Strategies to increase uptake of cycling freight in London

20th November 2017

Final report

A report commissioned by Transport for London and prepared by

Element Energy Ltd, Suite 1, Bishop Bateman Court, Thompson's Lane, Cambridge, CB5 8AQ

Tel: 01223 852499, www.element-energy.co.uk

Executive summary

Background and objectives

As London grows, so does traffic congestion and air pollution. London is in breach of legal limits for NO_2, which has a major, damaging impact on public health. Commercial freight vehicles account for 27% of transport-related nitrogen oxides in London.

Cycle freight is a low cost, low emission alternative to motorised vehicles for transporting goods over short distances. The term “cycle freight” refers to freight moved by pedal cycles and electrically assisted pedal cycles (EAPCs), including tricycles and quadricycles. Recent improvements in cycle freight vehicles and London’s cycling infrastructure, combined with worsening congestion and London’s sustainable transport objectives make a strong case for cycle freight uptake in London.

Element Energy and WSP were commissioned by Transport for London to provide an evidence-based assessment of the potential for cycle freight to replace light goods vehicles (LGVs) in London, and to make recommendations for policies and strategies to deliver this modal shift.

Scope and approach

This study focuses on the use of cycle freight for commercial logistics, with the specific aim of assessing the potential for reduction of vans up to 2025. The whole Greater London area is considered but a greater emphasis is on central London locations where the potential for uptake is most significant.

Opportunities and challenges for uptake of cycle freight were identified through:

- an extensive review of previous research
- two stakeholder workshops
- interviews with 21 industry representatives and 6 London boroughs.

Current use of cycle freight

The primary motivations for freight sector organisations to use cycle freight relate to the quality of service that can be achieved in terms of journey speed and reliability. Rising congestion, access charges (e.g. introduction of the Ultra-Low Emission Zone, ULEZ) and parking issues (parking availability and penalty charge notices) are concerns for all van-based fleets.

Several cycle freight vehicle types are currently available, ranging from standard pushbikes carrying relatively low loads (< 10 kg), to cargo bikes typically carrying up to 100 kg and cargo trikes capable of carrying up to 300 kg (Figure 1). The payload capacity of cycles can be further extended by using trailers.

More than half of the cycles surveyed offered electric assist either as standard or as an option. EAPCs are favoured for use on hilly terrain and with heavy loads, but can also widen the pool of potential employees by lowering the required fitness level to operate the cycles without fatigue.

	Messenger	Cargo bike	Cargo trike		Trailer
					
Payload (kg)			Front-load	Back-load	
Range	20 – 40	100 – 275	100 – 200	200 – 300	60 – 150
Typical	25	100	100	300	60
Payload (L)					
Range	30 – 50	200 – 800	200 – 600	500 – 1500	200 – 2100
Typical	30	300	300	1000	300
Width (cm)					
Range	50	50 – 90	80 – 90	80 – 120	80 – 110
Typical	–	70	85	100	100

Figure 1 Summary of payload capacity and width of typical cycle freight vehicles

Cycle freight use in Europe has increased considerably over the past 10 years, primarily providing last mile/first mile, point-to-point (P2P), and express delivery services in urban areas.

Last mile/first mile services require a facility within or on the edge of the delivery area to act as a distribution or microconsolidation hub. P2P services operate under a pick-up/drop-off (PUDO) model, with trips originating at businesses.

The UK cycle freight sector is currently dominated by P2P services, including courier services, express food or grocery delivery, and small business logistics. Last mile/first mile services are operated by both national parcel carriers and 3rd party cycle logistics companies in Europe and the UK, replacing significant portions of van journeys (40-100%); however, in London, few last mile services are offered and cycle freight services in particular are limited to express deliveries.

As of 2017, major mail and parcel carriers are beginning trials to incorporate cycle freight into their own London operations. In addition, several small-scale initiatives currently exist for encouraging cycle freight uptake among local businesses in London, including cargo bike delivery schemes, cargo bike hire schemes, and grants to support the purchase of cargo bikes.

Potential uptake for cycle freight and challenges to be addressed

Potential for uptake

Under a business-as-usual scenario, it is estimated that **1%** of LGVs in London will be replaced by cycle freight by 2025. If measures are put in place to promote cycle freight, it is estimated that LGV displacement could rise to **6%** in the same time period. Under this high uptake scenario, the number of load carrying cycles could increase from less than 100 to over 30,000 in central London, with 11,500 LGVs displaced. For each van displaced, 1.2 tonnes of CO_2 and at least 2.8 kg NO_x would be saved per year.

Although the aggregated van displacement across London is relatively small as a proportion of total traffic, the impact of cycle freight on traffic will be much higher on a

localised level. In areas with high levels of LGV delivery and collection activity, **10-14%** of van trips could be transferred to cycle freight, **reducing total traffic by 4%**. Since vans often park in multiple locations within a short distance of each other in their duty cycle, removal of one van removes a much higher proportion of vehicle km and kerbside activity.

In order to realise the full potential of cycle freight in London, challenges faced by London boroughs and industry must be addressed.

Challenges for London boroughs

All consulted boroughs were keen to promote cycle freight as a measure to address issues of congestion, local poor air quality and competing demands for scarce road and kerb space. Common issues in supporting cycle freight are outlined in Table 1. Opportunities for overcoming these issues were identified, but boroughs expressed a need for more guidance to help target and implement appropriate measures.

Table 1 Key issues and barriers for London boroughs

Issue or barrier
Providing space – it is challenging to accommodate space in suitable locations for operators to use as distribution hubs. Where on-street sites are required, parking stress, lost parking revenues and limited scope for use of bays are key challenges.
Access restrictions – introducing access restrictions for motorised transport in key areas was recognised as advantageous for cycle freight. The extent to which these can be implemented, and to what scale, varies significantly depending on a borough's competing transport objectives, and the acceptability of proposals amongst stakeholders.
Pedestrian conflict and accountability of operators – Having experienced conflict issues with pedicabs, boroughs need assurance of professional conduct from operators. The ability to report and address any issues directly with operators is important.
Limited scope for direct financial support – Cycle freight schemes need to operate commercially, as boroughs do not have the resources to support them directly. Furthermore, issues of state aid present barriers in this regard.

Challenges for industry

Cycle freight is inherently limited by the payload capacity (particularly volume) and the distance that can be covered. The degree to which these limitations affect the commercial viability of cycle freight varies across sectors. Cycle freight is already established for mail & parcels and small-to-medium enterprises (SMEs); therefore, these sectors have high potential for increased uptake. In contrast, large wholesale & retail and utilities & services have lower potential since last mile services are not routinely

separated in these sectors and payloads are typically heavier or bulkier than those of parcel carriers.

The key barriers to uptake for each freight sector are summarised in Table 2.

Table 2 Key issues and barriers for industry

Barrier	Applies to
Lack of space for distribution – Mail & parcel carriers operate at a high drop rate (~10 deliveries per hour per driver/rider) which requires use of a local depot for efficient reloading of cargo cycles. The cost of suitable space in London is currently prohibitive in making cycle freight viable.	**Mail & Parcels: last mile**
Change in operation – Separating last mile deliveries and/or transferring them to cycle freight is a disruptive change in operations that is costly to implement.	**Mail & Parcels: last mile** **Wholesale & retail** **Utilities & services**
Awareness and capability – awareness of the capabilities and benefits of cycle freight is low outside the mail & parcel sector and understanding the available options is more difficult compared to choosing a van.	**SMEs**
Capital cost – The average vehicle cost is £1,900 for a cargo bike and £4,250 for a cargo trike. For EAPCs, this rises to £4,100 for a cargo bike and £7,500 for a cargo trike, but cargo trike prices can exceed £11,000. Although lower than a van (particularly an electric van), this is a considerable outlay for a small business or self-employed courier.	**SMEs** **Self-employed couriers**
Lack of suitable carriers – the costs and risks of cycle freight operations can be mitigated by sub-contracting to a 3rd party, but the number of cycle logistics carriers in London is currently low. Professionalism and customer relationships are important for all sectors, but are a particular concern for wholesale & retail sectors where brand image is very important.	**All**
Lack of secure parking and/or storage – on-premises space is limited for storing bikes, and suitable, secure on-street parking is not always available.	**SMEs** **Self-employed couriers**

Recommendations

Increasing the uptake of cycle freight in London requires action across four broad themes:

1. **Raising awareness and knowledge:** enabling boroughs and businesses to make informed decisions about freight solutions.
2. **Raising standards:** creating a professional image for the sector to assure boroughs and businesses that they are supporting a reputable operation.
3. **Making space:** provision of affordable space for distribution and cycle storage to assist businesses in using cycle freight.
4. **Increasing competitiveness:** enabling cycle freight to become competitive and sustainable, through funding and infrastructure provisions.

The most challenging actions going forward relate to providing space and implementing cycle freight-friendly strategies. However, these actions are the most critical for the successful uptake of cycle freight and therefore require appropriate support and incentives to facilitate them.

A long list of recommendations has been derived as part of this study (detailed in Section 4, from page 39), to help maximise cycle freight uptake from now to 2025. Figure 2 summarises the high-level recommendations and key milestones for each stakeholder over this timeline.

From now to 2020, the primary focus should be on raising awareness and knowledge amongst boroughs and London businesses. This will allow boroughs to plan for the necessary infrastructure for modal shift and to conduct trials. During this time, a new training standard and the grounds for a formal Code of Conduct (CoC) for operators should be developed to promote responsible working.

The first steps for TfL will be to develop guidance for boroughs and businesses, and to hold a workshop to begin the process of developing the CoC. Some of the contents of the borough guidance is already developed within this report, including a framework to identify suitable local areas in which cycle freight can have the most impact.

After 2020, uptake is expected to increase since key enablers will be in place, including the ULEZ, local access restrictions and the future-proofing of new developments and major schemes for cycle freight. From 2025, Zero Emission Zones are expected to be in place.

With a combination of ambitious policies, strategies, and an innovative and growing sector, London is expected to be well-positioned to support significant cycle freight uptake by 2025.

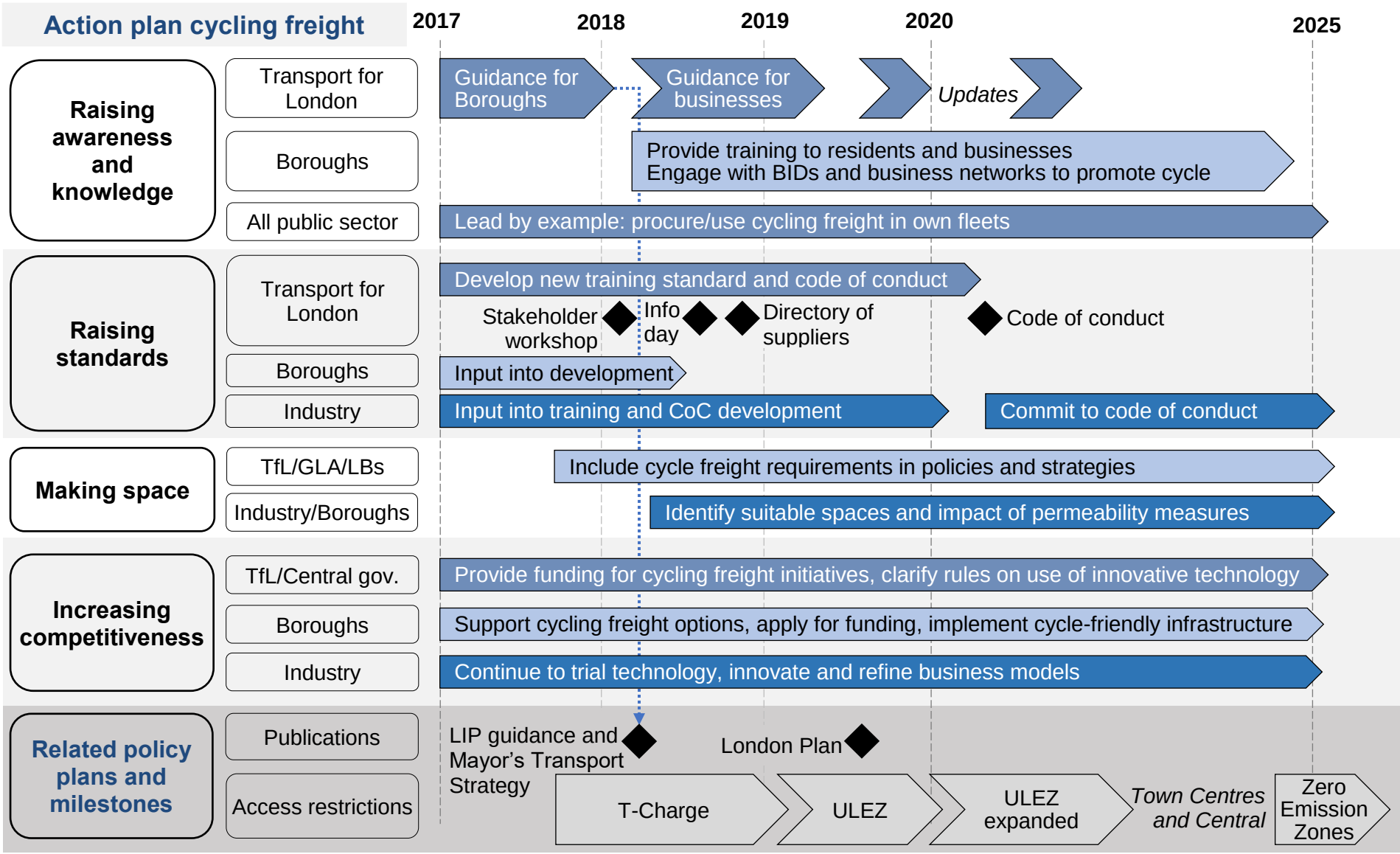

Figure 2 Summary of the action plan to support cycling freight in London

Contents

Authors

For comments or queries please contact:

Katherine Orchard, Consultant, Element Energy, katherine.orchard@element-energy.co.uk

Matt Croucher, Sustainable Transport Lead, WSP

Reviewers

Celine Cluzel, Associate Director, Element Energy, celine.cluzel@element-energy.co.uk

Sophie Lyons, Senior Consultant, Element Energy

Glenn Higgs, Associate Director, WSP

Other contributors

Adrian Lord, Associate Director, Phil Jones Associates

Disclaimer

Note on terminology

A van or Light Goods Vehicle (LGV) is a commercial vehicle of up to 3.5t Gross Vehicle Weight (GVW). However, in the logistic sector, trucks of around 7.5t GVW are used for urban deliveries and are sometimes referred to as vans by fleet operators. For simplicity, this report refers to ‘vans’ in the wider sense: from LGV to light trucks.

Acronyms

B2B	Business-to-business
B2C	Business-to-customer
BID	Business Improvement District
C2X	Customer-to-customer or customer-to-business
CCZ	Congestion Charging Zone
CLOCS	Construction Logistics and Community Safety
CoC	Code of Conduct
CoL	City of London
DfT	Department for Transport
EAPCs	Electrically Assisted Pedal Cycles
ECLF	European Cycle Logistics Federation
FORS	Fleet Operator Recognition Scheme
GCDA	Greenwich Co-Operative Development Agency
GLA	Greater London Authority
HGV	Heavy Goods Vehicle
LCSG	London Contracts and Supplies Group
LEN	Low Emission Neighbourhood
LGV	Light goods vehicle (up to 3.5t)
LIP	Local Implementation Plan
MTS	Mayor's Transport Strategy
P2P	Point-to-point
PCN	Penalty Charge Notice
PUDO	Pick-up/drop-off
SME	Small and medium sized enterprise (0-250 employees)
TfL	Transport for London
UKCLF	UK Cycle Logistics Federation
ULEV	Ultra-low emission vehicle
ULEZ	Ultra-low emission zone
ZED	Zero emission delivery
ZEN	Zero emissions network (a business forum group in City Fringe LEN)
ZEZ	Zero emission zone

1 Introduction

1.1 Background

As London grows, so does traffic congestion and air pollution. London is in breach of legal limits for NO_2, which has a major, damaging impact on public health. Transport is a major contributor to air pollution, accounting for 63% of NO_x, 21% of CO_2 and 52% of PM_{10} emissions in London in 2010.[1] The draft Mayor's Transport Strategy (MTS) aims to tackle air quality by promoting sustainable transport and creating safe, attractive environments for travel through the Healthy Streets agenda. Further measures introduced by Transport for London (TfL) to reduce transport emissions include Low Emission Neighbourhoods (LENs) and the introduction of the Ultra Low Emission Zone (ULEZ) in 2019.

Commercial freight vehicles account for 20-30% of London's transport emissions;[2] therefore TfL is taking specific measures to reduce emissions from this sector. Freight vehicles currently make up a third of traffic in the central London morning peak, and the Mayor aims to reduce this by 10% on current levels by 2026.

Cycle freight

The term "cycle freight" refers to the carriage of goods by pedal cycle, and is a low cost, low emission alternative to motorised vehicles for transporting goods over short distances. Transferring motorised goods journeys to cycle freight reduces both congestion and emissions, while improving service reliability for operators.

The case for cycle freight in London was previously examined by TfL in 2009, and for European cities by the EU-funded CycleLogistics project in 2014; the latter estimated that 51% of motorised goods transport trips (25% of all urban trips) could be shifted to cycle freight but this estimate was not mode-specific and included personal trips (e.g. shopping).

Several factors have improved the case for cycle freight in London since 2009, including:

- **The cycle freight industry has matured:** Increasing numbers of cycle freight vehicles have come to market, including significant growth in electric pedal assist cycle freight, aided by a change in regulations. There has also been rapid growth of new cycle-based services such as Deliveroo.
- **London policies favour sustainable transport:** The Mayor's Transport Strategy (MTS) focuses on reducing motorised vehicle use and increasing

[1] *Transport Emissions Roadmap, Cleaner transport for a cleaner London*, 2014.

[2] HGVs and 'vans & mini-buses' contribute to 27% of NO_x, 30% of PM_{10} and 19% of CO_2 transport emissions. Source: TfL ULEZ consultation

walking and cycling. Initiatives including Healthy Streets, Mini-Holland projects and Liveable Neighbourhoods have been implemented to achieve these goals.

- **Cycling infrastructure and culture has improved:** Sustained investment in cycle networks has improved cycle access, with six Cycle Superhighways already in place and two more in progress. The first seven Quietways are due for completion in 2018. The number of cycling journeys in London increased by 63% between 2005 and 2015.[3]
- **Worsening congestion:** Population growth, road reallocation and road modernisation have all contributed to increased congestion and vehicle journey times[4]. Road freight traffic is predicted to grow by 20% by 2031, exacerbated by the growth of bespoke, express delivery services.

It is therefore timely to re-assess the current potential for increasing cycle freight use in London.

1.2 Objectives

The objective of this research is to provide an evidence-based assessment of the potential for cycle freight to replace light goods vehicles (LGVs) in London and to make recommendations for policies and strategies to deliver this modal shift.

1.3 Scope and approach

Scope

This study focuses on the use of cycle freight for commercial logistics, with the specific aim of assessing the potential for reduction in vans. The term cycle freight is limited to the use of pedal cycles and electrically assisted pedal cycles (EAPCs) for transporting goods. Mopeds, motorcycles, L-category vehicles and other powered two or three wheelers are not in the scope of this work. The whole Greater London area is considered but a greater emphasis is on central London locations where the potential for uptake is most significant. The time horizon is limited to 2025.

Cycle freight is one of several strategies that Boroughs and freight operators can adopt to address issues of congestion and air quality. Other measures include consolidation centres, re-timing of deliveries and encouraging uptake of motorised Ultra Low Emission Vehicles (ULEVs). Recommendations of the appropriate mix of each of these strategies is outside the scope of this study and would need to be assessed on a case-by-case basis.

Approach

Opportunities and challenges for uptake of cycle freight in London were identified

[3] *Travel in London Report 9,* 2016
[4] Average central London traffic speed decreased by 12.6% between 2014 and 2015, to 12 km per h. *Travel in London Report 9,* 2016

through an extensive review of previous research, stakeholder interviews, and workshops. Our overall approach is outlined in Figure 3

A baseline assessment of the current cycle freight industry was established based on secondary research, comprising a review of the market offer in the UK and London, as well as evidence around barriers to, and enablers of, cycle freight uptake. London was characterised in terms of factors influencing the benefits and potential of cycle freight, and policies and incentives that could change the potential were reviewed.

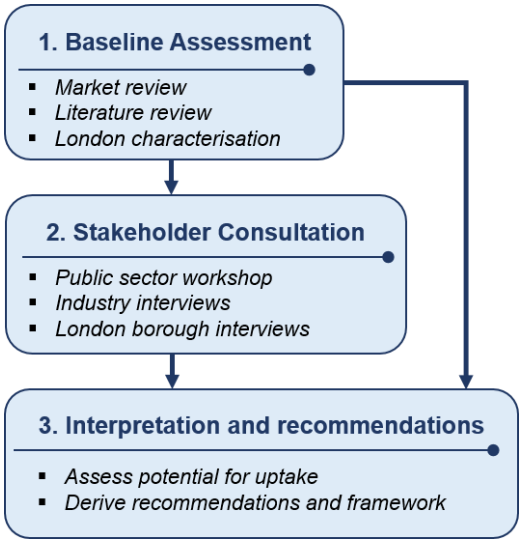

Figure 3 Summary of the approach

The evidence gathered in the review was used to inform a focused stakeholder consultation, which refined the findings to the case of London. The consultation included a workshop with TfL, GLA, and London Councils, interviews with 21 industry representatives, and interviews with 6 Boroughs.

The private sector interviews investigated which barriers affect their operations and how they could be addressed. The point of view of the employer and employee were considered, as the job becomes significantly different on transition from van driver to cyclist. Interviewees included both national and local logistic companies, as well as SMEs and national retail and service sector companies.

The public-sector organisations' input provided an understanding of their aspiration for cycle freight, planned policy developments, barriers to supporting uptake and potential opportunities for overcoming these. Likely timescales for changes affecting cycle freight were also explored. The feasibility of recommended actions from the literature was tested. The list of interviewed stakeholders is provided in Appendix.

The findings of the review and consultation were combined to assess the potential for cycle freight uptake and to derive recommendations for each stakeholder.

1.4 Structure of the report

Section 2 presents the baseline assessment of the current cycle freight industry in the UK. Section 2.1 outlines the market offer with regard to availability and cost of cycle freight vehicles. Section 2.2 then details the freight sectors and services that currently feature cycle freight, with examples from Europe, the UK and London.

Section 3 considers the potential for cycle freight in London specifically. It first focuses on the sector-specific barriers and opportunities experienced by freight operators, before outlining the Borough perspective. Projections for cycling freight uptake are

discussed in Section 3.3, and a framework for assessing the potential cycle freight uptake within a more localised area is presented in Section 3.4.

Section 4 outlines a series of recommendations for each of the key stakeholders based on the findings of the preceding sections.

The **Appendix** contains additional supporting information.

2 Current uptake of cycle freight

2.1 Available vehicles

2.1.1 Vehicle types

Several cycle freight vehicle types are currently available, ranging from standard pushbikes carrying relatively low loads (< 10 kg) up to cargo trikes capable of carrying up to 300 kg (Figure 4 and Table 3). Trailers can be used to extend the capacity of pushbikes and front-loading cargo bikes and trikes. Quadricycles are also available[5] but they are not widely adopted in the UK. The sector is evolving rapidly, with innovative solutions continually being developed for both business and personal use.[6]

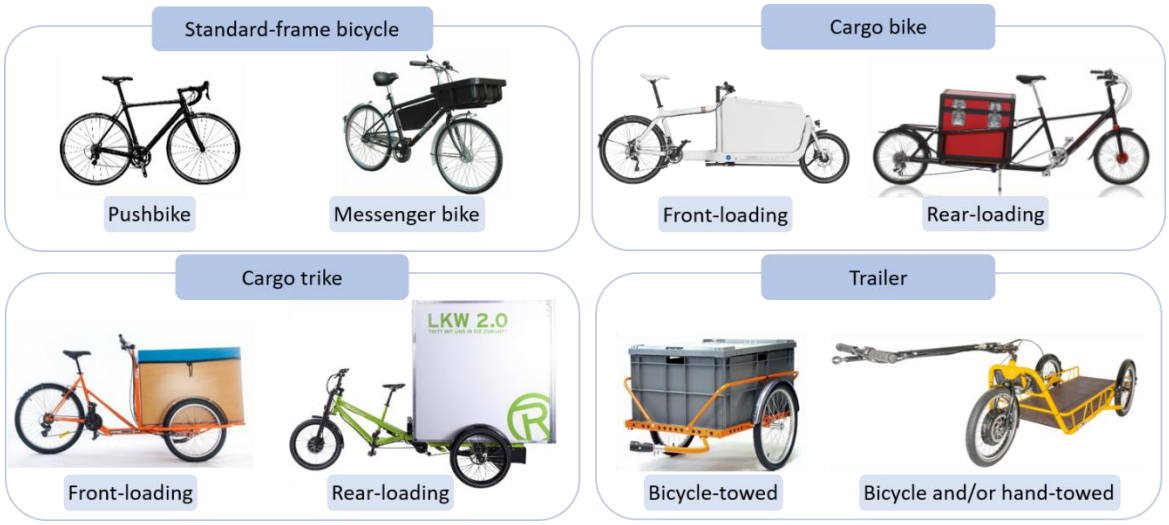

Figure 4 Overview of available cycling freight vehicle styles

In general, cargo bikes are more manoeuvrable than cargo trikes. Cargo bikes are a similar width to a pushbike (see Table 3) so they can easily move around congestion whereas cargo trikes cannot. Additionally, although both cargo bikes and trikes are allowed to use cycle lanes, trikes typically need wider lanes and access routes in order to not cause an obstruction for other cyclists. Cargo bike operation is closer to that of a pushbike (particularly for rear-load) making the adjustment from standard bike to cargo cycle easier for a rider than for a trike. Cargo bikes also typically carry a lower payload than a trike, allowing them to travel at a higher average speed.

Rear-load vehicles have higher volume capacity (see Table 3) since the load does not directly interfere with visibility or steering.

Cargo bikes and trikes are longer than standard pushbikes (2.4-3.4 and 2.1-2.8 m for bikes and trikes, respectively, compared to 1.8 m for a standard bike). This additional

[5] For example, the Velove Armadillo used by DHL in Germany and the Netherlands (http://velove.se/the-armadillo/)

[6] Recent examples include the Fleximodal BicyLift trailer (http://fleximodal.fr/en/bicylift-en/) and the TreGo trolley (http://trego-trolley.com/).

length adds difficulty in overtaking, cornering and parking; however, the London Cycling Design Standards provide recommendations for including these vehicles in infrastructure planning.

Some models of cargo trike provide overhead cover for the rider, and can be designed with lockable doors; for example, the cargo cruiser used by UPS in Europe.[7]

Table 3 Typical payload capability and width of cycling freight vehicles[a]

	Messenger	Cargo bike	Cargo trike		Trailer
Payload (kg)			Front-load	Rear-load	
Range	20 – 40	100 – 275	100 – 200	200 – 300	60 – 150
Typical	25	100	100	300	60
Payload (L)					
Range	30 – 50	200 – 800	200 – 600	500 – 1500	200 – 2100
Typical	30	300	300	1000	300
Width (cm)					
Range	50	50 – 90	80 – 90	80 – 120	80 – 110
Typical	–	70	85	100	100

[a]Based on a survey of 5 trailers and 23 unique bike and trike models, with a total of 30 cycle/cargo box combinations across 17 brands of cycles. Of the unique models, the sample included: 5 messenger bikes, 7 cargo bikes, 5 front-load trikes and 6 rear-load trikes.

Electrically Assisted Pedal Cycles (EAPCs)

The EAPC market has grown considerably over the past 10 years[8]. Reflecting this growth, electric-assist is available as an option, or included as standard, in 57% of the load-carrying cycles surveyed (pushbikes were not surveyed). Of these, only one messenger bike is offered with electric assist, compared to 46% of cargo bikes and 67% of cargo trikes. One trailer (Carla Cargo) is offered with electric assistance.

UK EAPC regulations were amended in 2015 to bring them in line with EU regulations (see Appendix 5.1), which included increasing the allowed motor power (up to 250 W) and assisted speed (up to 15.5 mph). The main impact of these amendments on cycle freight was the removal of weight restrictions, which allowed EAPC cargo bikes and trikes to be used without requiring a motor vehicle licence.

EAPCs are typically favoured over non-EAPC vehicles for use on hilly terrain and with heavy loads; however, even on flat terrain, EAPCs have the added benefit of widening the pool of potential employees by lowering the required fitness level at which the cycles can be operated without fatigue. EAPC uptake is increasing among cycle logistics operators, especially for cargo trikes, with 28% of companies owning at least one EAPC trike in 2016 compared with 12.5% in 2014.[9]

[7] https://compass.ups.com/eco-friendly-package-delivery-bikes-debut-europe/

[8] European sales increased by 22% between 2015-2016, and have increased by 1700% since 2006. *European Bicycle Market 2017 Edition,* Confederation of the European Bicycle Industry.

[9] *Cycle Logistics Industry Survey,* 2016.

In line with regulations, EAPCs use 250 W motors and battery capacities range from 300 to 1200 Wh. The range capability of these vehicles depends on the load carried, but manufacturers quote 40-120 km per charge. Cycle logistics operators reported that a single charge was sufficient to meet their daily delivery needs. Allowing EAPCs to use higher-powered motors may assist with moving heavier loads; however, such cycles are currently subject to registration and type-approval[10] in Europe and, as such, there is no precedent for changing the regulations at this time.

In contrast with electric motor vehicles, EAPCs do not require a public charging network; they are charged at the depot or at the employee's home using mains electricity.

2.1.2 Vehicle cost

Capital cost – current

Prices of cycle freight vehicles were obtained from manufacturer and supplier websites, correct as of July 2017. Vehicle prices vary widely (from £500 to over £11,000) but broadly correlate with the payload capacity of the vehicle (see Figure 5 and Figure 16, Appendix 5.1).

Without electric assist: The average price for a **cargo bike** is £1,900 (ex. VAT; range £1,600-2,450) and the average price for a **cargo trike** is £4,250 (ex. VAT; range £1,000-6,500).

With electric assist: The additional cost of electric assist (EAPC) for cargo cycles is largely dictated by the quality of the battery and EAPC system, but is typically in the region of £2,000 (range £700–£5,300). The average price for an **EAPC-cargo bike** is £4,100 (ex. VAT; range £3,600–4,500). The average price for an **EAPC-cargo trike** is £7,500 (ex. VAT; range £4,800–11,700).

In contrast to the case of vans, there is not a large second-hand market for cargo cycles and leasing is not available from manufacturers; however, financing options are available from some cycle shops (for example, London Green Cycles) which may help small businesses. Cycle logistics companies can also benefit from price reductions through bulk orders.

Capital cost – future trends

Cycle freight vehicles are still manufactured on a relatively small scale. Although some companies already outsource manufacturing to Taiwan (including one UK brand), the majority of UK companies manufacture locally, supplying fewer than 100 vehicles per year.

[10] Vehicles must be delivered with a certificate of conformity and fitted with a plate showing their type approval number.

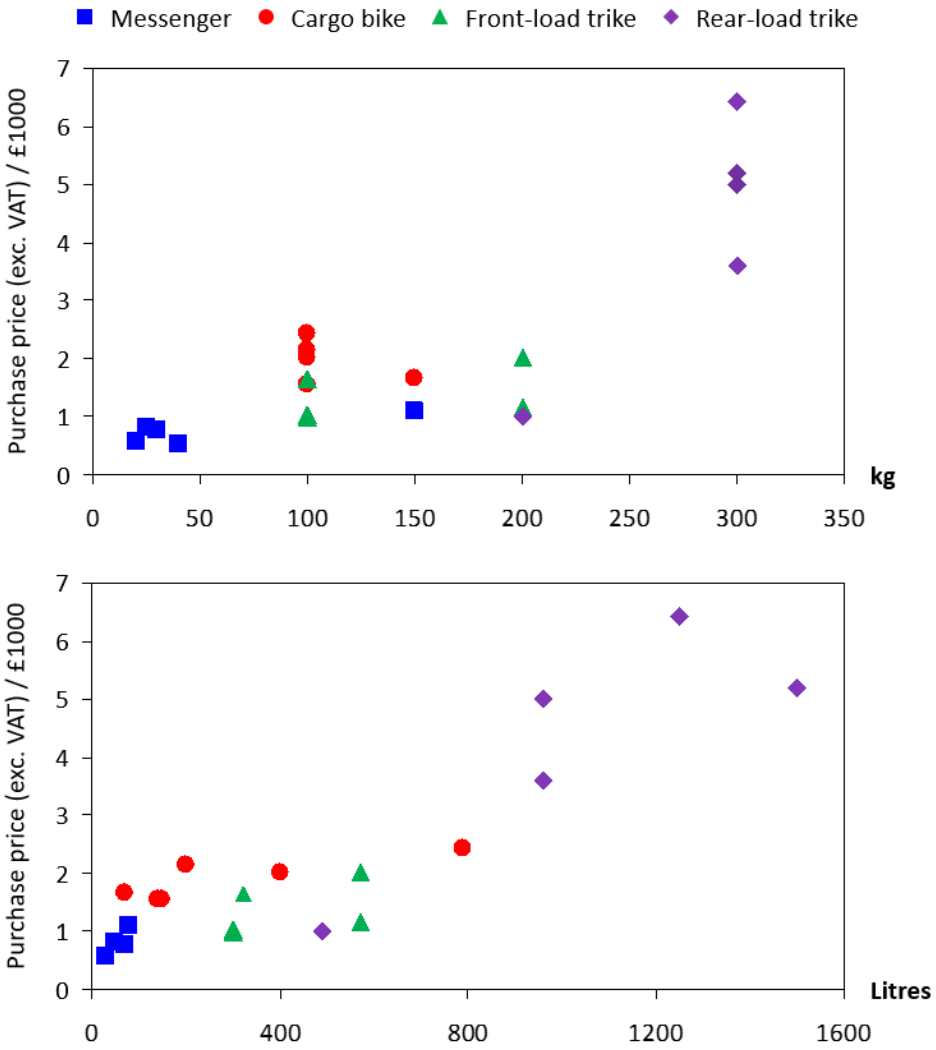

Figure 5 Vehicle purchase cost (exc. VAT) vs. maximum payload for non-EAPC vehicles. See Appendix for equivalent figure for EAPC vehicles.[11]

Vehicle price is not expected to reduce over the next 5 – 10 years, and may in fact increase, for the following reasons:

- Although manufacturing costs typically decrease at high-volume, the market demand for commercial cargo cycles is not expected to reach high-volume. Cargo cycle uptake is expected to displace only a small fraction of the ca. 380,000 LGVs sold per year in the UK, representing a considerably smaller market than standard cycles[12], even if more than 1 cargo cycle is needed for each van replaced. For comparison, a total of 3 million standard cycles are sold per year in the UK[13], and high-volume manufacturers based in the Far East are dominant in this sector.

[11]Authors' review of market (17 brands, 27 vehicle/cargo box combinations reviewed), prices correct as of July 2017.
[12] It should be noted that a proportion of the cycle freight uptake may also include standard cycles.
[13] 3,050,000 cycles sold in Great Britain in 2016 *European Bicycle Market 2017 Edition* Confederation of the European Bicycle Industry

- Cargo cycles already use many standard cycle parts or parts from other established sectors (e.g. mopeds).
- Although battery costs may decrease with growth of the EAPC market, batteries account for only 10% of the total price of an EAPC cargo cycle.[14]
- It is also expected that, with EAPC development, brands will continue to aim for the highest quality by incorporating the latest technology.

Operating costs

Vehicle maintenance costs are largely associated with regular replacement of consumables such as tyres, brakes, chains and saddles, but more extensive damage such as cracked frames and loss of wheel spokes are also common among operators. From the industry consultation, overall maintenance costs were reported to be £120-160 per year. This compares favourably to maintenance of a van, which might be expected to cost up to £500 per year.[15]

2.1.3 Vehicle availability in the UK and London

No "standard" cargo cycle currently exists. Across 30 organisations operating cycle freight in the UK, 14 brands are used, with the Larry vs Harry Bullitt (and e-Bullitt) used by 40% of the organisations surveyed[16].

Of the 19 vehicle brands surveyed, 6 are based in the UK, with the remainder across Europe[17]. In London, 12 brands are available from one dedicated cargo bike store (London Green Cycles), with a further 6 brands available either from other stores or direct from the manufacturer.

2.2 Current use in Europe, UK and London

Cycle freight use has increased significantly over the past 7 – 10 years, as represented in Figure 6. Based on the recent Cycle Logistics Industry Survey (2016), it is now used in at least 93 towns and cities across 17 countries in Europe. In the UK, it operates in at least 25 towns and cities, and freight services are provided by at least 19 3rd party logistics companies. It should be noted that this only reflects a market presence and not the share of delivery activity.

We estimate that, at the time of writing, there are fewer than 100 load-carrying cycles in use in London in operations that effectively replace vans (i.e. excluding food delivery).

[14] Estimated by comparing the retail cost of the listed battery pack to the total EAPC cost for 8 EAPCs.
[15] Estimated for a Ford transit panel van, driving 50 miles per day. Based on figures from http://www.commercialfleet.org/tools/van/running-costs/
[16] Based on consultations and a review of vehicles shown on company websites
[17] 5 in Denmark, 3 in Germany, 2 in the Netherlands, 1 in Sweden, 1 in France, 1 in Italy

Logistics Market Sectors

Cycle freight is most prevalent in urban areas over short distances, and the main services offered include (Figure 7)[18]:

- **First mile/Last mile** – carrying deliveries from a local distribution centre to a customer;
- **Point-to-point (P2P)** – including business-to-business (B2B), business-to-customer (B2C) and customer-to-customer or customer-to-business (C2X), within a local area;
- **Express delivery** – time-sensitive deliveries both for last mile and P2P (for example, pre-9 am or within 1 h).

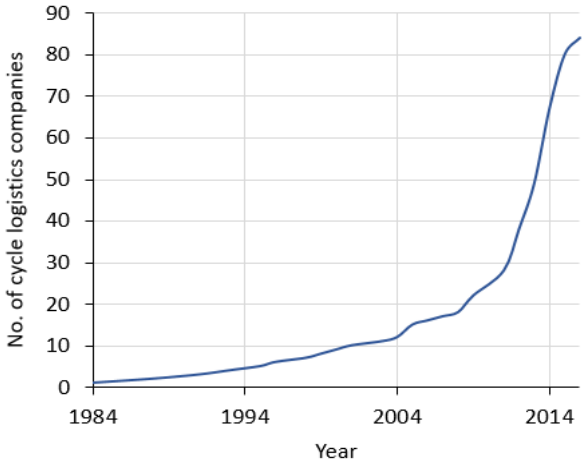

Figure 6 Historical increase in companies operating cycle logistics in Europe, based on year company was founded (EE analysis of ECLF data).

Last mile and first mile services require a facility within or on the edge of the delivery area, referred to as a distribution hub or microconsolidation centre (Figure 7, left). Example formats for distribution hubs include company depots, shipping containers and pick-up/drop-off (PUDO) lockers (see Appendix 5.4, page 58 for more details). Point-to-point services operate as PUDO services – with trips originating at businesses – and don't typically require distribution hubs (Figure 7, right).

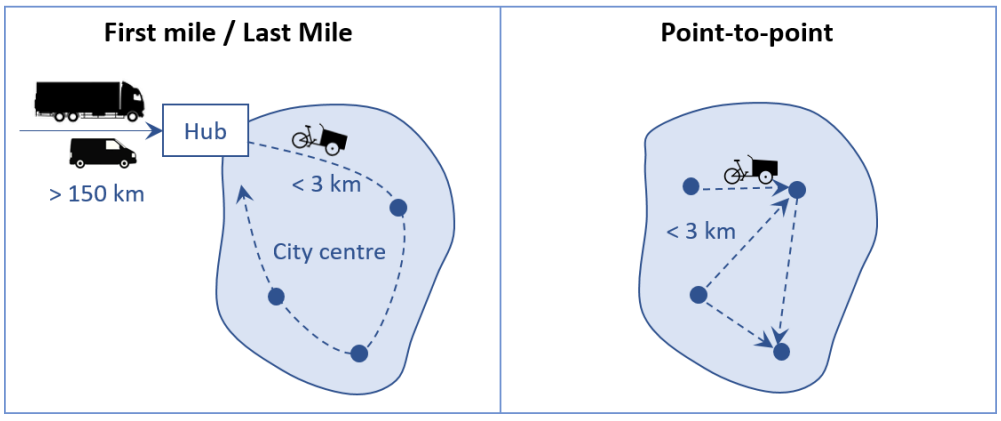

Figure 7 Cycle freight logistics models operating within an urban area.

The UK cycle freight sector (Figure 8) is currently dominated by P2P services. Of these, mail and parcel courier services are considered to reduce or replace van journeys (for example, CitySprint, Stuart, Shutl, Quiqup), whereas express food or grocery delivery services (such as Deliveroo) represent new services. Most P2P

[18] Note that the data in Figure 6 only considers companies that are still operating, and represents a small sample of companies (84 out of 400 contacted).

carriers use a suite of different vehicles (bicycles, mopeds, motorcycles, cars, and vans) with pushbikes accounting for the majority of cycle freight; however, cargo bikes are offered in a few cases and 78% of dedicated cycle logistics companies also offer B2B and B2C services[19].

National carriers can either operate their own last mile/first mile services or subcontract to a 3rd party carrier. Several major carriers have trialled their own last mile cycle logistics operations in medium-sized European cities and, in some cases, have been able to carry out all of their inner-city deliveries this way (*see Case Study 1).*

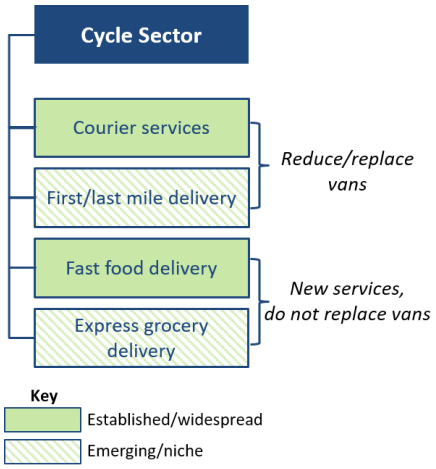

Figure 8 Overview of current cycle freight sector

Half of European cycle logistics companies operate last mile services for other 3rd party carriers.[17] Of these, 54% of respondents worked with more than one carrier, effectively operating as consolidation and distribution centres at the edge of cities. In the UK, many national carriers subcontract to local cycle logistics companies and have been able to remove significant portions of their van journeys (*see Case Study 2*). However, in London, few last mile services are offered. For one last-mile operator, cycle logistics is limited to express delivery (*see Case Study 3*). In this case, the main benefit of cycle freight is to improve the efficiency of van routes by removing time-sensitive deliveries from vans.

Cycle freight is also used by small businesses for their own deliveries, particularly in the wholesale and retail sector such as bakeries and florists (not shown in Figure 6). Both running their own deliveries and sub-contracting to 3rd parties bring benefits of cost and flexibility (for example, *see Case Study 4 and Case Study 5*). The number of small businesses that already use cycle freight is not known, although several examples can be found on both vehicle brand websites[20] and the website of the Zero Emission Network[21] (*see Established London Initiatives, below*).

Additional, niche, examples of cargo bike use include advertising (for example, information bikes on the South Bank)[22], municipal services (for example, park maintenance in Bulgaria)[23], and the service sector (for example, bike shops, gardeners).[20]

[19] *Cycle Logistics Industry Survey*, 2016
[20] For example, http://8freight.com/case-studies
[21] https://zeroemissionsnetwork.com/offers/cargo-bike-trial
[22] http://www.southbanklondon.com/infobikes
[23] Cycle Logistics Report (2014)

Case Study 1 – UPS in Europe: Hamburg and Dublin

Microdistribution

Model: Last mile delivery in 3rd party logistics. Parcels are delivered by truck to a city centre storage container for onward delivery by electric-assist trikes and/or on foot.

Motivations and benefits: UPS has a long-standing low emissions policy. Congestion and lack of parking, exacerbated by narrow city streets make cycling and walking efficient choices.

Vehicle displacement: In their operation areas, all delivery vehicle routes have been replaced, with van drivers switching to cycle freight: 7 vans in Hamburg, 4 vans in North Dublin.

Employee's perspective: The main benefit has been increased exercise of cycling and walking. The ability to park the trikes more easily means that more deliveries can be carried out from one location (on foot) than when using a van. Public reception has been overwhelmingly positive, with the trikes regularly photographed by pedestrians. Other road users, such as bus drivers, are supportive.

Moving the model to London: Congestion and competition for space are considerably higher in London. This leads to much more reliance on walking for van drivers and is anticipated to be the case also for cycle freight. It also requires a more sophisticated delivery model to make the system cost-effective.

UPS have partnered with Fernhay and Skotkonung to trial a new cycle and walk model in London (*see Case Study 7, page 16)*.

Case Study 2 – TNT and Outspoken! Delivery in Cambridge

Last mile

Model: Last mile delivery in 3rd party logistics. Parcels suitable for cycle freight are segregated by TNT and delivered to the Outspoken! Depot for onward delivery by bike or trike.

Motivations and benefits: Motorised vehicle access is restricted in Cambridge, with loading and unloading prohibited in the city centre between 10am and 4pm, and several roads permanently closed to traffic other than cycles and buses. Cycle logistics is able to provide a cost-effective, high level of service compared to vans.

Vehicle displacement: In the region of 500 parcels are delivered per day by cargo bike and cargo trike across 3 areas of Cambridge, replacing two 7.5t van routes (40% of routes).

Main barriers: Payload capacity, particularly volume.

Case Study 3 – Gnewt Cargo in London

London – Last mile

Model: Last mile delivery in 3rd party logistics. Gnewt Cargo have been operating in London since 2008. Initially focused on cycle freight, now majority of fleet is electric vans. Cycle freight is primarily used for express delivery (pre-9am or pre-10am).

Motivations and benefits: The speed and reliability of cycle freight in congested areas allows for high level of service. By removing time-dependent deliveries from van routes, van efficiency is improved.

Main barriers: Payload capacity, particularly volume, prevents greater use of cycle freight – although faster than a van for one load, efficiency is lost through the need to re-load.

Case Study 4 – Pedal & Post (Oxford)

Support for small businesses

Model: Third party cycle logistics operator, providing last mile and P2P services (including multi-drop) using non-EAPC cargo bikes. Additional, complementary, services include storage for businesses and residents, pick and pack, and fulfilment. Customers include large logistics operators (e.g. Yodel, who struggle to find carriers willing to enter the city), small businesses, and a pharmacy. Deliveries are conducted over a 5-mile radius.

Example vehicle displacement: In taking over deliveries for an SME, two cycle routes replaced one van route per day. The flexibility of service allowed the SME to offer different delivery timeslots and to easily expand their business – now serving 6 times the number of clients as with the van.

Relevance for London: The presence of cycle delivery firms can help local businesses grow. In bringing cycle logistics operators to an area, the operators need to be able to build up a good mix of national and local business to become commercially sustainable.

Case Study 5 – AV2Hire, London

London – SME

Model: SME based in Bloomsbury, providing audiovisual equipment hire throughout London. Staff carry out 5-6 deliveries of equipment to customers (B2C) per day using non-EAPC cargo bikes. Riders handle 40-50 kg per trip but up to 100 kg is possible. Most (~80%) journeys are 2-5 miles but up to 10 miles is possible.

Motivations and benefits: Environmental benefit, operational cost, speed and flexibility of service compared to a van. Journey times can be reduced by up to 50% compared to a van.

Main barriers: Payload capacity when handling multiple items. If they were to use a trike to increase capacity, storage space on-premises would be limiting and speed in traffic would be reduced.

Existing and upcoming London cycle freight initiatives

Cargo bike delivery schemes: Cycle freight delivery services are currently advertised to businesses in the Better Bankside Business Improvement District (BID) and two new schemes were launched in September 2017 in Waltham Forest[24] and Greenwich[25] (*see information box 1*).

Zero Emissions Network (ZEN): The ZEN is a partnership between the London boroughs of Islington, Hackney and Tower Hamlets. It offers businesses a free two-week cargo bike trial.[26] If eligible, businesses can also apply for up to £2,000 towards the purchase of a cargo bike through the Sustainable Travel Grants Scheme. ZEN partners with London Green Cycles to provide guidance to businesses in choosing an appropriate vehicle.

Cargo bike hire schemes: Free cargo bike hire for up to 7 days is also offered to both residents and businesses by Waltham Forest. Paid hire is offered by some cycle stores (for example, London Green Cycles, Fully Charged) and by Carry Me Cargo in Hackney.

National Mail and Parcel carriers: CitySprint and UPS began trials in London in 2017 (*see Case Study 6 and Case Study 7)*

Industry Representation in the UK and Europe

The European Cycle Logistics Federation (ECLF) was established in 2012 following the Cyclelogistics program, with the aim to provide representation and a network for cycle logistics companies (see information box 2). Local arms of the ECLF including the UK Cycle Logistics Federation (UKCLF) are in the process of being established.

Industry Training Programmes

The majority of cycle logistics providers (62%; ECLF, 2016) provide some training; however, there is currently no standard cycle freight training programme. Providers we consulted who employed their riders typically provided Bikeability training to level 3, followed by their own cycle freight vehicle training.

[24] http://www.enjoywalthamforest.co.uk/local-deliveries/
[25] http://rechargecargo.co.uk/locations/london
[26] A one-week free trial is also offered for residents for private use.

Information box 1 - Cargo bike delivery schemes

Waltham Forest: As part of their Mini-Holland scheme, Waltham Forest (WF) initially ran a Christmas Courier service in 2016 in which cargo bikes were used to deliver 1000 parcels for 20 local businesses over two weeks.

Following the success of the Christmas scheme, WF secured funding from the Mayor's Air Quality fund to set up a zero emissions courier service operated by Outspoken! Delivery. The service launched at the end of September 2017, serving both local businesses and a national carrier. The first two years of operation are supported by generous funding, with the expectation that the service will become fully commercial at the end of this period.

ReCharge Cargo, Greenwich: Match funding to support a zero-emission delivery service was secured as one of several projects to address air quality in the Royal Greenwich Low Emission Neighbourhood (LEN). Beginning in September 2017, ReCharge Cargo operated commercially from launch, serving national logistics operators and local businesses within a 4km radius. ReCharge operate out of a shipping container, which is primarily used to store the cycles and some stock. A number of national logistics operators have depots within the operating radius, reducing the need for central consolidation.

Space for the shipping container was provided on Greenwich Co-Operative Development Agency (GCDA) land on the edge of the LEN. This land is provided at peppercorn rates, as it is seen as being beneficial to the area. Before the scheme began, Greenwich Council carried out a survey of businesses to raise awareness and gauge interest. The workplace travel planning element of the LEN signposts businesses to the scheme.

Case Study 6 – CitySprint, London

London – trial

Model: Logistics with predominantly P2P services, operating with self-employed couriers. Deliveries are carried out by a mixed fleet of vans, cyclists and motorcyclists. Cyclists cover 60-80 miles per day and deliver ~20 packages per day. Following a successful recent trial using two non-EAPC cargo bikes in central London, CitySprint are expanding their cargo bike offering. By the end of 2017, 20 EAPC cargo bikes will be in use in their fleet in central London.

Motivations and benefits: Ease of access, including increased speed in congestion and avoidance of parking issues. Compliance with ULEZ, with the aim of removing van journeys from zone 1.

Main barriers: Low availability of couriers with cargo bikes in the long-term – the trial bikes are currently owned by CitySprint. Lack of vehicle storage close to the service area – without local storage, efficiency (and range for EAPC) is lost due to time taken to travel to the service area.

Case Study 7 – Low Impact City Logistics Trial (Fernhay and Skotkonung with UPS)

London – trial

Funded by Innovate UK, this consortium project aims to develop a system that fully replaces a 7.5t van at scale for last mile deliveries for a given set of postcodes. A trial by UPS is commencing in London.

Model: A vehicle trailer is pre-loaded at depot using dedicated parcel optimisation software, then towed to a city centre location by existing scheduled truck. A parking area the size of two 5m parking bays is required for the trailer. Up to three staff operate from this location for a six hour shift, delivering and picking up parcels by cycle and walk mode devices. The trailer is returned to depot at the end of the shift.

Motivations and benefits: The system addresses the wider adoption and expansion of pedestrianised zones and zero emissions zone. It reduces congestion and kerb-side demands through greater use of underutilised city assets such as cycle ways, one-way streets and legal short cuts through parks and other public spaces. It eliminates double handling of parcels and reduces vehicle miles compared to competing cycle logistics systems.

Vehicle displacement: One trailer directly replaces one 7.5t van.

Main barriers: Lack of clarity in the use of the walk device on footways. Finding suitable, affordable space to park the trailer

Information box 2 - European Cycle Logistics Federation

Main objectives of the ECLF:

- Highlight best practice
- Support cycle logistics operators by:
  - Acting as a network for cycle logistics operators to share knowledge and experience
  - Identifying opportunities for shared promotions, marketing and costs
  - Acting as a source of information (template standard forms and documents, carbon foot-printing tool, media resources)
  - Establishing lobby groups to influence relevant stakeholders (representation, collective negotiating)
- Provide training and advice (including two workshops)
- Work towards formal accreditation, with a focus on appropriate rider training and fair employment for riders (full employees, paid a living wage)

2.3 Benefits and limitations of cycle freight

Environmental benefit

Replacing motorised goods vehicles with cycle freight has significant benefits in CO_2 emissions reductions and air quality improvement. For example, replacing one 7.5t HGV in central London would save 9.8 tonnes of CO_2 emissions and at least 7.4 kg NO_x and 60 g PM per year.[27] For each LGV replaced in central London (travelling 10 miles per day on average), 1.2 tonnes of CO_2 and at least 2.8 kg NO_x and 4 g PM per year would be saved. Removing these vehicles from central London represents a damage cost saving of over £700 and £270 per year per vehicle for HGVs and LGVs, respectively.[28]

Operational benefits

Aside from the environmental benefit, the main benefits and limitations of cycle freight relevant to London are outlined in Table 4.

Table 4 Main benefits and limitations of cycle freight

Benefits
Speed and reliability - The ability to bypass traffic using cycle lanes and more direct routes, and with fewer parking restrictions, results in a 25-50% reduction in journey time[29] - Cycles are less prone to traffic disruption resulting from accidents and roadworks, offering more reliable journey times - Cycles have more freedom to park, and can park closer to their destination, reducing travel time and improving reliability
Flexibility of service - Greater speed and reliability allow for more flexibility in when deliveries can be made and the range of delivery services offered - In some cases, using a cycle freight company can help businesses expand (*see Case Study 4, page 13)*
Low running cost - Cycle freight eliminates the risk of parking issues such as penalty charge notices (PCNs), which on average cost a fleet £1,500 per year per van[30] - No or low fuel costs, depending on whether EAPC is used - No access charges, such as congestion or T-charge

[27] Based on an average driving distance of 80 km per day with 260 operating days per year, assuming the replaced vehicle is Euro6/VI; using emissions data from *In-service emissions performance of Euro 6/VI vehicles* (TfL, 2015).

[28] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/460398/air-quality-econanalysis-damagecost.pdf

[29] From interviews with cycle freight operators. See also: http://www.av2hire.com/about.htm and *Case Study 5*

[30] Calculated based on *FTA PCN Survey 2012*, and van fleet sizes from *Van travel trends in Great Britain,* RAC Foundation, 2014.

- Lower staff costs, where cycle freight replaces HGV drivers (with C1 licence requirements)

Low capital cost

As a low emissions vehicle, cargo bikes and trikes are a cost-effective option (for example, compared to an electric van); however, the capital cost benefit depends on the logistics model. For example:

- Where one cargo bike can replace one van, the capital cost is lower
- For a large carrier replacing one van with 3 cargo vehicles, the cost may be higher

Employee health benefit

Cycle logistics offers much more active travel for staff (*see Case Study 1, page 12*).

PR benefit

Cycle freight is viewed positively by the public (*see Case Study 1, page 12*).

Reduced noise

Cycle freight deliveries are inherently quieter than deliveries made by vans or HGVs, since there is no engine noise and generally no heavy doors to open/close. Unloading also does not require equipment that itself can be noisy, such as tail lifts and metallic trolleys. Therefore, cycle logistics is suited to deliveries in areas and at times of the day that are unsuitable for motorised vehicles (e.g. residential areas, night time).

Limitations

Payload

- Volume is the main limitation but, in some applications, weight may also be a problem
- Shipments must be segregated, and multiple bikes and/or trips are required to fulfil the same number of deliveries – these increased handling/sorting cycles increase operational costs

Range

- Bike couriers can cover large distances per day (largely limited by the rider and the type of job) but, if making large numbers of deliveries, the need to reload limits the service range to small areas (minimising trip distances to maximise efficiency)
- There is a trade-off in speed (and rider comfort) over longer distances
- Commuting long distances from outside a service area is not generally feasible with cycle freight vehicles

Security

Bikes are less secure than vans, which can cause customers to choose not to use cycle freight for transporting valuable goods.

However, in practice, operators have largely not experienced security issues since bikes are not targeted for theft in the same way that vans are. Security might become a problem later, if cycle freight use increases.

3 Potential for cycle freight in London

To assess the potential for cycle freight uptake in London, the barriers and opportunities from both an industry (Section 3.1) and London borough (Section 3.2) perspective were first identified. These findings were then used to estimate the feasible potential for uptake on a London-wide and local level (Sections 3.3 and 3.4).

3.1 Motivations and barriers to uptake across freight sectors

Results from our literature review and interviews with industry stakeholders were used to assess the potential for modal shift from vans to cycle freight in each sector (Figure 9). Several sectors already operate cycle freight and have the highest potential for increased adoption. Large retail chains and the utilities and services sector have the highest barriers to overcome, and therefore only small opportunities are expected without major operational change. The operational needs of public sector services were not explored in our consultation; however, they are considered a high potential sector since several UK cycle logistics companies work with Local Authorities in their respective cities, and the point-to-point (P2P) nature of interdepartmental mail is suited to cycle freight.

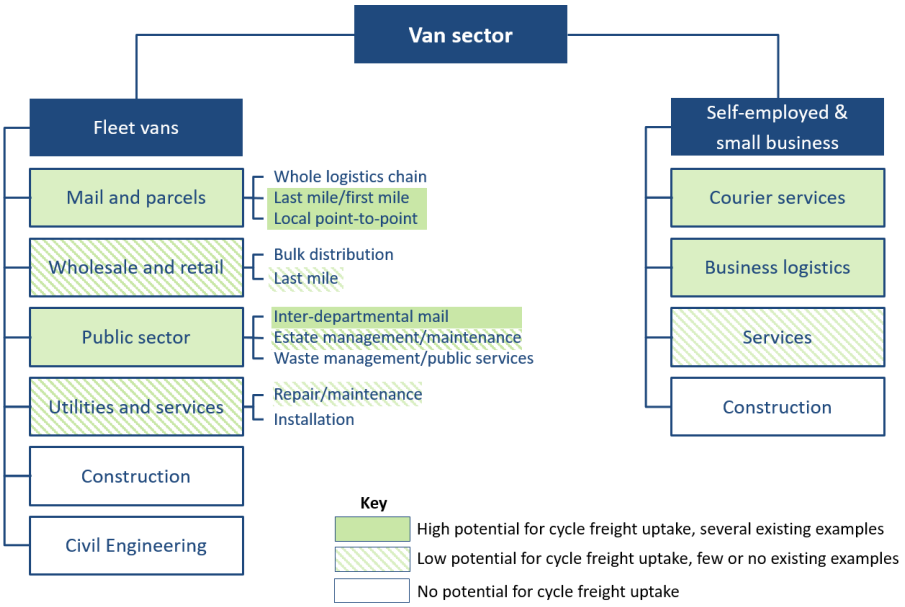

Figure 9 Overview of van-based freight sectors and their potential for modal shift to cycle freight. Freight sectors adapted from Commission for Integrated Transport (2011)

Motivations

Although emissions targets or environmental benefits were cited as reasons for businesses to consider cycle freight, these factors are not important for the majority of customers; therefore, there is little client-side pressure on businesses to pursue low emission modes (either cycle freight or ULEV). Therefore, the primary motivations for using cycle freight relate to the quality of service that can be achieved, with respect to speed, reliability and flexibility. Rising congestion, access charges (e.g. introduction of

the ULEZ) and parking issues (availability and penalty charge notices) were highlighted as concerns for all van fleets. Vehicle compliance with the ULEZ has previously been highlighted as a particular concern for small businesses[31].

Operational needs and main opportunities for cycling freight

Replacing vans with cycle freight requires, as a minimum, that the level and quality of service is maintained. Each sector has different operational requirements, which affects the suitability of cycle freight. Table 5 summarises the operational needs across the four sectors identified as having some potential for cycling freight adoption, along with the main opportunities for adoption.

A common theme is the distance that can be covered by bikes, limiting the modal shift to short distance deliveries (up to 10 miles but typically less than 5 miles). Major mail and parcel companies typically have depots located in outer London but, for large wholesale and retail companies, most distribution centres are located much further outside of London (up to 50 miles). Delivery vans can therefore cover up to 90 miles per day, with the majority of the distance due to travel to and from London.

In addition to delivery services, many companies offer value-added pick-up services, such as collection of mail (for mail & parcels), or collection of waste or recycling (for wholesale & retail), which would also need to be matched by any cycle freight service.

It should be noted that a large proportion of deliveries are currently made on foot by van drivers, due to difficulties in parking close to drop-off points.[32]

Table 5 Summary of operational needs and main opportunities for cycling freight uptake across freight sectors

Sector	Operational needs	Main opportunities
Mail & parcels, including self-employed couriers	High drop-rate, typically 10 deliveries per hour per driver. The need to maintain this drop-rate limits the delivery radius for cycle freight to 1-4 miles, in areas with a high density of pick-up/drop-off (PUDO) points and suitable mix of businesses[33]. Vans typically carry 80-150 parcels per trip, with 1-3 trips per day. Based on volume alone, replacing a 3.5t van[34] requires the	Last mile, first mile and P2P in dense urban areas, operating from local distribution hubs.

[31] *Federation of Small Businesses (FSB) response to proposals for changes to the central London Ultra Low Emission Zone (ULEZ)* 23rd June 2017.

[32] Up to 62% of travel time and 40% of travel distance for parcel carriers J. Allen *et al*. 2017 https://doi.org/10.1016/j.trd.2017.07.020.

[33] For example, some recent cycle freight trials have found that clusters of smaller businesses or offices were better suited to operators.

[34] Assuming a maximum volume of 6-7 m^3 for a 3.5t van

	equivalent of 20 cargo bike trips or 6 cargo trike trips to fulfil.	
SMEs – business logistics	Duty cycles of SMEs are highly variable, ranging from only a few drops per week up to 1-5 drops per day. As such, drop-rate and drop-density are not as crucial as for the Mail & Parcel sector, and larger distances can be covered. While cycle freight is most suitable for deliveries up to 5 miles, travel up to 10 miles is possible (*see Case Study 5, page 13*).	P2P deliveries as part of business operations within the local area. Particularly relevant for SMEs in the wholesale & retail sector but includes all businesses that use vans for delivery.
Large wholesale & retail	Payloads in this sector are often heavier and/or bulkier than parcel delivery. For example: • for office supplies, large shipments of paper supplies can exceed 300 kg • major retail chains such as John Lewis and M&S already sub-contract small packages to existing couriers, such that their own fleets only deal with larger items. Click & Collect has also been implemented which has reduced the overall number of deliveries. • home grocery delivery requires maintenance of cold chain, and typically entails 15 deliveries per van per trip	Last mile services are not routinely separated in this sector, therefore shifting the last mile to cycle freight represents a significant change in operations. However, trials have shown it to be feasible in some sectors (*see Information Box 3*). In the short term, same-day or on-demand fulfilment services have the most modal shift potential.
Utilities & Services	The carriage of goods is primarily associated with performing a job rather than delivery; therefore, the payload is dictated by the minimum equipment required to perform the service. For example, carrying a standard set of tools and/or a minimum set of common replacement parts. Service sector journeys typically include commuting from home to the service area. Except for local sole traders, commuting is likely to be from outside London, representing a distance that is unsuitable for cycle freight.	In the short-term, niche support services. For example, bringing on-demand or stock parts to an engineer on-site to reduce restocking trips or to reduce the load regularly carried. Parts could either be brought from company-run warehouses (mobile or permanent) or a sub-contractor (e.g. local partner store)

Major challenges for industry

Table 6 summarises the barriers to uptake applicable to London. Some themes apply across sectors, such as space (either to shorten the delivery distance through a local hub/distribution centre or for parking/storage space). Other themes apply most acutely to SMEs, namely awareness of cycling freight options and setting up costs. Overall, the viability of the business case will depend on the scale of the operation and how suitable cycle freight is for providing the same level of service (e.g. whether it can meet payload requirements and deliver any 'added value' services cost-effectively).

Table 6 Summary of major barriers to uptake of cycle freight in London

No.	Barrier	Sector(s) affected
1.	**Lack of space for distribution** The cost of suitable space in London is currently prohibitive in making a business case for cycle freight. Requirements vary with the distribution model. For example: - a cycle logistics company operating from a permanent hub uses space equivalent to 1-2 shipping containers (160 square ft footprint) - a large logistics company operating its own last mile services may use a temporary hub that uses the equivalent of 2 standard parking bays for 6 hours *(see Case Study 7, page 16)*	**Mail & Parcels: own fleets**
2.	**Changes in operation for commercial viability** Separating last mile deliveries and/or transferring them to cycle freight represents a disruptive change in operations. At a minimum, additional sorting and handling procedures are required, which reduces efficiency. For a company implementing their own cycle freight, the additional cost of vehicles, recruitment of riders and setup of a distribution centre adds to the complexity.	**Mail & Parcels: own fleets** **Wholesale & Retail** **Utilities & Services**
3.	**Awareness and capability** Awareness and understanding of the capabilities of cycle freight are low outside of the mail and parcel sector. For SMEs, compared to choosing a van, understanding the options for cycle freight is more difficult for non-experts. Guidance in choosing a vehicle, such as that provided for SMEs in the ZEN scheme, is therefore valuable.	**SMEs**

4.	**Capital cost** Although the capital cost of a cargo bike is lower than a van, it is still a considerable outlay for a small business, especially if choosing an EAPC vehicle. Some businesses already operating vans may be tied into lease periods that delay or disfavour the immediate switch to cycle freight. If cycle freight does not meet all of a business's needs, the net cost benefit of running both a van and a bike may not be sufficient incentive.	**SMEs** **Mail & Parcels: Self-employed couriers**
5.	**Lack of suitable carriers** For mail and parcel fleets with self-employed couriers, cycle freight vehicle prices are considered too high for a courier to cover themselves. The company may therefore have to purchase vehicles themselves if they want to shift to this mode (*see Case Study 6, page 15*) The costs and risks of running cycle freight can be mitigated by sub-contracting to a cycle logistics carrier. In London, the number of cycle logistics carriers is currently low, limiting this route of implementation. In encouraging cycle freight operators into an area, it is important that they are able to build up a balanced customer base to become sustainable. Professionalism of cycle logistics operators is also important. For national mail & parcel carriers, experience of providing last mile deliveries and formation of good client relationships – helped by using employed staff who regularly deliver to the same locations – were reported to be factors in choosing sub-contractors. For wholesale & retail, brand image is particularly important; therefore, potential sub-contractors need to be professional in their appearance (e.g. uniforms) and behaviour with customers.	**All**
6.	**Lack of secure parking and/or storage** For SMEs, space on premises may be limited, which either limits the size of vehicle that can be used (e.g. a trike is too large to be stored inside) or may be prohibitive in using cycle freight at all. On-street parking is not considered to be sufficiently secure, with the risk of theft of parts. An SME rider may need to stay for longer at their destination than a courier so the need for secure parking	**SMEs** **SMEs**

	is greater; suitable space is not always available for large bikes. For self-employed courier fleets using company-owned cargo bikes, company depots are often a considerable distance from the operational area. This extra distance adds journey time, reducing efficiency and impacting the useable range for an EAPC vehicle (*see Case Study 6, page 16*).	**Mail & Parcels: contracted fleets**

3.2 Local government perspective

London Boroughs and TfL have a key role to play in supporting and proactively promoting the uptake of cycle freight in London. As such it was important for this study to establish their current or future plans and aspirations for the role of cycle freight locally, and potential issues and barriers faced, including any potentially conflicting objectives. Opportunities and potential levers available for promoting uptake were also identified.

These factors were explored through interviews with six London boroughs (City of London, Croydon, Greenwich, Hackney, Hammersmith and Fulham and Westminster) in August 2017 and a workshop with London Councils, the Greater London Authority (GLA) and TfL.

3.2.1 Summary of Borough awareness and existing policies

From a borough perspective, it is clear that promoting a switch from motorised delivery vehicles to cycle freight would be desirable. To a greater or lesser extent all boroughs are facing challenges of congestion, poor local air quality, pressures to facilitate new development, and competing demands for scarce road and kerb space. As such, if cycle freight can lessen the numbers of LGVs and HGVs, the boroughs are keen to encourage and support this.

None of the boroughs interviewed had any specific references or targets within their current policy or strategies, though many see cycle freight as being complementary to their wider strategies and objectives. There was some discussion as to whether parallel initiatives to promote ULEV deliveries over conventional vehicles presented a conflicting policy ambition, but this was not seen as a particular issue amongst the boroughs consulted, as most are seeking to promote both, and would consider either an improvement on conventional, often diesel, LGVs. It was noted that cycle freight would be prioritised in some places as it results in a localised reduction in motorised vehicle trips.

Each borough consulted identified areas within their borough which they felt presented more promising conditions for cycle freight uptake.

Most were engaged in schemes to promote cycle freight, ranging from proactively launching trials and working closely with industry partners, through to more general

awareness raising measures or loan schemes towards cycle freight uptake amongst local businesses.

3.2.2 Summary of issues, barriers, perceived risks and perceived opportunities

A number of recurring issues and barriers to supporting the growth in cycle freight locally were identified by boroughs, as well as potential opportunities for overcoming some of these issues. A summary of these key findings is presented in Table 7 and Table 8.

Table 7 Key Issues and Barriers – Borough perspective

Key Issues and Barriers	Issue/ Barrier	Opportunities
Providing space for microconsolidation locally – boroughs recognised that securing the space within the local operating area was key in supporting cycle freight, but noted that it was often challenging to accommodate this in the required locations. Where on-street sites are required, parking stress, lost parking revenues and limited scope for use of bays are key challenges. A number of solutions were discussed, including the potential use of borough/TfL land, as well as making provision for facilities as part of new developments; however, each requires funding and resources to initiate the set up. Several boroughs reported surplus off-street parking but this can present issues regarding access when in basements or on the upper floors of multi-storey car parks (MSCPs). One option suggested was to enable longer stays, i.e. 1.5 hours (versus current stays of up to 20 min) to allow a larger number of local deliveries on foot / cycle. Others noted that parking bays further afield, where parking occupancy was lower, would be easier to make available for cycle freight, but may not be optimally placed.	X	X
Access restrictions/ congestion – the presence of congestion or vehicular access restrictions was recognised as very important in providing relative time savings for cycle freight deliveries over vans, and as also being a factor that the boroughs have a major influence over. Greenwich identified this as a key factor in selecting their cycle freight trial area, whilst Croydon felt it would be challenging for them to impose greater restrictions on vehicle access in the short term.	X	X
Pedestrian conflict – Many were not overly concerned, unless cycle freight activity increased significantly. Others had concerns where footways are already too congested. Having experienced conflict issues by pedi-cabs, several Boroughs emphasised that they would want to be able to contact the	X	

operator if problems of pedestrian conflict and inconsiderate cycling/parking were arising, to be assured that the operator would respond accordingly.		
Limited scope for direct financial support – several boroughs emphasised the need for cycle freight schemes to operate commercially, as boroughs do not have the resources to support them directly. Furthermore, issues of state aid present barriers in this regard.	X	
Re-timing, collectivisation/co-ordinating deliveries – many boroughs are working on a range of measures to manage and reduce freight impacts, and several highlighted that these were likely to achieve more quick wins than cycle freight, and so may be seen as competing alternatives when it comes to funding and the deployment of resources.	X	X
Topography – was generally not considered to be a decisive factor but some identified it as a positive for certain areas of their borough.	X	

Table 8 Factors identified as opportunities/enablers for cycling freight by Boroughs

Borough Guidance – there was a general appetite for knowledge/ guidance to help Boroughs in targeting supporting measures. Many expressed an interest in more details of the sector-specific operational requirements and areas of greatest potential.
Proactive borough support – For example**,** Greenwich supported the set-up of a cycle logistics scheme by undertaking an initial business survey to gauge interest and build contacts for prospective operators (*see Information Box 1*).
Cycle infrastructure/ environment – general improvements to the cycling environment (either infrastructure or traffic calming measures) were recognised as being beneficial, though not decisive, in supporting cycle freight.
New developments – were identified as important in bringing forward and accommodating infrastructure. Boroughs could, for example, provide on-site PUDO centres or, where they relate to area wide masterplans, micro-consolidation centres. New developments could also have delivery restrictions imposed through planning conditions to promote cycle freight usage. Workplace travel planning could signpost businesses to a scheme.
Awareness raising – many boroughs/areas are at different stages in promoting cycle freight, but in all instances, there is some degree of awareness raising on-going amongst local business groups.
New planning/ policy/ strategy development presents opportunities to include cycle freight from an early stage.

Low Emission Neighbourhoods (LENs) – were recognised as complimentary schemes/ initiatives, and in several cases, had been selected as the area for promoting cycle freight trials.
Business Improvement Districts (BIDs) – and equivalent business groups were identified as being useful platforms for promoting cycle freight and serving as a focus for an operator to establish a foothold in the marketplace.
Cargo bike loan schemes is something several boroughs offer as means of raising awareness and promoting uptake amongst small businesses for B2B use.

3.2.3 Comparison of industry needs vs Borough perspective

As described in section 3.2.2, the boroughs are keen to promote the uptake of cycle freight as it directly or indirectly contributes to achieving many of their objectives.

The key challenges arise in catering to the operational requirements of the cycle freight operators, without posing unacceptable costs to the borough. For example, provision of space for microconsolidation was recognised as a key enabler for cycle freight; however, potential costs of providing the required space include forgone revenues from parking bays taken out of use or opportunity costs from leasing publicly owned space (e.g. under-used car parks or other publicly owned land) that could otherwise be put to more lucrative uses.

Any agreements between the boroughs and operators will also need to be acceptable amongst residents, business or councillors if, for example, they result in the loss of bays in an area of parking stress. Planning and policy-related measures, such as requirements for new developments, will need to strike a balance in being flexible and supporting a variety of potential cycle freight operating models, whilst not imposing an unreasonable burden on developers.

A concern amongst several boroughs was that they cannot afford to prop up an unviable commercial operator, and state aid restrictions present limitations to the extent to which boroughs can affect the market. Therefore, it is essential that any schemes are able to operate commercially. Boroughs were clear that they do not want and cannot take on an operational role, or any associated liabilities.

The boroughs also require reassurance from operators that their cycle freight activities will be operated professionally and considerately to pedestrians and other road users, and require operators to be responsive to any concerns raised.

3.3 Projections for uptake

There are very few cycling freight uptake projections in the literature. The Cycle Logistics report (2014)[35] estimates that 51% of all urban trips in European cities can be shifted to cycle freight. This analysis included a shift of 38% of commercial logistics trips, encompassing 8% of total urban trips. The Cycle Logistics projection can be considered an upper limit of potential uptake, since it is based only on the proportion of trips with a payload and journey distance appropriate for cycle freight; it does not account for the feasibility of modal shift across logistics sectors and includes all business trips. Finally, it is not mode-specific and includes commercial trips by cars.[36]

Here we have developed a forecast that focuses on the displacement of LGVs. Based on our interviews with key industry operators, we have tailored our forecast to be specific to London in the near-term (out to 2025).

3.3.1 Uptake potential across freight sectors

As shown in Section 3.1, the potential for modal shift varies widely across different freight sectors and is highly dependent on the operational needs of individual businesses. Very little data is available regarding van activity across sectors; therefore, to provide a broad, high-level estimate of the scale of potential uptake, UK fleet sizes across sectors[37] were used as a proxy for sector-based van activity (Table 9). These sectors were assigned a broad uptake potential (low or high) based on the findings in section 3.1, and the proportion of vans that could be displaced was then estimated based on two uptake scenarios:

- **Low:** A business-as-usual scenario where few provisions are made for cycle freight and little change in business practice occurs beyond that which is already underway.
- **High:** A best case scenario in which distribution spaces are provided and motor vehicle access restrictions are in place in suitable, high density urban areas across London. Major operational change is assumed for the parcel sector, with some operational change in low uptake sectors.

<u>Highest growth potential sector</u> (parcels, post and courier)

The **low uptake scenario** was assumed to represent shifts towards cycle freight primarily in express deliveries, as well as some P2P services.

- Courier services make up 3% of van trips in central London during the morning peak[38] and, for logistics companies we consulted, express delivery was estimated to make up less than 5% of deliveries;

[35] *D 7.1: Performance indicators and baseline assumptions* (Cycle Logistics Project, 2014) http://one.cyclelogistics.eu/docs/111/CycleLogistics_Baseline_Study_external.pdf

[36] Based on previous studies, 60% of goods transport is carried in passenger cars compared to 25% LGVs and 8% in vehicles greater than 3.5t

[37] *Van Excellence Review, 2015/2016* Freight Transport Association

[38] https://consultations.tfl.gov.uk/policy/9b28c200/user_uploads/mts-outcomes-summary-report---full-report-final.pdf

Table 9 Summary of van sectors and cycle freight uptake potential

Sector	UK LGVs	% total	Potential	Assigned modal shift		Key enablers
				High scenario	Low scenario	
Construction	930,000	26.8%	None	–	–	
Engineering	260,000	7.5%	None	–	–	
Utilities and services[a]	350,700	10.1%	Low	5%	1%	Support for trials
Retail (major chains)	30,000	0.9%	Low	5%	1%	Support for trials, distribution space
Retail (independent)	55,000	1.6%	Low	5%	1%	Awareness raising, support for purchase, space for storage
Other skilled trades[b]	70,000	2.0%	Low	5%	1%	*As retail (independent)*
Parcels, post and couriers	297,000	8.6%	High	50%	5%	Space for distribution and storage
Agriculture and environment	100,000	2.9%	None	–	–	
Gardening	165,000	4.8%	None	–	–	
Cleaning and salvage operations	149,000	4.3%	None	–	–	
Mobile catering	1,600	0.0%	None	–	–	
Security and enforcement	30,000	0.9%	None	–	–	
Health care and social transport	23,500	0.7%	None	–	–	
Vehicle repair and parts	60,000	1.7%	None	–	–	
Road transport and distribution	50,000	1.4%	None	–	–	
Other[c]	841,200	24.2%	Low	5%	1%	*As retail (independent)*
Vehicles between keepers	58,200	1.7%	None	–	–	
Total	**3,471,200**	100.0%		**6%**	**1%**	

[a] Includes telecoms, TV audio engineers and electricians
[b] Includes florists, woodworkers, glass and pottery makers
[c] Includes a variety of self-employed professions
Source: *Van Excellence Review, 2015/2016* Freight Transport Association

- Therefore a **5%** modal shift has been applied as an upper limit on current practices.

The **high uptake scenario** was assumed to represent a significant shift in last mile and P2P deliveries in addition to express services.

- A modal shift potential of **50%** was assigned to this scenario. Although a modal shift of 40-100% has been observed for logistics companies in medium-sized cities, this sector includes major players such as Royal Mail[39] that have ruled out cycle freight in their operations at present[40]. As such, 50% is considered a reasonable upper limit based on current practice.

Low potential sectors (utilities & services, retail and other small businesses)

These sectors are more variable in their operational requirements and therefore are more difficult to assign an absolute uptake potential. To encompass this variability, the uptake potential was set to be the same across the low potential sectors.

For service organisations and major chain retailers, the **low uptake scenario** is primarily assumed to represent shift of on-demand deliveries and support services, whereas the **high uptake scenario** assumes some change in operations; for example, shifting some engineer trips to cycle freight or relevant retail companies adopting last mile services.

Although small business logistics is considered a high potential sector for uptake of cycle freight, the proportion of van journeys that could be shifted depends on the type of goods transported and the proportion of trips that occur locally.[41] More detailed data regarding the use of vans by independent businesses is not available; therefore, to reflect this uncertainty and the fact that eligible businesses are spread across the retail (independent), Other skilled, and Other categories (Table 9), a low uptake potential was applied across all of these sectors.

To determine the projected uptake for low potential sectors, estimated modal shifts for small and large businesses were combined with company-based fleet size data to give the number of LGVs displaced (*see Appendix 5.6 page 59 for details*). Based on this analysis, the high and low uptake scenarios were set as **5%** and **1%**, respectively.

3.3.2 LGV vehicle displacement

These assignments in uptake potential result in van displacement estimates of 6% and 1% for the high and low scenarios, respectively. Assuming that the van stock make-up of London is the same as the wider UK, this corresponds to a best-case reduction of

[39] Accounting for 31.5%, 48% and 40% share of the sector by revenue, parcel volume and fleet size, respectively (RAC Foundation, 2017)

[40] https://cyclingindustry.news/royal-mail-modernisation-plan-will-shun-cargo-bike-deliveries-despite-strong-business-case/. It should be noted that Royal Mail was not directly consulted during this research.

[41] For example, a local bakery could transfer 100% of deliveries to cycle freight, whereas a convenience store or furniture store may not be able to replace a van at all.

11,500 LGVs entering Central London per day (Table 10). Applying the same uptake potentials to measured vehicle km gives a best-case estimate of 6.5 million LGV km avoided per year in Central London (Table 10).

These figures should be interpreted with caution since they do not reflect the different journey distances across sectors; for example, in 2003-2005, delivery and collection activities represented 13% of UK LGVs but 21% of vehicle km.[42] In many cases, the "displaced" LGVs may still exist in the van stock but will either be used for fewer journeys or used for journeys in another area of London. Additionally, HGVs (7.5t) and cars are also used for urban parcel delivery; therefore, some of the reduction in parcel traffic will be due to removal of vehicles other than LGVs.

Table 10 Estimated uptake potential for London for High and Low uptake scenarios

	Reduction in daily number of LGVs crossing cordon[a]		Reduction in annual LGV vehicle km (millions)[b]	
Scenario	**Central London**	**Inner London**	**Central London**	**Inner London**
Low (1%)	1,500	2,500	0.9	6.8
High (6%)	11,500	19,000	6.5	42.6

[a] Calculated by applying uptake potential shift to reported 2014 data:[3] 183,000 and 306,000 LGVs crossing boundary cordon to Central and Inner London, respectively; outer London was not included since journeys from outside London are assumed to be unsuitable for cycle freight. Numbers rounded to nearest 500.

[b] Calculated by applying uptake potential shift to reported 2014 data: 103.7m and 676.7m LGV vehicle km per annum, respectively (calculated from TfL travel data).[3,43]

3.3.3 Local perspective

Whilst at an aggregate level the estimated potential for van displacement across London is relatively small, the impact of cycle freight on traffic is expected to be much higher on a localised scale where the local conditions are suitable. This is because composition of the freight related traffic at a local level will vary significantly from the average used to inform the overall forecasts, and will depend on the density and types of business present, even on a street-by-street level.

For example, a recent in-depth freight study of kerbside activity[44] in the Oxford Street area[45] found that goods vehicles (LGVs and HGVs) contributed to 30% of kerbside activity on average (Figure 10). However, these proportions varied considerably across the area, with 97% of kerbside activity on Oxford Street itself due to taxis, but 23-42%

[42] *Van Activity Baseline Study* DfT, 2008; N.B. data in this report is from 2003-2005.

[43] *Traffic levels on major roads 1993-2010*, TfL 2010.

[44] Where kerbside activity refers to vehicles stopping at kerbside locations, excluding buses stopping at bus stops

[45] *Oxford Street Kerbside Activity* Westminster City Council/TfL, 2015

of activity due to goods vehicles in side streets. In one location, 76% of kerbside activity was due to goods vehicles.

The study found that on average across the area LGVs represented 65% of the goods vehicle related kerbside activity. Of these, 37% were involved in delivery and/or collection, but this was as high as 64% in some areas.

Another recent study of the Oxford Street West area[46] found that 89% of freight-generating trips for businesses were for delivery or collection and only 11% for servicing (Figure 11a). This is markedly different to the overall observed activity of the UK van parc (Figure 11b).

As such, although 6% of vans could potentially be removed from London overall, this represents a much larger proportion of overall traffic in delivery hot-spots. For example, in areas where LGVs contribute over 60% of traffic activity, in a **high uptake scenario 10-14%** of van based trips could be undertaken by cycle freight. This corresponds to a **reduction in total traffic of 4%**.

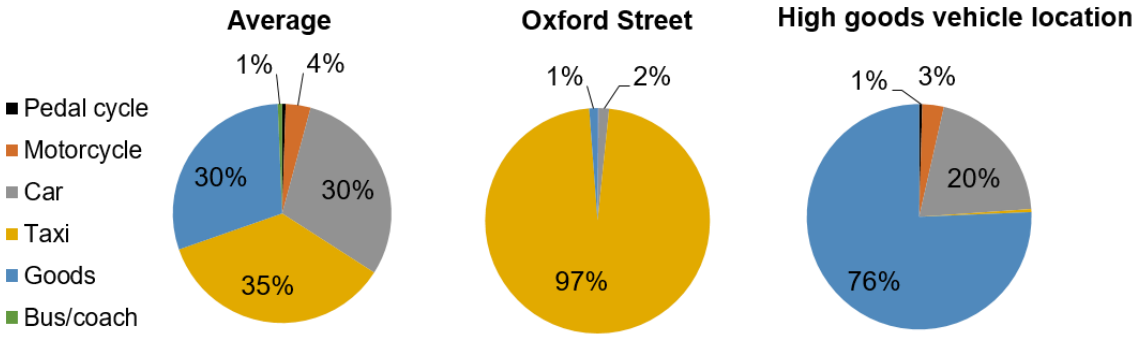

Figure 10 Vehicle distribution of kerbside activity in the Oxford Street area[45]

LGVs have been observed to park in multiple locations within a short distance of each other to fulfil local deliveries (i.e. parking, delivering a single parcel, then moving on a short distance for another delivery)[46]. Therefore, the removal of one van effectively removes a much higher proportion of the overall kerbside activity. The overall vehicle km within an area will also reduce due to the saving on vans repeatedly searching for parking spaces.

As such, meaningful projections of the impact of cycle freight uptake must be carried out on a case-by-case basis within Boroughs and business districts. These assessments must incorporate the numbers and types of businesses within the local area as well as identifying local traffic and delivery hot-spots.

[46] *Oxford Street West Delivery & Servicing Business Engagement Study*, Cross River Partnership, 2017. This study monitored 287 kerbside locations over 3 weekdays.

There are many factors that can make an area of London more likely to see a high uptake, including policies in place and environmental factors (such as level of congestion, business density). These factors are discussed in Section 3.4, along with a framework to evaluate a given area in terms of ability to enable a high level of uptake.

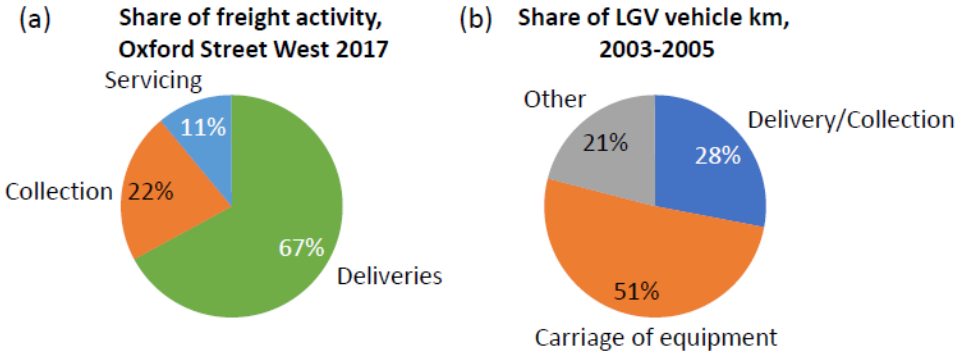

Figure 11 Comparison of freight activity (a) generated by businesses in the Oxford Street West area[46] and (b) within the UK LGV parc[42]

3.3.4 Increase in cycle traffic

Direct replacement of LGV services with cycle freight could lead to a large increase in cycle traffic (assuming current LGV services are fully loaded). Because of the lower capacity of cycle freight compared to vans, both vehicle distances and/or total vehicle numbers will increase. For example, a cycle freight trial in 2009 found that road space and time occupation decreased by 20% overall, but increased by 11% within central London (*see information box 3*).

From our estimates (Table 10), replacing each van with three cycle freight vehicles (bicycles or tricycles) would result in a 44% increase in cycle traffic in central London (Table 11). This increase in cycle traffic is approximately half that estimated to be possible for transferring personal journeys to cycles (61,000 journeys entirely within central London)[47].

Table 11 Estimated increase in cycle traffic in central London in high uptake scenario

LGVs displaced[a]	Cycles introduced[b]	Current cycles in Central London[c]	Increase in bicycle traffic
11,500	34,500	78,500	44%

[a] See Table 10

[b] Based on replacing one van with 3 cycle freight vehicles

[c] Based on 157,000 recorded cycles crossing the Central London cordon over 24 h,[3] assuming each cycle is part of a return journey and is therefore counted twice.

[47] *Analysis of Cycling Potential* TfL, 2017

Information box 3 - Office Depot trial with Gnewt Cargo (2009)

Before the trial: Seven 3.5t van journeys per day delivered parcels within the City of London (CoL) from a depot located outside London. On average, each van travelled a total of 68 km per day, 10 km of which occurred within CoL.

During the trial: The same total number of parcels was delivered to a distribution hub within CoL by an HGV. Six EAPC cargo trikes and three electric vans then delivered within CoL. Each trike travelled 8.9 km per journey, carrying out 2-4 journeys per day.

CO_2 equivalent emissions per parcel reduced by 83% within CoL (54% in all of London)

Distance per parcel increased by 349% within CoL but reduced by 20% overall

Road space and time occupation increased by 11% in CoL but reduced by 20% overall. *This metric takes into account the footprint of the vehicles and total journey time.*

Kerbside occupation reduced by 10%.

Source: M. Browne *et al* IATSS Research (2011), *35*, 1-6

The impact of additional cycle freight vehicles in place of LGVs will depend on the type of vehicles deployed and how they operate. Cargo trikes operate efficiently where wider access lanes are available (for example, filtered side streets or bus lanes), but may be subject to (and contribute to) delays in mixed traffic environments. Standard bicycles and cargo bikes are able to negotiate narrow gaps through traffic on existing shared carriageways, use cycle lanes and easily enter vehicle restricted areas where bollards or other means of filtered permeability are used; therefore, these smaller models do not occupy road space in the same way. Cargo bikes have few problems parking, whereas trikes may have more difficulty finding suitable places to stop on busy streets.

EAPC and non EAPC uptake

The split of uptake between EAPC and non-EAPC is unknown. Except for cost (see section 2.1.2), there are no differences in the factors that influence the uptake of EAPCs compared to non-EAPCs and the impact of uptake with regards to infrastructure and space requirements is the same for both types of vehicles. These vehicles are therefore not considered separately in our analysis or recommendations.

Walk mode

It should be noted that, in a congested and parking-constrained city such as London, there will be some local areas where cycles will also experience access difficulties. Therefore, for high volume deliveries, van/walk[48] delivery methods will need to be replaced by cycle/walk[49] delivery methods in order to maintain efficiencies. Since walking is an integral strand of either freight transport method, the transport of goods on footways needs to be acknowledged and supported.

[48] Parking a van and making multiple deliveries on foot
[49] Parking a cycle and making multiple deliveries on foot, albeit from a closer parking point than a van.

3.4 Assessing local cycle freight uptake potential

As mentioned in section 3.3.4, the potential for cycle freight will vary significantly at a local level. An area's potential for cycle freight uptake may be greater where:

- the local freight traffic features more parcels, post, and courier activity, which is more readily transferable to cycle freight (see Table 9), i.e. high density, office or retail dominated areas; and/ or
- the local conditions are conducive to cycle freight, including environmental factors (such as level of congestion, access restrictions, parking availability).

3.4.1 Key Factors in determining cycle uptake

A comprehensive set of key factors influencing the potential for cycle freight uptake were identified from the literature reviews, analysis and consultations with operators, TfL, GLA, London Councils and a selection of London Boroughs. These factors are summarised in Figure 12, and categorised as follows:

1) **Cycle Freight Industry** – reflects key factors determining commercial viability from the private sector operators' perspective, and therefore governs where a cycle freight service could operate, including costs, range, regulations and business models.
2) **Local Environment** – includes the physical characteristics that make up an area, including the types of businesses, traffic volumes and congestion, road layouts, the presence of cycle infrastructure or hostile cycling conditions, cycle parking, microconsolidation facilities, topography.
3) **Local Population** - represents the local market place, including socio-demographic and behavioural characteristics, as well as organisational structures such as BIDs and LENs.
4) **Drivers for change** – whilst the 'Local Environment' and 'Local Population' factors are considered as baseline conditions for an area, 'Drivers for Change' represents the potential levers available to central and local government to influence the growth in cycle freight.

3.5 Framework for assessing local potential

This section outlines the core principles of a framework for evaluating the potential for cycle freight uptake at a local level, based on some of the key factors identified in the previous section.

Most of the influential factors identified can be quantitatively assessed using available datasets (i.e. congestion mapping, a review of cycle routes/infrastructure, speed limits, topography), or qualitatively through reviews by borough officers (i.e. planned transport schemes, presence of a BID, potential for micro-consolidation).

By collating this information, a borough, sub-regional group or TfL can identify areas with the greatest potential for cycle freight. Measures to support cycle freight can then be prioritised in these areas in order to maximise uptake.

From the initial long list of factors, the most influential were identified and assigned a weighting according to their relative influence on cycle freight uptake (Figure 13; see Appendix 5.6, page 59 for description).

Using this framework, an area can be assessed by scoring each factor (from 1-10) based on the quantitative and qualitative reviews described above. For example, for Employment/retail density, a score of 1 would be awarded if an area has few employing businesses and organisations, at low density. A score of 10 would be awarded if an area is dominated by workplaces (e.g. offices) at high densities. The scores and weightings are then combined to give an overall score out of 100. A worked example of this approach is shown in Figure 13.

Figure 12 Key factors in determining cycle freight uptake

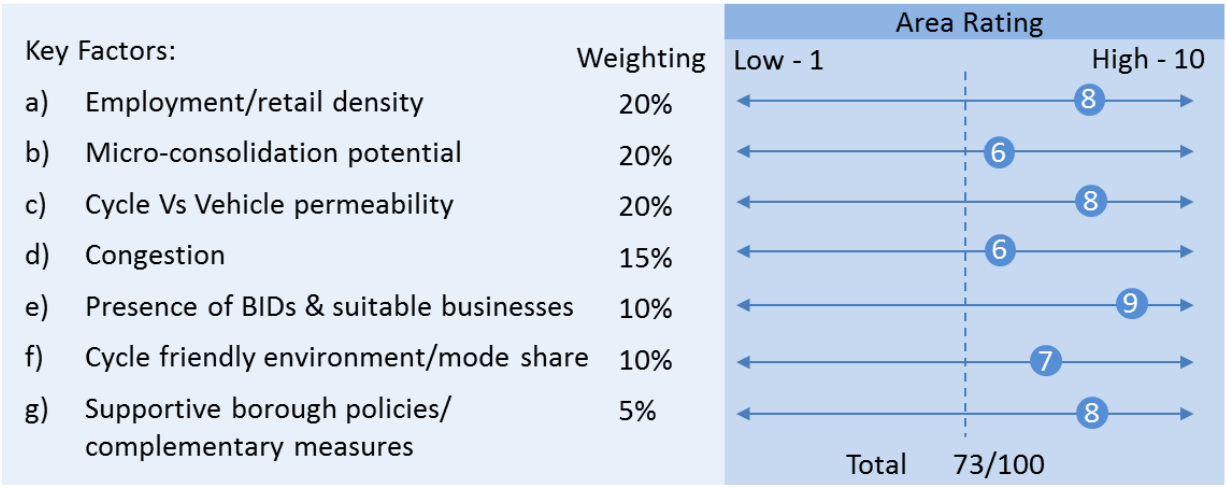

Figure 13 Framework for assessing local potential – example completed for Hackney/City Fringe LEN area)

Table 12 illustrates how this assessment of the local conditions for cycle freight uptake could be used to determine the potential modal shift from vans to cycle freight in a given area.

Based on the worked example presented in Figure 13 for the Hackney/City Fringe LEN area, where the total score awarded was 73 out 100, this would equate to 'Very High' potential uptake.

Table 12 Differing cycle freight potential based on local factors

Local Cycle Freight Uptake Potential	Very Low (0-20)	Low (21-49)	Medium (50-60)	High (61-70)	Very High (71-100)
Area with typical freight activity	< 0.5%	0.5-0.9%	1%	1-2%	2-6%
Areas with higher levels of parcel, post and courier activity	<0.5%	0.5-0.9%	1-2%	2-5%	5-14%

The forecast potential replacement of vans by cycle freight (see section 3.3.2), ranges from 1% in the low scenario to 6% in the high scenario, where the local freight activity is the same as the average UK van sectors (Table 9).

As described in section 3.3.4, if the local freight traffic features more parcels, post, couriers, which are more readily transferable onto cycle freight, there is potential for a larger percentage share of LGVs trips to be reassigned to cycle freight.

Based on the example framework presented in Table 12, the score of 73 out of 100 awarded to the Hackney/ City Fringe LEN area would mean its cycle freight potential is 'Very High'. With the potential for 2-6% of vans to be replaced by cycle freight, or between 5-14% if there are higher levels of parcel, post and courier activity.

It should be noted that at this stage that, given that the cycle market is yet to mature, the variables, weightings and baseline forecasts are likely to evolve; however, this approach provides an initial framework.

Examples of how this framework can be applied to local areas are given in the Appendix (section 5.7.2, page 61).

4 Recommendations

Increasing the uptake of cycle freight in London requires action to address challenges across four broad themes:

1. **Raising awareness and knowledge:** increasing awareness of the benefits of cycle freight and expertise in applying it to allow Boroughs and businesses to make informed decisions about freight solutions. TfL will have a key role to play in this area, and this report constitutes a first step in bringing the facts together.
2. **Raising standards:** creating a professional image for the sector to assure Boroughs and businesses that they are supporting a reputable operation.
3. **Making space:** provision of affordable space for distribution and cycle storage to assist businesses in using cycle freight. The recommendations for this topic centre on planning and Borough-industry collaboration.
4. **Increasing competitiveness:** providing support to enable cycle freight to become competitive and sustainable. Funding is only one aspect in this theme, with access restrictions on vans being a key enabler of cycling freight.

The recommended actions to address these themes are detailed in section 4.1, arranged by relevant stakeholder.

4.1 Recommendations for relevant stakeholders: TfL (and GLA where indicated)

4.1.1 Raising awareness & knowledge

1. Provide guidance for Boroughs

TfL should provide information that encourages and helps boroughs to account for cycle freight in their policies and planning.

(a) Local Implementation Plan (LIP) guidance

TfL should include additional information on cycle freight in the LIP guidance before it is formally issued in early 2018. As part of their LIP preparation, boroughs should be required to demonstrate that they have considered the role of cycle freight locally. This should include an assessment to identify the local potential for cycle freight, with reference to the borough guidance document (see part (b), below). It should also include setting targets, such as running a trial in a suitable area by a certain date, or promoting cycle freight to a defined number of local businesses. In areas with low potential, where appropriate, targets could include implementing measures to improve the local potential, such as restricting motorised vehicle access.

(b) Cycle freight guidance document

A guidance document should be created and made available via the TfL freight website. An early version of this guidance should be available in early 2018, in time for boroughs to include measures in their LIPs. Going forward, the document will need to be regularly updated as the sector matures.

The document should cover:

- **An overview of cycle freight** that
  - Highlights the benefits of cycle freight for London, boroughs and businesses
  - Summarises the available vehicles, their dimensions and their capabilities (including examples of what they can and can't carry)
  - Outlines the main services that cycle freight can cover
  - Details the key needs of different cycle freight sectors, such as space and business density
- **A toolkit of measures** for adopting cycle freight, including:
  - Examples of measures, such as cargo bike loans, zero emission delivery schemes, providing space for distribution and/or storage; where possible, costings for different options should be provided
  - Case studies of successful Borough-led initiatives, including highlighting approaches to address any issues of State Aid-compliance
  - Examples of suitable spaces for supporting cycle freight (e.g. underutilised car parks, on-street bays, cycle hubs)
  - Examples of ways to incorporate cycle freight into their own supply chain and procurement processes
  - Advice for engaging with businesses to encourage uptake
  - Advice on infrastructural barriers to cycle freight to avoid putting in place (e.g. high kerbs, narrow bollards)
  - Explanation of mechanisms for addressing issues with poor operators (e.g. Highways obstruction orders)
- **A framework for assessing the suitability of areas** for cycle freight:
  - The metrics outlined in section 3.4 (page 35) provide a means for assessing the potential of local areas based on key factors (e.g. business mix, infrastructure, distribution locations). These metrics form a preliminary framework that can be tested and refined as the sector matures.
  - Where possible, the datasets used for mapping congestion, retail density and cycle networks should be made available in an easily accessible location (e.g. similar to Playbook system used by TfL)
- **A framework for monitoring success of schemes** see section 4.6
- **Potential funding opportunities** available to boroughs

2. Provide guidance for businesses

TfL should facilitate uptake of cycle freight by London businesses by creating an information document that can be distributed by boroughs and BIDs, and by the Federation of Small Businesses (FSB). This document should:

- **highlight the benefits** of cycle freight in terms of cost, journey reliability and wider impact (congestion, air quality)

- **encourage adoption** of cycle freight in the business's supply chain and/or in their own deliveries, either by owning or hiring a cycle, or by using sub-contractors
- **address common concerns**, including around security
- **provide a list of approved suppliers** (*see Raising Standards)*

3. Lead by example

Procurement practices should favour cycle freight in TfL's supply chain and own fleet where possible and appropriate. To achieve this:

- TfL (and GLA) should carry out a mapping exercise of their own operations to identify current freight activities and identify opportunities for mode shift (e.g. number, size and distance of deliveries).
- Tenders should be adapted to allow for cycle freight to cover suitable parts of delivery needs; where necessary, partnerships between carriers should be encouraged to provide a complete solution (e.g. if servicing contracts require a mix of long and short distance travel)
- A section for cycle freight operators should be added to the London Contracts and Supplies Group and Crown Commercial Services frameworks
- Options for cycle freight should be considered when selecting new buildings (e.g. included in Soft Landings Strategy).

A few examples exist of UK and European cities using cycle freight in some of their operations;[50] however, to our knowledge, a best practice model for integrating cycle freight into procurement and own-fleet operations is yet to be developed.

TfL-led initiatives, such as the Santander Cycles hire scheme, could also be extended to include cargo bikes in suitable areas, to help both the public and businesses to use a cargo bike cheaply for occasional deliveries.

4.1.2 Raising standards

4. Develop and provide new training standard and accreditation

TfL should develop a new cycle freight-specific training scheme that can be incorporated into the Fleet Operator Recognition Scheme (FORS) as a means for voluntary regulation amongst cycle logistics operators. A **stakeholder workshop** should be held to agree and shape best practice. Workshop attendees should include the ECLF, boroughs with experience of cycle freight in their area, and a number of London-based cycle freight operators (see Appendix 5.8, page 65 for a list of known operators).

The training scheme should be offered in addition to Bikeability and should include:

- Cargo bike and/or trike handling, including pedestrian and cyclist safety
- Parking best practice
- Considerate use of cycling lanes

[50] See the CycleLogistics report (2014).

- Loading and speed limits
- Use of footways, including with a trailer
- Cycle freight security
- Cold chain rules (as appropriate)

In the longer term, accreditation should include a formal Code of Conduct (CoC) for operators which establishes responsibility and accountability during operations. The New York City Department of Transport commercial bicycling rules serve as an example of potential measures that could be implemented (Figure 14), which includes requirements for operators to maintain a training record for staff, and for riders to carry identification.[51] However, the exact requirements and level of enforcement would need to be agreed among stakeholders; for example, during our consultation, the enforcement of helmets and high-vis clothing was reported to be unwelcome among couriers and not possible for fleets with self-employed riders. Additionally, although employment of staff at a living wage is a key principle of the ECLF, the appropriateness of including these conditions in accreditation would need to be considered in consultation with stakeholders.

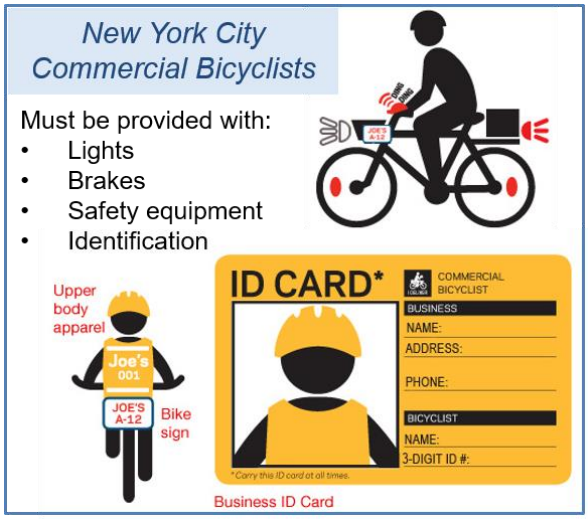

Figure 14 Overview of requirements set out by the New York City Department of Transport for commercial bicyclists

The cost of accreditation would need to not disadvantage small businesses (including third party cycle logistics companies) with small fleets.

5. Prepare a directory of approved suppliers

To support both public sector and private organisations in procuring cycle freight, it would be useful to maintain a directory of industry operatives active in London. As an interim before establishing formal accreditation, the directory could be established by inviting operators to an **information day**. The information day would present the best practice standards and expectations established in the workshop (recommendation 4, above) and outline the timeline for establishing formal accreditation. Expected attendees can include those who attended the initial workshop but should be open to all freight operators (including those not currently operating cycle freight) and to small businesses.

[51] http://www.nyc.gov/html/dot/html/bicyclists/commercial-cyclists.shtml These measures include the rider and the bicycle to display identification and for helmets to be worn. Helmets are not legally required by UK law and, from industry interviews, enforcement by logistics operators was considered controversial.

At this stage, the directory would include those who attended the information day, and could include basic information on company operating models and the level of training delivered to their staff. Later, the directory would be updated to only include those that have undergone the required training and are FORS accredited.

4.1.3 Making space

6. Include cycle freight requirements in the London Plan (GLA) and the MTS

The Mayor's Transport Strategy already includes a reference to cycle freight (Proposal 77)[52], and a similar reference could feature in the updated London Plan, building on current provisions for cargo cycle vehicle parking.[53]

These recommendations should also be reflected in associated planning documents, such as the Opportunity Area Planning Framework (OAPF) and Supplementary Planning Guidance (SPG), as well as local borough planning guidance/standards.

The extent of the requirements for cycle freight will need to be defined but could include:

- **Provision for cycle freight**, such as distribution and storage space within suitable locations and in new developments. It will be beneficial to provide information which raises awareness of the benefits and precedents of providing space in car parks for cycle freight distribution and storage.
- **More stringent restrictions** for daytime deliveries by motor vehicles which will provide greater demand for cycle freight during these periods. These could include restricting motor vehicle access during certain hours, and/or along certain routes. For example, the London borough of Hackney is looking to implement an ultra-low emission vehicle (ULEV) street, which would only allow deliveries by cycle freight or ULEV vehicles during restricted hours. In some cases, boroughs include restrictions on delivery access times (i.e. to avoid peak hours) in the planning conditions for new developments. This approach could also serve to promote cycle freight if deliveries by cycle freight were exempt from these restrictions.

Existing Travel Plan monitoring requirements could be extended to include the monitoring of cycle freight operations and activities.

4.1.4 Increasing competitiveness

7. Continue to provide funding for cycle freight initiatives

Borough-led measures for supporting cycle freight require significant funding. This should include existing funding routes such as the Mayor's Air Quality Fund (e.g. via LENs), and complementary measures such as Healthy Streets and Liveable Neighbourhoods for improving cycling infrastructure and environments. Consideration

[52] Proposal 77 states: "The Mayor, through TfL and the boroughs, will seek to ensure that delivery and servicing plans facilitate off-peak deliveries using quiet technology, and the use of more sustainable modes of delivery, including cargo bikes and electric vehicles where practicable".

[53] Section 6A.13 of the current London Plan states that: *"For both long-stay and short-stay parking, consideration should be given to providing spaces accessible to less conventional bicycle types, such as tricycles, cargo bicycles and bicycles with trailers"*.

could be given to extending the TfL Cycling Workplaces Scheme to include the purchase or hire of cycle freight. In addition, the creation of a specific cycle freight-focused funding opportunity that boroughs can bid for should be considered.

4.2 Recommendations for relevant stakeholders: London Boroughs

4.2.1 Raising awareness & knowledge

1. Lead by example

London boroughs should put in measures to favour cycle freight for their own logistics where possible, in a similar way as described for TfL (section 4.1, page 41).

Recommended measures include:

- Carrying out a mapping exercise of their own operations to identify where the movement of goods is of the appropriate weight, volume and distance to be carried by cycle freight
- Promoting procurement practices for choosing cycle freight where possible. This could include a requirement for approved suppliers to demonstrate their sustainable credentials by offering cycle freight as part of their delivery options. In addition, tenders should allow for part fulfilment or partnerships between organisations where only part of the procurement need can be met by cycle freight.
- Using cycle freight vehicles in their own fleets where appropriate
- Encouraging more cross-working and better communication across departments and sites regarding delivery coordination and using cycle freight for deliveries, led by the management or procurement teams.
- Consider whether supplier frameworks can be adapted to include cycle freight operators (London Councils).

2. Engage with BIDs and business networks to promote cycle freight

To improve uptake among businesses, promotional material from TfL should be distributed to BIDs and businesses. This material could be hosted on the borough's website alongside supporting area-specific information to provide a more local context and relevance. In addition, boroughs should engage with BIDs to identify opportunities for using commercial space for cycle freight (e.g. vacant lots or parking bays for pop-up distribution) and to encourage BID-driven funding opportunities for cycle freight solutions (e.g. cycle delivery services, such as the Better Bankside scheme). Businesses should be required to consider the potential for cycle freight in their own operations as part of the application process for businesses parking permits.

3. Provide cycle freight training to local businesses and residents

Existing cycle training schemes should be extended to include cycle freight-specific elements. This can be linked to other cycle freight funding and promotional activities.

4.2.2 Raising standards

4. Engage with TfL and industry to develop training and Code of Conduct

Boroughs should participate in the training and accreditation workshop to ensure their needs are met in defining best practice (*see section 4.1 for more details*). Once formal accreditation is established, best practice information should be disseminated locally to promote awareness of, and compliance with, the training standards and CoC.

4.2.3 Making space

5. Assess local area for cycle freight potential

To target cycle freight measures appropriately, boroughs should carry out a baseline assessment of their local area using the framework detailed in the guidance to be prepared by TfL (expected early 2018). This could form part of the LIP preparation.

6. Develop a cycle freight strategy

A borough's cycle freight strategy could form a section within a wider strategy document, such as a low emissions delivery strategy, but would need to include a clearly defined strategy for promoting a shift from van deliveries to cycle freight, with defined targets, actions and timescales*.*

7. Engage with industry and businesses to identify and provide suitable spaces to support cycle freight.

Work with cycle freight operators and local businesses to identify and provide the space required to facilitate cycle freight operations as far as possible. This may entail:

- Engagement with logistics companies and businesses already trying to establish cycle freight in an area to identify specific needs
- Engagement with organisations such as the ECLF to identify potential future spaces, for micro-distribution and cycle storage (e.g. cycle hangars) in a target area or new development to ensure future-proofing of delivery and servicing
- Engagement with potential operators and with boroughs that already support cycle freight (e.g. Waltham Forest and Greenwich) to establish competitive pricing for spaces

Examples of potential models include:

- Renting on-street spaces to one or more operators, as is done for car clubs. Boroughs may be willing to provide a reduced rate for spaces during an initial period whilst the operation becomes established, where there is a demonstrable benefit to the local area
- Using under-utilised borough car parks, provided access requirements are met (e.g. appropriate HGV and cycle access). Workplace parking levies or schemes to reduce staff commuting by car may increase the number of available car parking spaces.
- Private land e.g. from BID partners

- Co-location or integration of cycle freight space with existing or planned cycle hubs. A list of existing cycle hubs is included in the Appendix (section 5.8, page 65).
- The use of extended time-period loading bays or virtual loading bays[54]; however, it should be noted that these measures are typically designed to increase the efficiency of van use, rather than specifically to favour cycle freight.

Cycle freight storage and distribution space should be considered as part of road space reallocation and public realm improvements. This is likely to include existing kerbside parking spaces and excessively wide (and underutilised) carriageway space.

8. Include cycle freight in policies and strategies

Provision for cycle freight spaces and services should be included in boroughs' LIPs, local planning documents and local/sub-regional freight strategies. New developments present good opportunities to incorporate specific cycle freight plans and to ensure that developments are future-proofed to favour sustainable delivery and servicing. Where suitable for large master planning schemes, or as part of wider spatial planning, boroughs should ensure that consideration is given to the inclusion of microconsolidation centres, PUDOs points, cycle friendly environments and restricted vehicular access.

4.2.4 Increasing competitiveness

9. Support cycle freight options in the local area

As part of their on-going policies and strategies, boroughs should seek to promote local cycle freight operations. This can include:

(a) Industry-led solutions:

Where logistics companies want to trial cycle freight, boroughs should work with these operators to accommodate their needs and establish best practice expectations (*see also recommendation 6 above*). Be open to trialling innovative technology where it is beneficial to uptake, for example the use of powered trailers in walk-mode on footways (*see also section 4.4, below*).

(b) Borough-led solutions:

Where suitable areas for cycle freight exist in a borough, simple measures to support local businesses can include:

- Cargo bike hire schemes: providing vehicles for local businesses to use, either as a regular delivery solution or as a trial before buying their own vehicles
- Grants for cargo bike purchases: to encourage local businesses to buy their own vehicles

A more advanced solution is to establish a local cycle freight delivery service, such as the zero emission delivery schemes in Waltham forest and Greenwich. In establishing a delivery service, the following steps are recommended:

54 http://freightinthecity.com/2017/04/virtual-loading-bays-aim-reduce-pcns-boost-uptake-cleaner-freight-vehicles/

- Carry out a survey of local businesses to gauge interest and build contacts for prospective operators.
- If interest exists, run a short trial. If the trial is successful, tender for a cycle logistics provider to establish a local cycle freight operation.

10. Continue to seek funding to support cycle freight initiatives

Funding opportunities exist through the Mayor's Air Quality Fund initiatives, including LENs and funding provided to support the introduction of freight cycle hire and cycle freight delivery services. There is also potential for LIP funding and S106 contributions to be used. Match-funding of BID schemes may present a mechanism for leveraging additional funding.

11. Continue to implement cycle friendly infrastructure and create Healthy Streets

In-line with the draft MTS and Healthy Streets agenda, recommended infrastructure measures for supporting cycle freight include:

- Segregated and unsegregated cycle paths and quietways
- Filtered permeability (e.g. bollards and narrow access points) and other types of full or part-time access restrictions to motorised vehicles.
- Low Emission Neighbourhoods, local ULEZ and ZEZ areas
- 20mph speed limits and other cycle friendly traffic calming measures

4.3 Recommendations for relevant stakeholders: cycle logistics operators and the ECLF

4.3.1 Raising standards

1. Engage with TfL to help develop training and code of conduct

London-based cycle logistics operators and the ECLF/UKCLF should attend the TfL-led workshop to provide input on best practice and the most relevant and practical standards for training and accreditation (*see also section 4.1*). Key issues for operators to input on will be appropriate cycle freight training requirements and the inclusion of safety equipment in responsible operations. The appropriateness of employment status in accreditation will need to be agreed amongst operators and stakeholders.

2. Commit to code of conduct

Once formal accreditation is established, operators should commit to train cycle staff to the agreed standard of accountability and professionalism.

4.3.2 Making space

3. Engage with Boroughs to identify needs and opportunities for modal shift

Where required, both local operators and the ECLF can provide advice to boroughs on potential trials that could be conducted, and the infrastructure required for cycle freight to be successful. This advice can include innovative new approaches and operating

models to best fit the local context. Private sector solutions could include the use of storage units for distribution or cycle storage (e.g. SafeStore, with 11 locations close to central London).

4.3.3 Increasing competitiveness

4. Participate in trials to test viability of cycle freight

Existing cycle freight operators should continue to tender for borough-led delivery service initiatives in order to increase the presence of experienced operators in London.

5. Continue to work with manufacturers and to drive the market forward

Cycle logistics operators and manufacturers and/or software providers need to continue to work together to:

- improve the reliability of cycle freight vehicles. Operators currently report some parts should be sturdier, this feedback must be passed on to and implemented by manufacturers.
- improve the capability of vehicles, for instance to include cold chain capabilities;
- develop mega-city solutions, such as new distribution models and software.

One way to facilitate the communication between stakeholders could be through a working group, as has been successful in the approach by LoCITY.

4.4 Recommendations for relevant stakeholders: van-based freight sectors

Raising awareness & knowledge: *Assess potential for cycle freight in own operations*

All freight sectors with London-based operations, including small businesses, should assess their operations to look for potential for mode shift to cycle freight. This should include an analysis of goods dimensions and weight, and trip distances. Where immediate potential exists, businesses should participate in trials either by hiring cargo bikes or by partnering with a third party.

4.5 Recommendations for relevant stakeholders: National Government

Increasing competitiveness

1. Continue to provide funding for initiatives that support cycle freight

Successful funding schemes to-date include, for example, Innovate UK (e.g. Low Impact City Logistics) and DfT New Technology Grants (e.g. Innovation Challenge Fund).

2. Provide clarification on regulations regarding the use of innovative technology

Lack of clarity in the use of enabling technology can become a barrier to trials of sustainable delivery models. An example that arose during this research was the use of powered walk-mode trailers. Under the Road Traffic Act, electric-assist trailers are classified as pedestrian-controlled vehicles and are therefore exempt from motor vehicle licencing requirements; however, regulation of the use of these vehicles on footways is not clearly defined. The Highways Act (1835) prohibits the driving of trucks or sledges on the footway, and section 300 of the Highways Act (1980) provides exemptions for the use of motor vehicles on the footway for cleaning and footway maintenance by a local authority. However, since other, non-powered pedestrian accompaniments (e.g. prams, trolleys and trailers) are in use on footways, it is not clear that powered walk-mode trailers should be prohibited.

4.6 Monitoring success

As cycle freight in London is early in its development, it will be important that effective monitoring is in place to:

- learn from early attempts to promote cycle freight uptake, including:
    - the effectiveness of measures to promote cycle freight uptake
    - the sustainability of cycle freight operations in different areas
- quantify the wider benefits and impacts of cycle freight, including:
    - reductions in van numbers and vehicle km
    - numbers of cycle freight vehicles replacing vans
    - impact on traffic flows and congestion
    - impact in terms of emission reductions and air quality improvements

The type of data used to monitor success will depend on the nature of the cycle freight schemes that are implemented. Examples of key measurable data that can be collected as part of monitoring programmes are outlined in Table 13.

The frequency and extent of monitoring undertaken would need to be proportionate to the scale of the scheme being tested. This would ideally be undertaken on an annual basis to provide a robust means for assessing the impact and effectiveness of different measures and approaches, and inform future policy, planning and funding decisions

Table 13 Key measurable data for monitoring the impact of cycle freight measures

Cycle Freight Monitoring Criteria		Source
1	Changes in local area vehicle mode shares (i.e. proportion of vans) and absolute numbers relative to the baseline figures for the area, and a neutral control site.	Primary data collection at fixed or regular traffic count sites where applicable. Surveys of operators and/ or customers sites.
2	Journey time differences in cycle freight versus van deliveries	Primary data collection
3	Changes in congestion levels	Trafficmaster data or other TfL data
4	Changes in kerbside activity mode shares by van where data is available	Primary data collection
5	Air quality – CO_2, NO_2 and PM_{10}/$PM_{2.5}$	Borough Air Quality Monitoring Stations or primary data collection
6	Number of cycle freight bike loans/ or co-funding schemes awarded – by month/year. The number of motorised vehicles replaced by these cycle freight schemes should also be recorded.	Borough records and surveys of participating businesses.
7	Number of businesses/ customers using cycle freight deliveries	Primary data collection or via BIDs or cycle freight operators
8	Number of active cycle freight operators	Primary data collection or via BIDs or cycle freight operators.
9	Number of cycle freight operators registered to ECLF, and, later, FORS	ECLF
10	Number and proportion of Cycle Freight operators completed bikeability training for staff	British Cycling
11	Number of cycle freight trials	Boroughs
12	Number of cycle freight micro-consolidation/ operating hub facilities	Boroughs
13	Number of cycle cargo bikes available through hire schemes	TfL, Boroughs
14	Accident data	TfL
15	Number/ proportion of new developments with measures promoting cycle freight included within their planning conditions	Borough records

4.7 Timeline and feasibility

Timeline and integration with existing strategies/plans

With the exception of standard bike messengers, the sector is fairly nascent in London so, although actions to address awareness can be implemented rapidly, substantial uptake is expected to take place after 2020. For example, it will take time to identify potential in each area and to develop the policy required to incorporate cycle freight into local plans. Developing recognition for best practice among cycle freight operators will take careful planning to avoid creating unhelpful barriers to new entrants to the market.

The recommendations are therefore categorised according to two broad time periods:

(1) **Now to 2020:** The initial period is primarily focused on raising awareness and knowledge amongst Boroughs and London businesses. This will ensure that Boroughs are well-prepared to assess and identify opportunities for cycle freight within their area, and to plan for the infrastructure necessary to achieve the appropriate level of modal shift. Trials can be run to lay the ground for later expansion. During this time, the grounds for a formal Code of Conduct for operators should also be developed to promote responsible working.

(2) **From 2020:** It is expected that key enablers will be put in place, including the ULEZ, local access restrictions and the future proofing of new developments and major schemes for cycle freight. Uptake is therefore expected to increase more rapidly in this period, in the areas where all the decisive key factors are in place to provide the necessary conditions for cycle freight to reach its full potential as part of the urban ecosystem.

The timeline and key milestones are summarised in Figure 15.

Feasibility of recommended actions

The feasibility of the recommendations was assessed in a stakeholder workshop, with representatives from TfL, London Boroughs and the ECLF. Actions to raise awareness and knowledge were considered highly feasible, as was the development of new training standards and accreditation. The most challenging actions were related to providing space and implementing cycle freight-friendly strategies. The competing pressures experienced by Boroughs for space and resources – including human resources to implement projects – make prioritising cycle freight difficult. However, these actions are the most critical for the successful uptake of cycle freight and therefore require appropriate support and incentives to facilitate them.

Aligning the approach

The implementation of the recommendations will rely on collaboration among stakeholders to ensure a consistent policy approach, and to establish a cohesive framework that addresses both air quality, healthy streets and congestion reduction objectives. One means of achieving this would be to establish a working group, similar to the London Councils London Freight Borough Officer Liaison Group (BOLG), which

would bring together TfL, Boroughs and industry representatives (e.g. ECLF and freight operators). TfL are currently best placed to initiate and lead this working group, although this may evolve over time as policy needs change with maturation of the sector.

4.8 Additional recommendations

As highlighted in Section 3, very little data is currently available on freight activity in London. To accurately assess the potential for cycle freight (and other freight related measures), a better understanding of van activities would be needed. This could be achieved through detailed freight studies carried out on local levels to establish: (1) the number and type of journeys or kerbside activities, and (2) the number of deliveries received or generated by local businesses that could be carried by cycle freight (i.e. of appropriate weight and volume, and travelling fewer than five kilometres). This lack of data on van activity by sector is not only a London issue; there are no recent national statistics on this topic, with the last DfT Survey of Company Owned Vehicles conducted over a decade ago (2003/05).

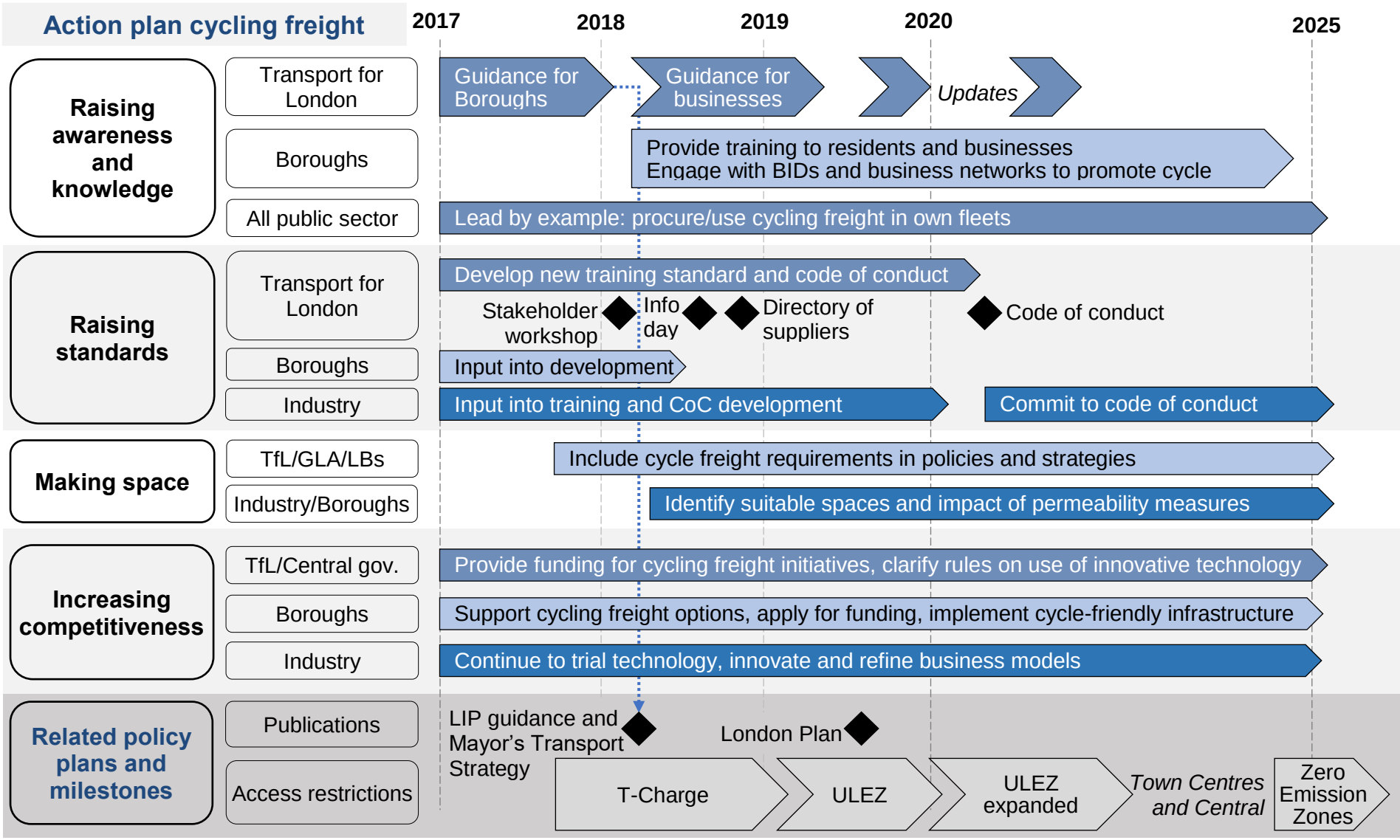

Figure 15 Summary of the action plan to support cycling freight in London

5 Appendix

5.1 EAPC regulations and vehicle costs

Before regulation change

The class of vehicles considered by the regulations includes **bicycles or tricycles** that comply with the following requirements to:
• Have a kerbside weight not exceeding 40 kg in the case of a bicycle, and not exceeding 60 kg in the case of a tandem or tricycle
• Be fitted with pedals by means of which it can be propelled
• Be fitted with an electric motor which:
  ○ has a continuous rated output of no more than 0.2 kW in the case of a bicycle or 0.25 kW in the case of a tandem or tricycle
  ○ cannot propel the vehicle when it is travelling at more than 15 mph

Since 2015

The class of vehicles considered by the regulations includes **pedal cycles with two or more wheels** that comply with the following requirements to:
• Be fitted with pedals by means of which it can be propelled
• Be fitted with an electric motor which:
  ○ has a continuous rated output that does not exceed 250 W
  ○ cannot propel the vehicle when it is travelling at more than 15.5 mph

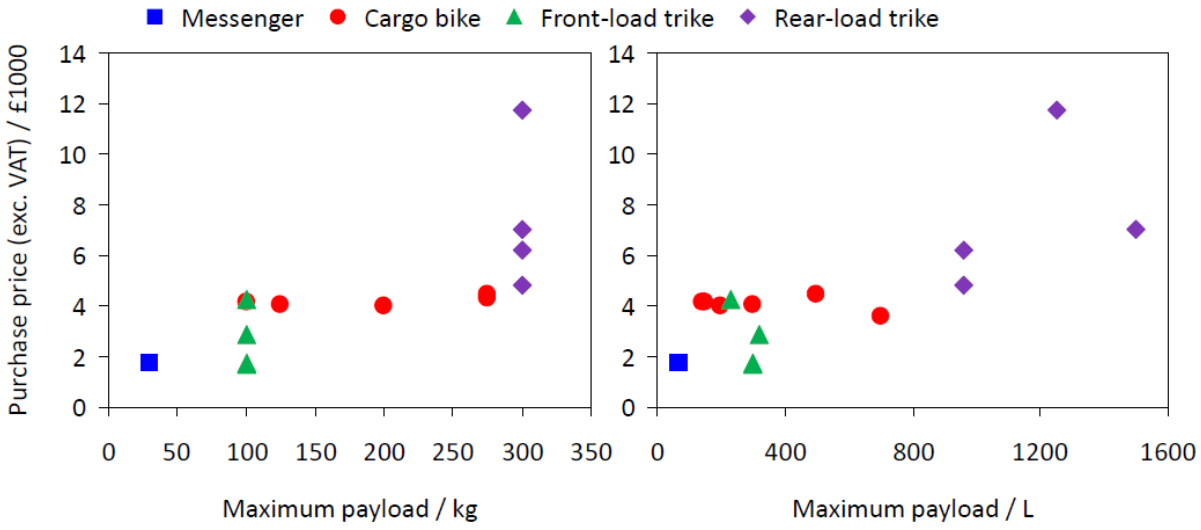

Figure 16 Vehicle purchase price vs maximum payload for electric assist vehicles. Source: authors' review of market (19 brands, 21 vehicle/cargo box combinations reviewed), prices correct as of July 2017

5.2 List of industry consultees

Stakeholder type	Organisation	Freight
Fleet operators	John Lewis Partnership	Van
	Commercial	Van
	Sainsbury's	Mixed
	British Gas	Van
Logistics operators	City Sprint	Mixed
	TNT	Mixed
	UPS	Mixed
	Gnewt Cargo	Mixed
	London Bike Hub	Cycle
	Outspoken! Delivery	Cycle
	Recharge Cargo	Cycle
	Pedal and Post	Cycle
	Pedals	Cycle
SMEs	AV2Hire	Cycle
	Calverts Co-operative	Cycle

Stakeholder type	Organisation
Manufacturers	Larry vs Harry (DK)
	Cycles Maximus (UK)
	Iceni Cycles (UK)
Employee	UPS (Dublin)
Other	Federation of Small Businesses
	Fernhay
	European Cycle Logistics Federation

5.3 List of reviewed papers

				General background		Cycle Freight				
Title	**Author(s)**	**Date**	**Public report**	**Policy - Transport/emissions**	**Policy - Cycling**	**Freight info**	**Info/ issues**	**Cycle models**	**Case studies**	**Relevance**
Cycle freight in London: A scoping study	TfL	2009	Y				x	x	x	High
London Stalling: Reducing Traffic Congestion in London	London Assembly	2017	Y			x	x		x	High
London Assembly Transport Committee investigation into light commercial traffic	London Assembly	2016	Y							Low
Mayor's Transport Strategy: Draft for public consultation	Mayor of London	2017	Y	x	x					High
Cyclelogistics Final Public Report	FGM-AMOR, Outspoken, ECF, CTC	2014	Y			x	x	x	x	High
Cycling and air quality	B. Deegan	2017	Y	x						Low
Strategic cycling analysis	TfL	2017	Y		x					Medium
Transport Emissions Roadmap	TfL	2014	Y							High
Electrically Assisted Pedal Cycles in Great Britain (Information Sheet)	DfT	2015	Y							High
Reject or embrace? Messengers and electric cargo bikes	J. Gruber, A. Kihm	2016	*				x			Low
Sustainable city logistics - making cargo cycles viable for urban freight transport	G. Schliwa, *et al.*	2015	*				x		x	High
Understanding vans in London	TfL	2013	Y			x				Medium
Van travel trends in Great Britain	RAC Foundation	2014	Y			x				Medium
London Cycling Design Standards	TfL	2016								Medium
London congestion trends	Inrix	2016	Y							Medium
The Implications of Internet Shopping Growth on the Van Fleet and Traffic Activity	RAC Foundation	2017	Y			x				Medium
Analysis of Cycling Potential	TfL	2017	Y							Medium
Rethinking deliveries	Mayor of London, TfL	2016	Y	x		x				Low
Cycle Logistics Industry Survey	ECLF	2016	Y				x			High
Evaluating the use of an urban consolidation centre and electric vehicles in central London	M. Browne, J. Allen, J. Leonardi	2011	*			x			x	High
Travel in London, Report 8	TfL	2015	Y			x				Medium
London Plan (FALP, 2016)	Mayor of London, GLA	2016	Y	x	x	x				Medium
Healthy Streets for London	Mayor of London, TfL	2017	Y	x	x	x				Medium
Delivery and Servicing Plans - Making freight work for you	TfL		Y			x	x			Medium
Ultra Low Emission Zone consultation report	Mayor of London, TfL	2014	Y	x						Medium
Low Emission Neighbourhoods - Guidance Note	Mayor of London, TfL		Y	x	x	x	x			Medium
Attitudes to Cycling	Mayor of London, TfL	2016	Y		x					Low
City Fringe Low Emission Neighbourhood and Public Realm Masterplan	WSP	2016	N	x	x		x		x	Medium
A City for all Londoners	Mayor of London	2016	Y	x	x	x				Low
Transport for London Business Plan	TfL	2016	Y	x	x	x				Low

Cycle Demand at Stations	TfL	2016	Y	x			Medium
Electrically-assisted bikes: Potential impacts on travel behaviour	TRL	2017	Y	x			Low
Evaluating the Potential of Electric Bikes to Reduce Emissions and Costs	TfL	2012	Y	x			Medium
Travel in London Report 9	TfL	2016	Y				Medium
The activity of GB-registered vans in Great Britain : 2003 to 2005	DfT	2006	Y		x		Medium
Van Activity Baseline Survey 2008: Provisional Results	DfT	2009	Y		x		High
Traffic levels on major roads in Greater London 1993-2010	TfL	2010	Y		x		Medium
Vans and the economy	Commission for Integrated Transport	2010	Y		x		Medium
CycleLogistics Baseline Study	ECLF	2014	Y		x	x	High
London Freight Data Report	TfL	2014	Y		x		Low
An analysis of the parcels market and parcel carriers' operations in the UK	FTC2050	2016	Y		x		Medium
An analysis of road freight in London and Britain: traffic, activity and sustainability	FTC2050	2016	Y		x		Medium
Oxford Street Kerbside Activity	Westminster City Council/TfL	2015	N		x		High
Oxford Street West Delivery & Servicing Business Engagement Study	Cross River Partnership	2017	N		x		High

* Denotes academic paper, which may require payment or subscription to access.

5.4 Examples of distribution and micro-consolidation hubs

Distribution – one parcel carrier	
Dublin 	• 20 ft container dropped in central location • Removed at end of day • Can be used within off-street car parks (provided sufficient access)
Frankfurt 	• Trailer with pre-sorted parcels brought to city • Containers transferred directly to cycles • Similar system to be trialled by UPS in London (*see Case Study 7, page 16*) • Requires two 5m parking bays for 6 hour shift
Micro-consolidation – several parcel carriers	
Netherlands 	• Shipping container in permanent location • Bikes can be stored in container overnight
Berlin 	• Pick-up/drop-off lockers act as hubs for couriers

5.5 Barriers identified from literature review

Themes	Common barriers to cycle freight uptake
Awareness/image	• Lack of awareness of cycle logistics beyond traditional bike messengers • Lack of recognition of cycle freight as a viable alternative
Vehicle and rider capabilities	• Limited payload capacity • Vehicle longevity – damage through constant high load use • Fatigue, seasonality, operation style
Business operations	• Initial cost of cycles – especially customised equipment • Competitiveness – pricing, capability compared to e.g. electric van • Inefficiency – number of sorting and loading cycles, double handling • Exclusivity and client competition • Digital proof of delivery
Infrastructure	• Lack of available (micro)consolidation centres • Urban planning requirements e.g. road layout, dropped kerbs, parking space
Support	• Lack of support from local authorities • Lack of financial support e.g. for start-up or trials

It should be noted that digital proof of delivery and client competition were not considered to be current barriers by cycle logistics operators interviewed during this research.

5.6 Determining uptake potentials for low potential sectors

To estimate the modal shift for low potential sectors, it was assumed that small businesses with fewer vans (and more local journeys) had the highest shift potential, whereas large companies have the lowest shift potential. The low shift potential for large companies derives from the likelihood that large retail businesses have already shifted the majority of their low weight and volume goods to 3rd party carriers or Click and Collect services. These companies are also more likely to have a national presence and to be based outside of London.

The distribution of vans across small to large businesses is not known. The best available data is that recorded by the Fleet Operator Recognition Scheme (FORS), which shows that the majority (78%) of LGVs are registered to companies with fleet sizes of over 100 vehicles (Table 14).[55]

For small fleets (1 – 5 LGVs), we assigned shift potentials of 60% and 25% for the high and low uptake scenarios, respectively. These figures are based on the average and lower shift potential of businesses interviewed (25 – 100%).

[55] FORS (2013), as reported in *Van travel trends in Great Britain* (RAC Foundation, 2014)

For medium-sized fleets (6 – 50 LGVs), we assigned shift potentials of 3% and 1%, respectively. The high uptake scenario value is based on previous data that reports that 8% of vans assigned to the utilities and services sector are primarily used for deliveries;[56] 3% derives from the assumption that approximately one third of these journeys are of the correct distance and payload to be carried by cycle.[57]

Large fleets (51+ LGVs) are assigned shift potentials of 1% and 0% to reflect the small proportion of deliveries that are available to be shifted to cycle freight.

Combined, these assignments result in overall shift potentials of 4% and 1% for the high and low uptake scenarios. In recognition of the uncertainty and variability of the low potential sectors, the upper limit was increased to **5%** in our final assessment of overall potential.

Table 14 FORS operator LGV fleet sizes[55] and their assigned potential shift for cycle freight

					Assigned potential	
Fleet size	**Operators**	**No of LGVs**	**% operators**	**% LGVs**	**High**	**Low**
1	458	458	22%	1%	60%	25%
2 - 5	823	2601	40%	3%		
6 - 10	263	2007	13%	3%	3%	1%
11 - 20	214	3213	10%	4%		
21 - 50	151	4777	7%	6%		
51 - 100	58	4064	3%	5%	1%	0%
101+	76	60472	4%	78%		
Total	**2043**	**77592**			**4%**	**1%**

5.7 Framework for local area assessment

5.7.1 Weighting of key factors for local area characterisation

The relative influence of the key local area factors on localised cycle freight uptake potential is not equal. The most influential amongst the key factors identified were felt to be:

- **Employment/ retail density (20%)** - High density areas of prospective customers, particularly office/employment dominated areas, as these provide the fundamental customer base to support the operation;
- **Microconsolidation potential (20%)** - Potential for accommodating a local micro-consolidation facility – which is key in sustaining many local cycle freight operations;

[56] *Van Activity Baseline Survey* (DfT, 2008)
[57] As used in the Cycle Logistics baseline study (2014).

- **Cycle vs Vehicle Permeability (20%)** – where delivery speed/ reliability by cycle freight is equal or better to delivery by vans – which can be achieved either through local access restrictions to vehicles (including LGVs), relative differences in ease of parking, loading/unloading, and also in terms of;
- **Congestion (15%)** - on the road network, conferring some relative advantages to cycle freight.

As such the factors were weighted to reflect these findings, with the remaining 25% attributed to secondary but nonetheless influential drivers: Presence of BIDs & suitable businesses (10%), Cycle friendly environment/ mode share (10%) and Supportive borough policies/ complementary measures (5%).

5.7.2 Application of the framework to example characterisation areas

The approach for assessing the potential for cycle freight uptake within a local area described in section 3.5 (page 35) was applied to six example areas.

The areas considered were identified through interviews with borough representatives, and each covers approximately two to four square kilometres. Our initial rankings are based on the discussions with the boroughs, and some initial desktop research. The individual scores for each key factor are detailed in Table 15.

The area characteristics and overall scores for each area are:

1. **Westminster – Oxford Street** (*Central London, retail dominated*) – a major retail destination. Major changes are planned as part of the Oxford Street pedestrianisation scheme, presenting opportunities to re-provision for cycle freight. A complimentary LEN scheme covers part of the area. **SCORE = 71**

2. **City of London – Barbican LEN** (*Central London, office dominated*) – an office and business dominated, with available under-used off-street parking. The area is part of the City's LEN. **SCORE = 75**

3. **Hackney – City Fringe LEN** (*Inner London, complementary schemes*) – a progressive area comprising a mix of uses, including start-ups and tech giants. The area is served by a Cycle Super Highway, and is part of the Shoreditch LEN, including the promotion of ULEV freight and filtered permeability. **SCORE = 73**

4. **Greenwich LEN** (*Inner London, complementary schemes*) – a progressive area featuring mixed land uses, SMEs and social enterprises. The area is part of the borough's LEN, with restricted vehicular access. A cycle freight scheme is being launched with ReCharge. Major logistic operator's depots nearby. **SCORE = 67**

5. **Hammersmith & Fulham – Hammersmith BID** (*Inner London, BID focused*) – area dominated by many smaller businesses, encompassed by an active

Business Improvement District, which forms the basis for the area being identified. **SCORE = 62.5**

6. **Croydon town centre** (*Outer London Major Centre*) – Outer London high density centre, dominated by large offices and a major transport hub. The area is characterised by high levels of development and construction activity, and is more car dominated than the other case study examples. **SCORE = 55.5**

These results are not intended to serve as a definitive set of outputs, and we would recommend further, more detailed assessments are conducted in these areas; however, these examples serve to illustrate how boroughs or cycle freight operators might prioritise their initiatives and funding within particular areas, and address particular barriers.

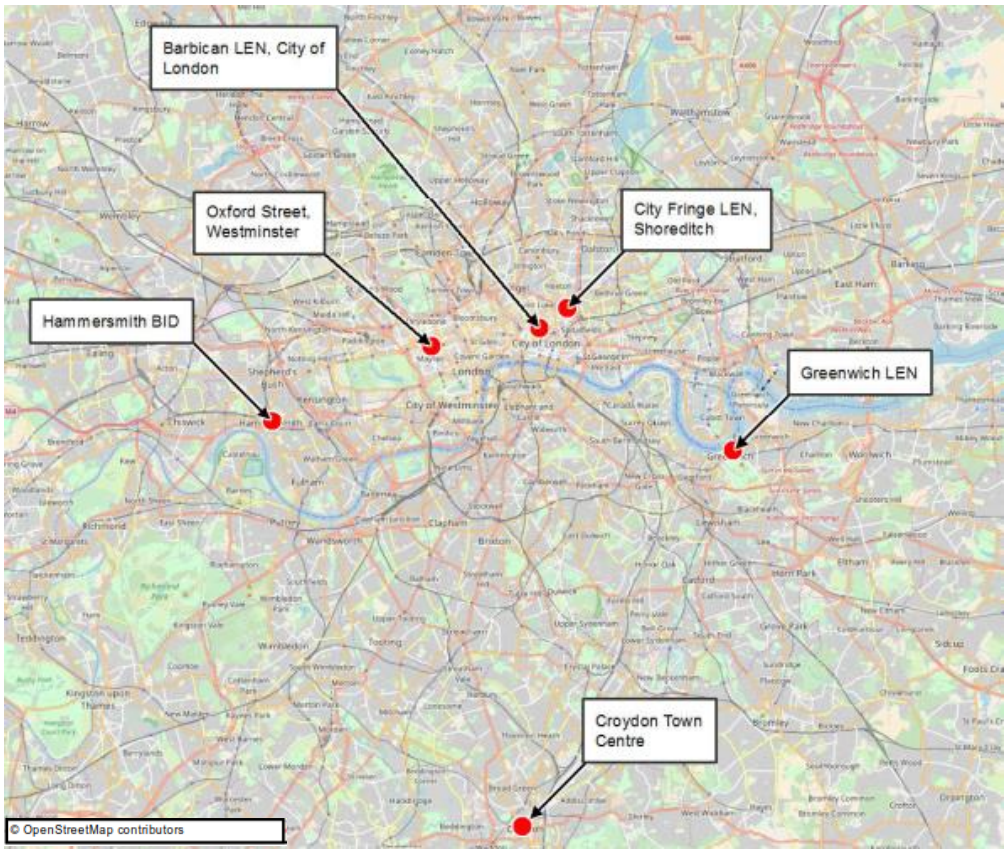

Figure 17 Localised Cycle Freight Uptake Potential - Characterisation areas

City Fringe LEN

Greenwich LEN

Hammersmith BID

Table 15 Localised Cycle Freight Uptake Potential - Characterisation areas assessments

	Character Area & *Key Characteristic*	Location (central/ inner/outer London)			Factor and weighting							
					Employment/ retail Density	Micro-consolidation potential	Cycle Vs Vehicle permeability	Congestion	Presence of BIDs & suitable businesses	Cycle friendly environment/ mode share	Supportive LB policies/ complementary measures	Total
		C	I	O	20	20	20	15	10	10	5	100
1	**Westminster – Oxford Street area** (*retail dominated*)	X			10	5	6	7	9	6	7	**71**
2	**City of London** (*office dominated*)	X			10	6	7	7	9	6	7	**75**
3	**Hackney – City Fringe** (*LEN - complementary schemes*)		X		8	6	8	6	9	7	8	**73**
4	**Greenwich town centre** (*LEN - complementary schemes*)		X		7	7	6	6	7	7	8	**67**
5	**Hammersmith town centre** (*BID focused*)		X		7	6	5	7	7	6	6	**62.5**
6	**Croydon town centre** (*Major Centre*)			X	6	6	5	6	6	4	5	**55.5**

5.8 List of London-based cycle freight operators

The following companies known to be operating cycle freight in London are listed below. This is not an exhaustive list, and other operators may be present in London:

National carriers
UPS
DHL
CitySprint
Absolutely

Local 3rd party logistics carriers
Outspoken! Delivery (Waltham Forest)
ReCharge Cargo (Greenwich)
Pedals
Subtle Couriers
Stuart

Small companies
AV2Hire
Dusty Knuckles Bakery
Calverts Cooperative
Zig Zag Tea
Champagne Lasseaux
Cooper's Bakehouse

5.9 List of cycle hubs in London

Name	Location	Services offered	Link
Private Sector enterprises			
Midtown BID Cycle Vault	Bloomsbury Square, Camden	100 spaces, showers, lockers, repair centre (in car park)	https://cyclevault.inmidtown.org/index3.php
Heathrow Cycle Hub	Heathrow Airport	400 spaces, retail shop	http://www.heathrow.com/company/heathrow-jobs/commuting-to-heathrow/commute-by-bike#
Bankside BID	Bankside BID	70 spaces (in car park)	http://www.betterbankside.co.uk/services/bankside-secure-cycle-park
Canary Wharf	Canary Wharf	400+ spaces (in car park)	http://canarywharf.com/wp-content/uploads/2016/06/canary-wharf-getting-here-cycle-parking-locations-summer-2016.pdf

H2 Bike and Run	Soho	360 spaces, showers, lockers, gym	https://www.h2bikerun.co.uk/h2-commute/
H2 Bike and Run	Victoria	360 spaces, showers, lockers, gym	
O2 Arena	Greenwich	500 spaces (in car park)	
Public sector, as listed on the TfL website[58]			
Finsbury Park station	Finsbury Park station	147 spaces, repair equipment	
Hounslow West station	Hounslow West station	190 spaces, repairs	
North Greenwich Station	North Greenwich Station	350 spaces (in car park)	
Waterloo station	Waterloo station	5000 space super-hub to open in 2018	
City of London	London Wall	176 spaces (in car park)	
City of London	Baynard House, nr Blackfriars station	106 spaces (in car park)	
City of London	Tower Hill	52 spaces (in car park)	
City of London	Minories	15 spaces (in car park)	
Croydon	East Croydon Hub	80 spaces on-street secure shelter	https://www.croydon.gov.uk/transportandstreets/rhps/roads/rms/croydon-cycle-hub
Ealing	Ealing Broadway	130 spaces plus 20 hire bikes	
Waltham Forest	Leyton	150	http://www.enjoywalthamforest.co.uk/cycle-sheds/
Waltham Forest	Leytonstone	50	http://www.enjoywalthamforest.co.uk/cycle-sheds/
Waltham Forest	Wood St	28	http://www.enjoywalthamforest.co.uk/cycle-sheds/
Waltham Forest	Lea Bridge	50	http://www.enjoywalthamforest.co.uk/cycle-sheds/
Waltham Forest	Walthamstow Central		http://www.enjoywalthamforest.co.uk/cycle-sheds/

[58] https://tfl.gov.uk/modes/cycling/cycling-in-london/cycle-parking#on-this-page-2