Port of Tilbury London Limited Research Report

Making the case for light-weight freight: Initial Market, Operational and Feasibility Study November 2019

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Making the case for light-weight freight

1. Introduction

1.1 Background

This document presents the initial findings of a study carried out in relation to the possibility of using the Port of Tilbury for a new category of freight business. Specifically, the study focused on identifying whether a case can be made for moving general light-weight freight by water, using high-speed boats or a ferry service, to transport finished goods in London. The "last-mile" refers to the final stages of delivery in logistics networks. Put simply, is it feasible to use waterborne freight solutions travelling into London to replace predominantly Light Goods Vehicles (LGVs) and small Heavy Goods Vehicles (HGVs) up to 7.5T gross vehicle weight (GVW) journeying in the same direction to deliver to homes and businesses in London.

1.2 Scope and approach

The objective of this study was to understand whether there may be a market for using the river for general light-weight freight and to carry out a desk-based assessment to theorise over cost drivers and to compare freight costs across different modes. Our approach was to examine the existing market and players engaged in final mile deliveries, their operating models, cost drivers (subject to availability of information) and comparing these against a theoretical operational and cost model for transporting general light-weight freight on the river.

The term general freight is taken to exclude passengers, bulk materials, ISO containers, cars, waste and construction materials. It is assumed to mean traditional deliveries which use small HGVs (7.5T) and LGVs (Vans).

1.3 Key limitations

This study focuses on operational drivers and operating costs incurred by

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typical final mile delivery operations. It therefore excludes an exploration of capital costs. All road based related costs reported in this document are based on typical running and standing costs as reported by the Freight Transport Association in the Vehicle Operating Costs April 2019 Report. It should be noted that these costs can provide a rough estimate only as they can vary greatly depending on the operating model deployed by a final mile operator. This applies, in particular, to delivery operators (such as Amazon, Yodel, Hermes) that make greater use of so called 'Owner Drivers' (Gig economy model) as opposed to operators using employed drivers (UPS, Parcelforce, DX) or a mixture of both (DHL, FedEx, TNT Express, DPD and others).

2. Policy and Environmental Drivers

Air pollution caused by road transport is the biggest source of emissions affecting the health of London's population and the Mayor, through TfL, is taking action. The Mayor's Freight and Servicing Action Plan (published 2018), include the following objectives:

- Proposal 15; work with the boroughs, businesses and the freight and servicing industry to reduce the adverse impacts of freight and service vehicles on the street network. The Mayor aims to reduce the number of lorries and vans entering central London in the morning peak (07:00-10:00) by 10 per cent by 2026

- Proposal 16; improve the efficiency of freight and servicing trips on London's strategic transport network by reviewing the potential benefits of a regional freight consolidation and distribution network

Proposal 17; work with the boroughs, the Freight Forum, landlords and all parts of the supply chain, including the freight industry, BIDs and individual businesses, to improve the efficiency of last-mile deliveries and servicing
Proposal 33; the Mayor, through TfL and the boroughs, will introduce regulatory and pricing incentives to support the transition to the usage of Ultra Low Emission Vehicles in London



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Proposal 35; the Mayor, through TfL and the boroughs, and working with Government, will seek to implement zero emission zones in town centres from 2020 and aim to deliver a zero emission zone in central London from 2025
The Mayor also aims for all deaths and serious injuries from road collisions to be eliminated from London's streets by 2041 (Vision Zero).

Such policy levers are compelling the transport industry to respond and companies have been upgrading their fleets to Euro VI standard since 2014. Zero tailpipe emission vans have almost reach cost parity with diesel equivalents and are also being introduced into fleets in ever increasing numbers. To further future proof final mile operations in city centres, delivery operators are developing new network models (see chapter 5.2).

3. Freight Consolidation

A small number of London Boroughs (e.g. City of London, Camden) preferred measure to reduce freight vehicle trips is through the physical consolidation of goods destined for delivery to parts of their boroughs at Consolidation Centres. New developments of commercial premises above a specified size are required to commit to consolidate deliveries away from the development. This planning condition applies to new developments only and cannot presently be imposed on existing in-situ businesses.

Whilst some organisations are still pursuing physical consolidation for operational purposes (e.g. NHS Guy's & St. Thomas's to reduce congestion in their loading bays), physical consolidation is no longer TfL's preferred measure as studies have shown that the problem (emissions) is simply being transferred elsewhere and, in some cases, diverting deliveries to Consolidation Centres increases overall emissions as suppliers have to travel further distances. Another recent study carried out for TfL also concluded that a network of Consolidation Centres serving central London should not be pursued. It is not possible, or efficient, to try and provide a one size fits all solution. The variety of supply chains, different sectors and end customers is too vast, dense, complex and nuanced for a network of consolidation centres

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to be able to effectively cater for all requirements. It is highly unlikely therefore, that proposal 16, outlined in chapter 2, will be pursued further.

4. Light-weight Freight – Existing Market Sectors

The scope of this study includes a review of existing market sectors for final mile delivery of light-weight goods. We have defined light-weight goods as items that can be lifted by one person and carried by hand into homes and business premises and have considered the following types of delivery commodities:

- eCommerce (e.g. fashion, electronics, small amounts of ambient food and drink, small household items). Final mile deliveries to both homes and work places are predominantly carried out by parcel delivery companies. We have included eCommerce deliveries in our research.

- Groceries, including food and beverages, to homes and businesses. Large supermarkets that have a grocery delivery offer tend to operate their own fleet of box vans. A notable exception is Morrison's, who partner with Amazon. Fresh foods such as meat, fish, vegetables, herbs etc. require transportation systems and containers that prevent contamination and provide chilled and frozen storage. Transportation by river of perishable groceries, could be undertaken with the use of flat-top ro-ro barges. There is a potential to provide on-board chargers for electric vehicles. We have not explored this further at this stage as it requires further detailed research.

- Bulk food, beverage and general catering item deliveries to businesses. Food and catering item deliveries carried out by companies such as Brakes and Bidfood are carried out in vehicles larger than vans and 7.5T vehicles. Similarly, drink deliveries for hotels, restaurants, pubs and bars delivered by for example Tradeteam or K&N Drink Logistics are also carried out by vehicles larger than 7.5T (usually 18T Curtain Siders). Transportation by river could be undertaken with the use of flat-top ro-ro barges. We have not explored this further for this initial report as the vehicles used fall outside the scope of this study.



Office Supplies. Office consumables, including general, non-hazardous cleaning materials are generally delivered by parcel delivery companies or own vehicles (vans). The major office supplies companies (Staples, Office Depot, Ryman) outsource the majority of their deliveries to parcel networks.
Furniture and white goods. These have been excluded from this study on the basis that they are not light-weight goods.

The potential addressable market for the waterborne carriage of light-weight freight from Tilbury lies predominantly with the type of goods carried by parcel delivery networks but could also include the heavier end of the food and beverage distribution market.

4.1 The UK Parcels Market

Mintel (2019) reported that the UK parcels market generated sales of £12.6 billion in 2018, an increase of 14% over the prior year and marking a 62% growth since 2014. Mintel predicts that the market will continue to maintain double-digit yearly growth, rising by 54% between 2019 and 2023. Parcel delivery operators delivered approximately 3.65 billion packages in 2018, up from 3.2 billion in 2017. In 2014, there were 11,765 parcel delivery companies registered in the UK (Keynote, 2015), of which 47% were classed as 'small' with annual turnover of less than £50,000.

The UK parcels industry continues to evolve dynamically with continued overall volume growth, new investment in additional and upgraded facilities, vehicle fleets (Euro VI, Hybrid and Electric Vehicles), IT systems and the refinement of operating models and launch of new services and features to enable evolving customer needs to be served profitably.

The parcels market is typically divided into three sub-sectors:

- B2B: Business to Business. Main players include DHL, TNT, UPS, FedEx and DX

- B2C: Business to Consumer. Main operators include Yodel, Parcelforce, Hermes, Amazon and DPD

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 C2X: Consumer to All Parties. Deliveries on behalf of consumers are typically fulfilled by the above mentioned B2C operators.

Estimates by Royal Mail (2016) suggest that the B2C and C2X sub-sectors account for almost two-thirds of UK parcel volume, with B2B making up the remainder. Royal Mail predicts that parcel volumes in the B2C and C2X sectors will drive most of the growth over the coming years, with B2B volumes either tracking or be slightly above GDP growth.

4.2 Operator Trends

The organic growth records of leading carriers show a significant degree of divergence between winners and losers. Operators who have gained market share include:

Amazon Logistics, which has rolled out more than 40 depots and delivers the majority of parcels on behalf of its parent and also market place sellers
DPD, which has gained significant market share over recent years on the back of service and systems enhancements, establishing itself as the leader at the high end of the B2C segment

- Hermes and Yodel, who are very strong in B2C based on their costleading business models

Those who have lost market share include:

- TNT Express, which has been impacted by customer contract losses and has suffered service issues related to its acquisition and operational integration with FedEx.

- DX, where some business was exited during the merger of the Nightfreight and DX networks and profit warnings led to multiple changes of management.

4.3 Main drivers for growth in last mile deliveries

Last mile delivery is driving a substantial proportion of the growth in the



freight transport industry in terms of the increasing number of LGVs on the UK's roads. LGV traffic growth has been more rapid than for any other vehicle type in London. The main factors that will continue to contribute to the growth in final mile deliveries include:

- Increasing demand for smaller, more frequent collections and deliveries to companies (just-in-time distribution)

- The rise in e-commerce: greater demand for online shopping and home delivery, express and parcels services

Factors influencing the future growth of e-commerce include:

- new demand from an internet-connected population due to the growing proportion of older people who are familiar with the convenience of internet ordering, and young people who learn from birth

- physical shops (bricks and mortar) reducing due to competition from online shopping

- the growing use of smart phones to purchase goods online will continue making shopping at home and on the move ever more convenient and easy

Whilst the retail sector has been at the vanguard of the last mile logistics movement, other areas of the economy are also beginning to recognize the benefits of more agile supply chains. It is anticipated that last mile logistics with a B2B focus will become increasingly prominent over time.

5. Last Mile Delivery Networks

5.1 Hub and spoke

The emergence of last mile logistics has disrupted the traditional logistics model. Historically, parcel network supply chains were simpler and consisted of a network of depots feeding collected freight into a central distribution centre

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(Hub) for onward transportation to the depot effecting the delivery. This is referred to as the hub and spoke network model.



The role of the depots within the network is to act as a link between the Hubs and the customer, by sorting and preparing parcels for delivery. Only very few parcel collection and delivery depots are now located within London. Many have relocated to the outskirts of London with convenient connections to the motorway network. Commercially acceptable distances between depots and the customer vary significantly and are typically influenced by factors such as: location; availability of labour, land/warehousing and the nature of the goods and transport mode options for delivery to the customer.

With the population of cities forecast to grow, congestion worsening, shortages of loading bays and new regulations being imposed by city authorities (e.g. ULEZ and the Congestion Charge Zone in London), delivery network operators are exploring alternative final mile delivery options.



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Many of these are focused on carrying out the final mile journey before delivery to the customer using smaller, more environmentally friendly vehicles.

5.2 The new network model

5.2.1 Gnewt Cargo

Gnewt is a relatively small, though growing, player in the final mile delivery market. They market themselves as a 'carriers carrier', delivering the final mile



Figure 2: Gnewt Cargo Railway Arches Depot

on behalf larger delivery networks. They have worked with TNT and Hermes to provide deliveries in the EC, WC and W postcode areas in central London. They also serve a small number of direct customers, including ASOS.

Gnewt's fleet consists of around 80 car derived vans (e.g. Renault Kangoo, Nissan ENV200), all of which are 100% electric. Gnewt was recently acquired by Menzies Distribution. Goods for delivery are delivered to Gnewt by their customers in diesel powered HGVs.

As a start up in 2009, Gnewt's first depot's were located in underground car parks and railway arches. They have recently moved to a significantly larger purpose built site in Bromley-by-Bow owned by Menzies.

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5.2.2 DPD

In 2018, DPD UK opened its first all-electric last-mile underground car park in Westminster. The site, which can handle 2,000 parcels per day, is the first of eight all-electric depots planned across the capital. Two 7.5-tonne eCanters, with 82kWh batteries capable of travelling up to 85 miles between each charge, are used to linehaul parcels to the depot. Final mile deliveries are then carried out by seven Nissan eNV200 all-electric vans, capable of making 120 stops per day, running multiple trips, on one charge, as well as eight Norwegian-built Paxsters.



Figure 3: DPD depot in Westminster

5.2.3 Cargo Bikes

Other delivery network operators are also piloting alternative methods to deliver parcels in congested inner cities, with many using Cargo Bikes..



Figure 4: New generation of Cargo Bike Models



Of interest is that the new generation of cargo bikes are capable of carrying greater loads (up to 125 Kilos) and that the design has been updated to include detachable cargo boxes. Delivery operators that do not have access to central London depots (e.g. underground car parks), can transport cargo boxes directly to their riders. The vehicles used, which at present tend to consist of 7.5T HGVs, deliver full boxes and collect empty ones up to four times per day. They therefore spend their time travelling between the delivery depot and cargo cyclists congregated in various areas of the city centre. This is necessitated by the fact that vehicles used to transport cargo boxes to the bikes are unable to park in city centres for any length of time.

5.2.4 Cost Factors

The existing supply chain model includes three depots (depot to hub to depot) and three vehicle journeys (two linehaul vehicles, one delivery vehicle) before delivery is made to the customer.



The supply chain is lengthened by one transport journey when cargo bikes are used to carry out the final mile delivery to the customer due to the limited carrying capacity of cargo bikes.



In the case of DPD, their underground car park depot in Westminster adds a further additional depot link to the supply chain. Conventional wisdom states that each additional link in a supply chain adds cost, time and risk. Anecdotal evidence suggests that operators have managed to make the model work commercially, achieving either cost neutrality or an acceptable small increase.

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5.2.4.1 New Network Model Cost Example

To provide an illustrative example of approximate cost factors, we have examined one element of the supply chain; the transport journey from the delivery depot to cargo bike riders.



We have assumed that an operator, located at Tilbury Docks using the cargo bike final mile delivery model would typically incur the following costs:

- The destination point is assumed to be in E16, a location suited to act as a springboard for deliveries in the city and a journey of 21 miles.

- The journey time during peak hours (07:00 to 10:00) is one hour, possibly a little longer

- The transport vehicle consists of a 7.5T Box HGV

- Weight limits are not applied as most parcel deliveries 'volume out'

- Detachable cargo boxes have a capacity of 1m³ and are based on the existing designs used by DHL (Armadillo Cargo Bike Box)

- The transport vehicle can carry up to 12 cargo boxes (12m³) per trip as boxes cannot at present be double stacked without major modifications to the 7.5T box

- The transport vehicle can make three return journeys during a normal 8-hour working day

- The operating costs of the vehicle and driver are £1.8756 per mile, rounded up to £1.88 per mile (Source: FTA Managers Guide to Distribution Costs April 2019 for a 7.5T box HGV travelling a maximum of 30,000 miles per year)



The transport vehicle incurs a daily cost of £11.50 for the congestion charge
We have not factored in any additional costs associated with loading and unloading at origin or destination as these functions are assumed to be carried out by the driver and cargo bike riders as part of their normal duties

Each 7.5T vehicle travels 126 miles per day (6 journeys of 21 miles each) and moves a total of $72m^3$ (72 boxes). The daily vehicle/labour cost amounts to £236.88 (126 miles x £1.88/mile). The congestion charge fee adds £11.50, resulting in a total daily cost of £248.38. The effective cost to move $1m^3$ of deliveries equates to £3.45 (£238.88 + £11.50 / 72). Using a higher capacity vehicle (e.g. 18T+) will reduce these costs.

To create a compelling commercial proposition for light-weight freight delivery operators to move from road to waterborne transportation for the final mile is likely to require either cost parity and/or provide a unique operational benefit.

5.2.5 Existing schemes and trials

Cities with extensive river and canal networks should be ideally suited to shift goods from road to water but there appear to be no examples of this happening at scale for light-weight general freight.

An example of waterborne freight distribution can be found in The Netherlands. The freight operator Mokum Mariteam uses the canals of Amsterdam to transport goods, waste and to deliver services. This is claimed to reduce the number of small- and medium-sized trucks operating in the inner-city but results have not been published. The vessels or barges are fitted with silent and clean electric engines. Goods are transported through the city and delivered to their destination with minimal noise or air pollutant emissions. Goods are transported using rolling containers, pallets and mesh containers, requiring cranes for lift on and off. On the return journey, vessels carry waste containers.

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Another example, closer to home, relates to Midlands craft brewer, Purity Brewing Company, who are barging beer kegs and crates of bottles into Birmingham, having purchased a canal boat in 2018 to increase city centre beer deliveries. No operational or cost data has been found.

In France, the Paris Air2 Logistique is a flagship urban logistics development, at the vanguard of multi-storey warehouse design. The design, allied with the site connections to main arterial roads will enable IKEA to transport goods using electric vehicles to central Paris and western suburbs. The location at Port de Gennevilliers also allows distribution of goods to Paris via The River Seine which, when in operational use, will reduce potential delivery delays caused by traffic congestion, and the port's rail links. IKEA announced in 2018 plans to develop deliveries by waterway from its new depot and hopes that the redevelopment of the roads around the Madeleine church will also allow the store to develop a bicycle delivery service. Trials with a view to potential roll-out are anticipated by the end of 2019.

6. Opportunities for Tilbury and a London Hub

6.1 Location

Tilbury's strategic location makes it a natural point for distribution facilities with eighteen million people living within seventy-five miles. Through bespoke consolidation and port-centric solutions, the port already provides supply chain solutions for a diverse range of sectors. Underpinning these port-centric solutions is 5 million square feet of undercover chilled and ambient warehousing and strong multimodal transportation links by road, rail and barge. These connections can remove complexity from the supply chain, reduce stock holding and journey miles and ultimately result in lower costs and a more environmentally friendly service for customers.



The port's distribution solutions are facilitated by three onsite railheads that allow connection to the main line directly into London or on to anywhere in the UK. Excellent road connections, with the M25 accessible by less than 6 miles of dual carriageway and barging options straight into the heart of London, complete the port's outstanding distribution network. Barging is known to reduce CO² emissions by 90% compared to HGVs, the number of vehicles on roads and also therefore the number of associated incidents and fatalities.

The Thurrock area, where the Port of Tilbury is located already benefits from having a strong commercial hub. It's a large logistics and supply chain area that already has existing companies such as Amazon, Tesco, Peroni and Asahi beer. In addition, Thurrock has large bases for P&G, DHL, UPS, Wincanton (M&S), Co-Operative, NHS and Sainsburys Northfleet.

There is no doubt that Tilbury's strategic location, coupled with its comprehensive facilities and the expansion of Tilbury2 with ro-ro capabilities and the new railhead opening in 2020 is ideally placed to site distribution centres that could make better use of waterways for the delivery of finished goods. Considering the findings of this high-level study, it is not yet clear that conventional parcel deliveries (light-weight goods) are a market that is addressable at scale. However, a definitive verdict in relation to this sector can only really be established through engagement with sector operators.

6.2 Potential Market Sectors

6.2.1 Locker Banks

The number of personal deliveries to offices in central London is thought to be between 200,000 and 400,000 per day. There is significant potential for click and collect lockers and collection points to help reduce unnecessary trips. TfL, working with Amazon and InPost, provide parcel lockers at eight Tube stations and plan to significantly expand the number of locker facilities provided stations.

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Locker banks are generally sited at places with high footfall such as major retail premises (e.g. supermarkets, petrol stations, shopping centres). There could be a potential opportunity to extend locker bank networks at riverside residential developments being erected all along the Thames. Further research would be required to establish:

- whether locker bank network operators (e.g. Amazon, InPost) would consider this to be commercially viable as not all retailers offer locker delivery options - the operational practicality. The time taken to empty and re-stock lockers could require the vessel to be used in place of a road vehicle - whether the existing infrastructure of piers and wharves is suitable

6.2.2 Other sectors

It is likely that opportunities could be identified across different sectors already discussed in this study (e.g. food and beverage) through initial engagement with some of the major existing businesses located in and around Tilbury and Thurrock.

Further opportunities within the public sector and existing outer London town centres could be another avenue to investigate. The level of development occurring in some outer London town centres (e.g. Barking) could make it viable for a consolidation scheme to operate providing political will to make it happen is high.

7. Future technologies

There are a variety of technological solutions that are believed to be capable of transforming last mile logistics and many of these are currently being developed for testing or are already being piloted (e.g. drones, pavement robots, 3D printing and many others). It is not yet clear, assuming these technologies can be made to work effectively, how the implementation of such technologies would impact final mile transport operations, whether by road or water and further research would be required to quantify this.



8. Conclusion

An environmental review carried out recently and focused on the waterborne movement of light-weight freight identified several benefits of this initiative, including:

- An overall improvement in air quality and potential reductions in noise pollution

- Significant reduction in greenhouse gas emissions when compared to moving goods by road

- Opportunity to revitalise, protect and promote appropriate use of disused wharves, including potential heritage assets

- Opportunity to provide new habitats and reduce impacts on designated sites

It is a certainty that the regulatory environment for road based transport operators will continue to get tougher. Combined with ever worsening congestion, particularly along the A13 towards London, distribution businesses located in the wider Thurrock area may well find it advantageous to consider the movement of their goods using the river to achieve more predictable delivery times.

Tilbury Port is well able to support the opportunity for moving goods by water and provides the Port with a unique opportunity for light-weight freight movements to be explored further. We would recommend that trials to develop a cost comparable and end-to-end waterborne solution in combination with a well positioned site in London be explored further. A good outcome has the potential to become more attractive for the final mile delivery sector by taking complexity out of the supply chain and could achieve a culture shift related to the use of the river.

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Tilbury Port's strategic location, excellent transport links and availability of industrial land in the wider area present opportunities to develop consolidation centres, multi-user and multi-product facilities. Although the cost of moving goods by water requires further investigation, all that is really required is a cultural shift about using the river.





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