-faceted issue, about which it is difficult to draw conclusions in a general sense, without reference to a specific land release proposition. Instead this study has developed a structured approach to analysing how transport could be affected by the release of industrial land, and presented the existing evidence and reference material to allow a more informed view to be taken in a planning context.

10.1.3 The following sections outlines some potential directions for future research to further inform consideration of this issue.

10.2 Directions for Future Research

- A set of (planning) 'Guidance' could be developed based on the Framework developed in this study aimed at qualitatively and quantitatively assessing the potential impacts of any release on a case by case basis. This Guidance could be developed on the basis of a set of detailed case studies with a view to be being used by planners in informing decisions about individual future release propositions. This Guidance would include information on appropriate data gathering to inform the decision making.
- Subject to the caveats surrounding the data, more detailed analysis of the Post Office redirections data could be undertaken, focussed on a set of specific postcodes where it is known that an industrial land release process has been implemented. This relatively minor task could provide a greater insight into the relocation patterns associated with these specific sites.
- Further detailed investigation of Posy Office data – including an analysis of trends over time, distances moved by SIL / PMA etc, and / or the consideration of movements in and out of LSISs. This is a rich data source that could be further analysed in the light of the findings uncovered here.
- As the emergence of 'big data' continues, it is likely that mobile phone / GPS data will increasingly become available and this could be used to more accurately assess the scope and scale of the vehicular movements associated with key industrial sites in London.
- The biggest insight into this issue would be obtained through evaluation of real world examples of the release of land. There are two possible approaches to this:
    - *Ex post* evaluation: Detailed case studies could be undertaken retrospectively of a recently released site – this would involve tracking down and interviewing all previous occupants who have been 'displaced', and determining the types of behavioural response, e.g. who's moved out of London and why?; and
    - 'Real time' evaluation of a sample of 'in play' land releases over say a 2-year period. This option may be more practical and would involve the recruitment of a 'panel' at an early stage from current occupiers of sites where a land release process is playing out over a period of time. Regular contact with these panel members would provide invaluable insight into the nature of the behavioural responses and the subsequent impacts on travel patterns and hence transport in London.

10.2.1 Further engagement with industry could focus on obtaining a more detailed understanding of the key economic linkages affecting key sectors of interest. This would determine in more

detail the range of origins and destinations which are of primary importance to key industrial sectors in London, and hence which locations these operations should be planned for in future.