

Where should an urban freight microhub be located?

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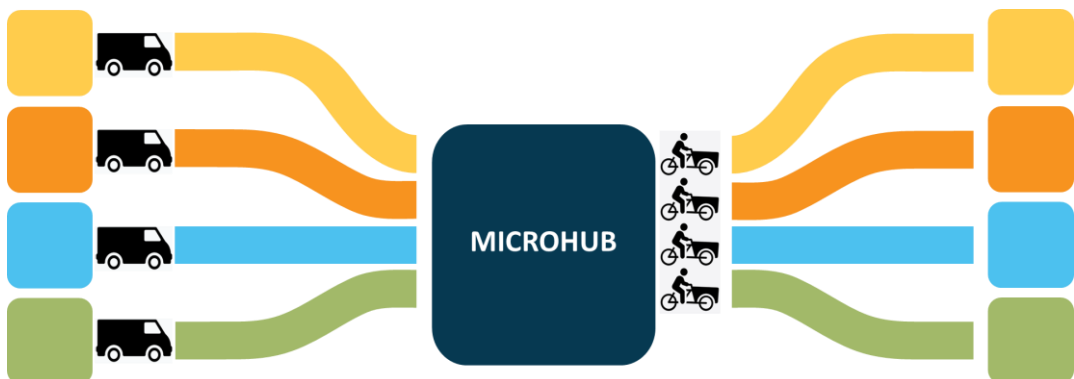
University College London

Last-Mile Micro-freight: Sustainable Transport Solutions and Challenges in Urban Landscapes
London, 19 June 2023

What do we mean by freight microhub?

AKA micro freight, micro consolidation, micro distribution, “last mile” freight distribution

Facility where freight is received and then **re-distributed** to end receivers **nearby**, using **low-emission** vehicles (e.g., cargo cycles)



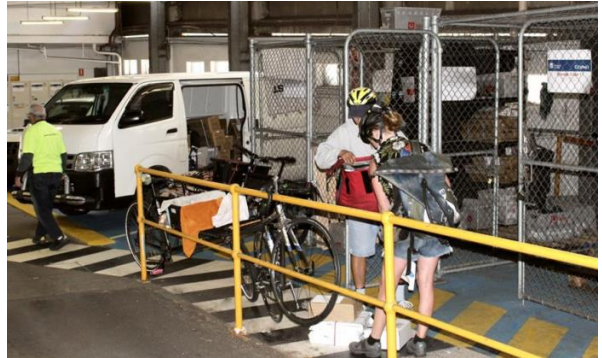
Microhubs are small facilities and can operate from...

parking lots



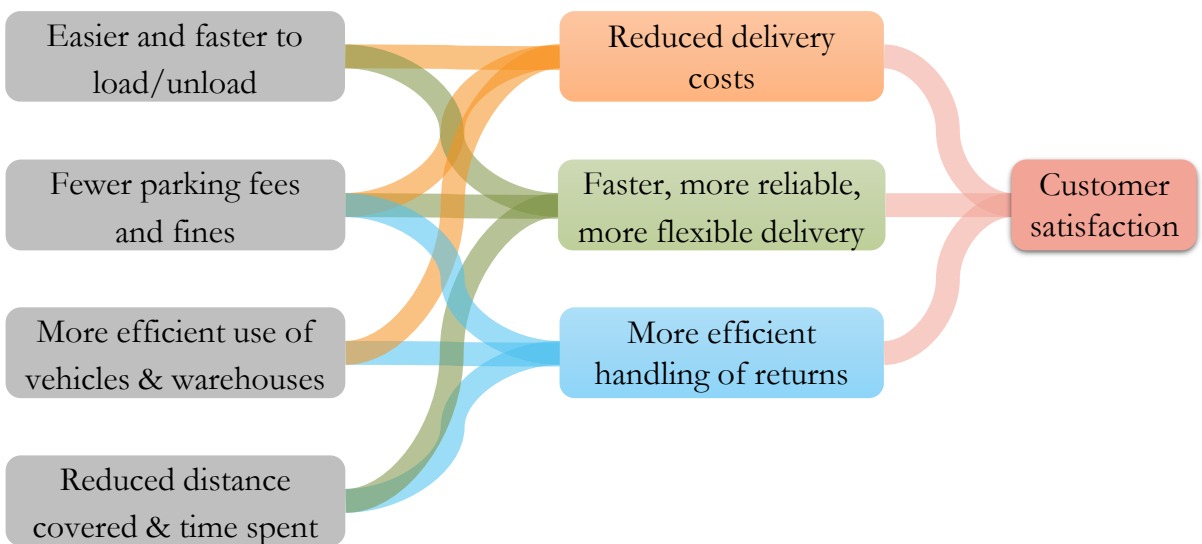
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or garages

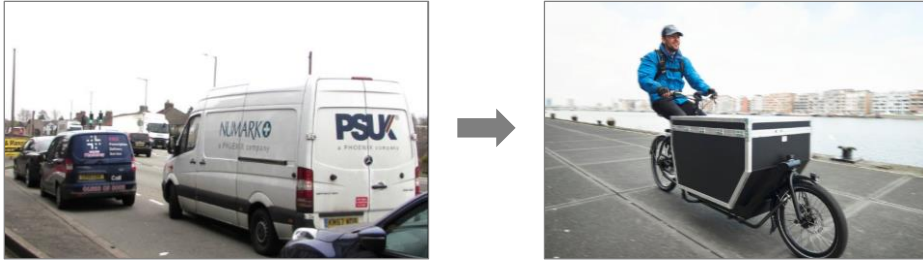


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Potential user benefits (for shippers, logistics providers, and receivers)



Potential wider benefits for society



Economy	Growth, employment
Environment	Reduced motorised traffic, energy consumption, noise, local/global emissions, visual impact of large vehicles
Accessibility	<ul style="list-style-type: none"> ▪ More space and better access for all road users ▪ Improved speed and travel time reliability
Equity	Positive effect if benefits above are in low-income areas

How about the delivery workers?



Safety

Conflicts with other road users

Exposure to pollution and to weather

Effort

Working hours

The user benefits of microhubs depend on location

LOCATIONAL CHARACTERISTICS	AFFECTED BENEFITS
<ul style="list-style-type: none"> ▪ Demand location ▪ Demand density 	Distance travelled, delivery times, and delivery costs
Road network conditions and management (road layout, congestion, competition for kerbside, access restrictions, speed limits, parking policies)	Delivery times (vs. using conventional vehicles)
Accessibility of workforce (public transport access to the hub, density of workers living within walking or cycling distance)	Attraction of workers for the hubs and deliveries
Land prices	Operational costs

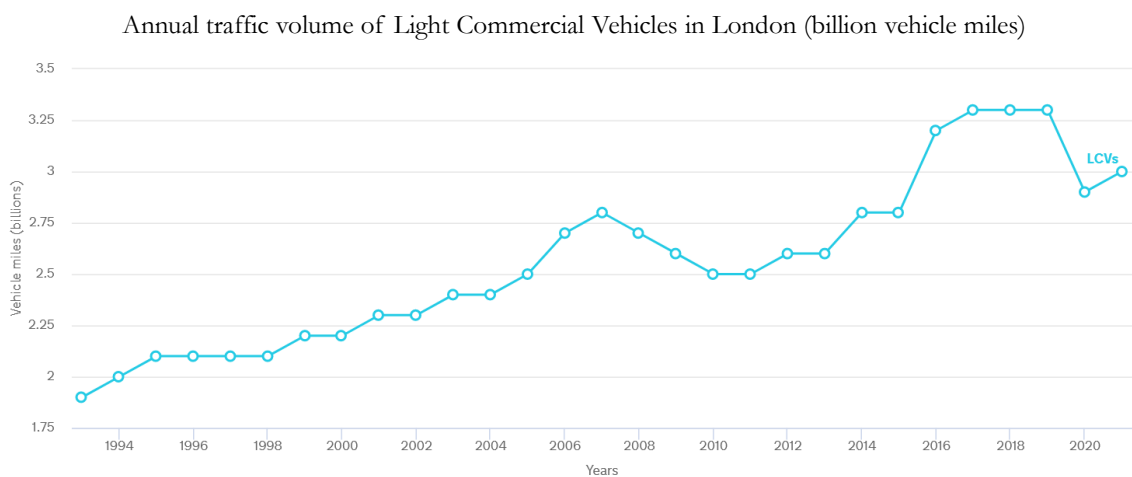
The wider benefits of microhubs also depend on location

LOCATIONAL CHARACTERISTICS	AFFECTED BENEFITS
Cycling infrastructure	<ul style="list-style-type: none"> ▪ Congestion and kerbside pressure reduction ▪ Traffic collision risk reduction ▪ Reduced conflicts with pedestrians
<ul style="list-style-type: none"> ▪ Road network characteristics ▪ Current traffic level and composition 	<ul style="list-style-type: none"> ▪ Distance travelled ▪ Emissions per delivery
Demand density	Energy use reduction
Demographic/socio-economic composition of the area	Equity (who benefits from economic, social, and environmental benefits of the hub)

The case of London

Why do London need more microhubs?

1) Van traffic is growing



Department for Transport (<https://roadtraffic.dft.gov.uk/regions/6>)

Why do London need more microhubs?

2) Freight distribution is adding to the pressures on road and kerbside space



Why London needs more microhubs?

3) Trials/models have shown potential benefits of these hubs

Browne <i>et al.</i> 2011	Electric vans and cargo cycles	<ul style="list-style-type: none"> ▪ Distance travelled: - 20% ▪ Co2 emissions/parcel: - 54%
Clarke and Leonardi 2017	Electric vehicles	<ul style="list-style-type: none"> ▪ Distance travelled: - 52% ▪ Empty running distances: - 65% ▪ Local emissions: - 81% ▪ Co2 emissions: - 88%
Allen <i>et al.</i> 2018	Pedestrian porters	<ul style="list-style-type: none"> ▪ Distance travelled: -86% ▪ Delivery time: -69%
McLeod 2020	Pedestrian porters and cycle couriers	<ul style="list-style-type: none"> ▪ Distance travelled: - 78% ▪ Kerbside parking time: - 45% ▪ Costs: - 34-39% ▪ NOx emissions: - 33%, ▪ Co2 emissions: - 45%.

It's a Transport for London priority



Locational issues are one of the key actions

Action 5

We will continue to work with the GLA and boroughs to develop a process that identifies, prioritises and evaluates opportunities to use land for micromobility hubs and last-mile freight.

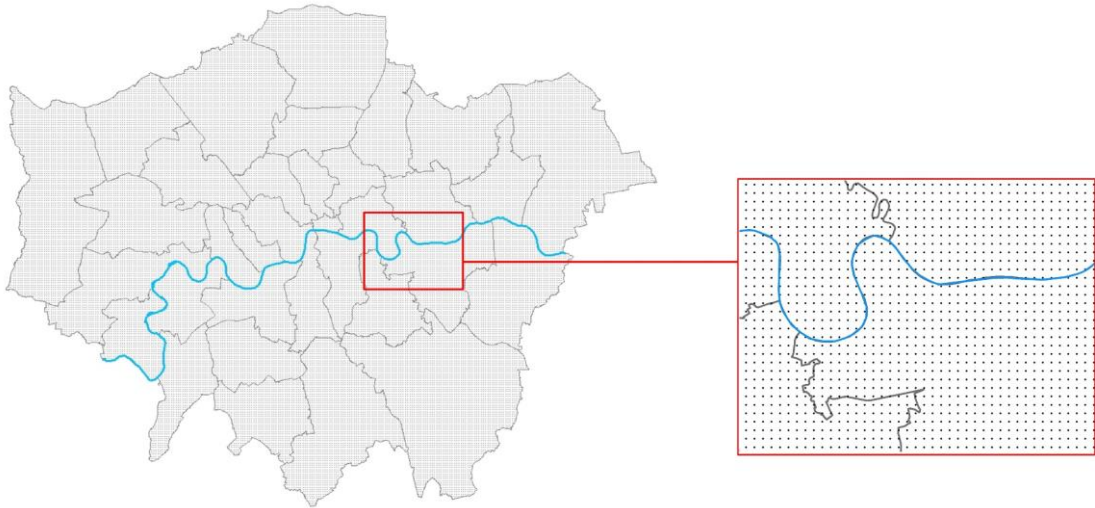
Objective

Identify the areas in London that are most suitable for the creation of urban logistics hubs

- ✓ Demand for deliveries
- ✓ Conditions of cycling infrastructure in delivery area
- ✓ Availability of labour
- ✓ Wider benefits of shifting motorised to cargo cycles within the delivery area

Unit of analysis

Grid of 39,861 points, 200m apart, covering Greater London



Process

SELECTION



CHARACTERISTICS
OF SELECTED
POINTS

- | | |
|---------------|---|
| STEP 1 | Minimum level of demand <ul style="list-style-type: none">• Population• Businesses and institutions |
| STEP 2 | Suitable infrastructure and operation conditions for cargo cycles <ul style="list-style-type: none">• Availability of cycle lanes/tracks• Traffic calming• Safety for cycling• Along freight distribution routes |
| STEP 3 | Availability of labour <ul style="list-style-type: none">• Characteristics of local labour force• Public transport accessibility for workers living elsewhere |

- | |
|--|
| Current environmental conditions in local area <ul style="list-style-type: none">• Noise and air pollution• Sensitivity of local population and land uses to environmental problems |
| Availability of potential sites for a freight microhub (car parks, industrial /business areas) |

Step 1: Minimum level of demand

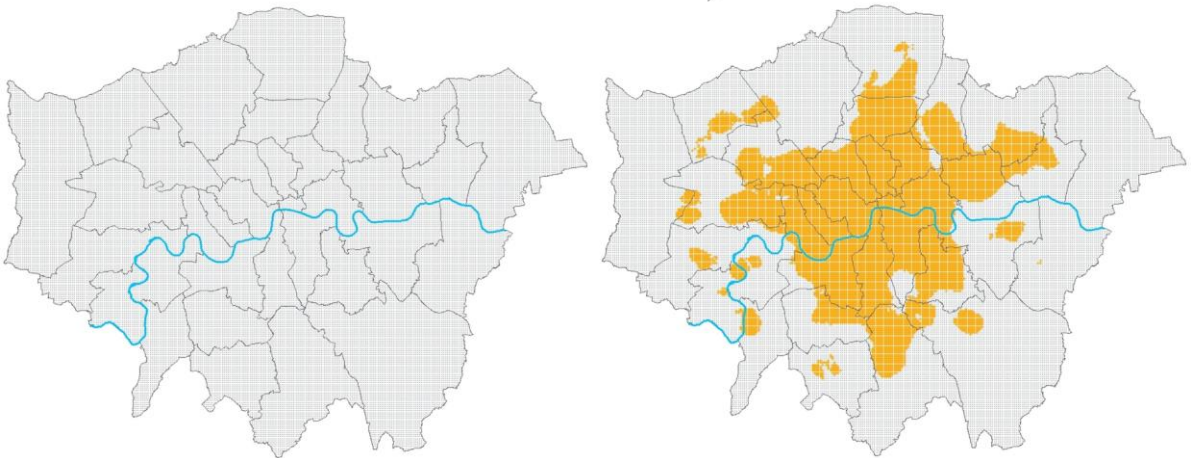
	Indicator	Area	Data source	Condition
Population	Number of residents	1600m	Population census	>75 th percentile (>54,836)
OR				
Business and institutions	Number of businesses and institutions	1600m	Ordnance Survey points of interest <ul style="list-style-type: none"> • 01 Accommodation, eating and drinking • 02 Commercial services • 03 Attractions • 04 Sport and entertainment • 05 Education and health • 0633 Central/local government • 0635 Organisations • 09 Retail 	>75 th percentile (>1,339)

Step 1: Minimum level of demand - Results

39,861
points

Minimum demand conditions
(population or businesses/institutions)

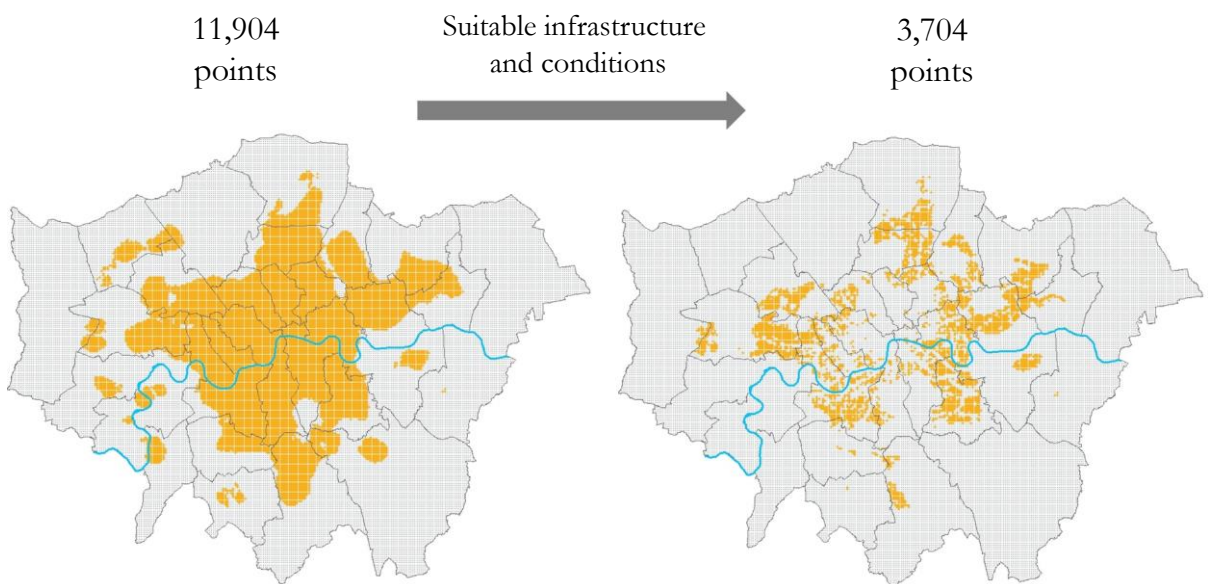
11,904
points



Step 2: Suitable infrastructure and operation conditions for cargo cycles

	Indicator	Area	Data source	Condition
Availability of cycle lanes/tracks	Metres of cycle lanes/tracks	400m	Transport for London	>0
				AND
Traffic calming	Number of structures for traffic calming	400m	Transport for London	>median (>8)
				AND
Safe for cycling	Number of collisions involving cyclists in last 5 years	200m	Department for Transport	<90 th percentile (<5)
				AND
Along freight distribution routes	Annual average daily flow of goods vehicles	1600m	Department for Transport	>median (>3,816)

Step 2: Suitable infrastructure and operation conditions for cargo cycles - results



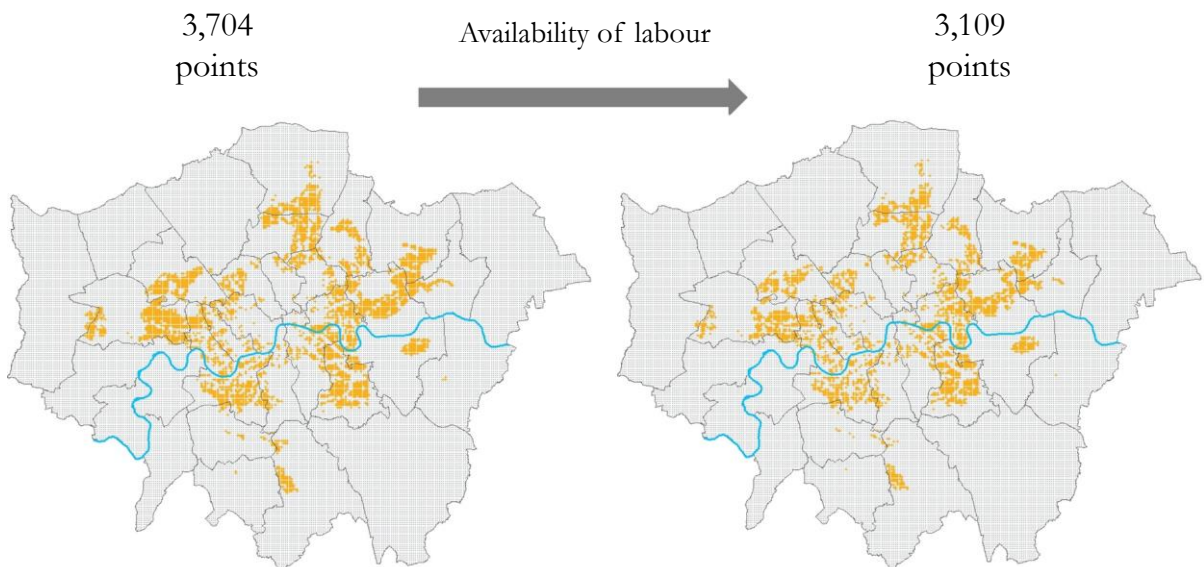
Step 3: Availability of labour

	Indicator	Area	Data source	Condition
Local labour	Composite indicator (0-1)	1600m	Population census	>median (>0.18)
AND				
Public transport accessibility	TFL Public Transport Accessibility Level (PTAL)	In census output area	Transport for London	>=2

Local labour composite indicator

$0.4 * \text{Number of residents working in routine/semi-routine occupations (as \% of maximum)}$
 $+ 0.4 * \text{Number of unemployed residents (as \% of maximum)}$
 $+ 0.2 * \text{Number of households with no car (as \% of maximum)}$

Step 3: Availability of labour - Results

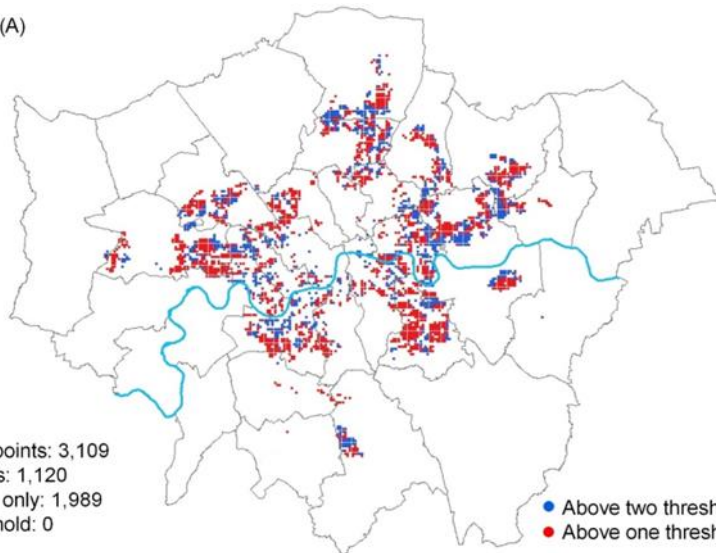


Environmental conditions

	Indicator	Area	Data source
Noise	Annual average roadside noise levels (7–23) (db(A))	400m (mean)	DEFRA
Air pollution	Annual average PM10 concentrations ($\mu\text{g}/\text{m}^3$)	400m (mean)	GLA and TFL
Sensitivity of local population to environmental conditions	Number of residents aged below 18	400m	Population census
	Number of residents aged above 65	400m	Population census
Sensitivity of local land uses to environmental conditions	Number of primary schools	400m	Ordnance Survey points of interest <ul style="list-style-type: none"> ▪ 05310375 First, primary and infant schools ▪ 05310377 Independent/preparatory schools
	Number of health institutions	400m	Ordnance Survey points of interest <ul style="list-style-type: none"> ▪ 0528 Health practitioners and establishments

Environmental conditions in the selected points

Noise threshold: 55db(A)
Pollution threshold: 3



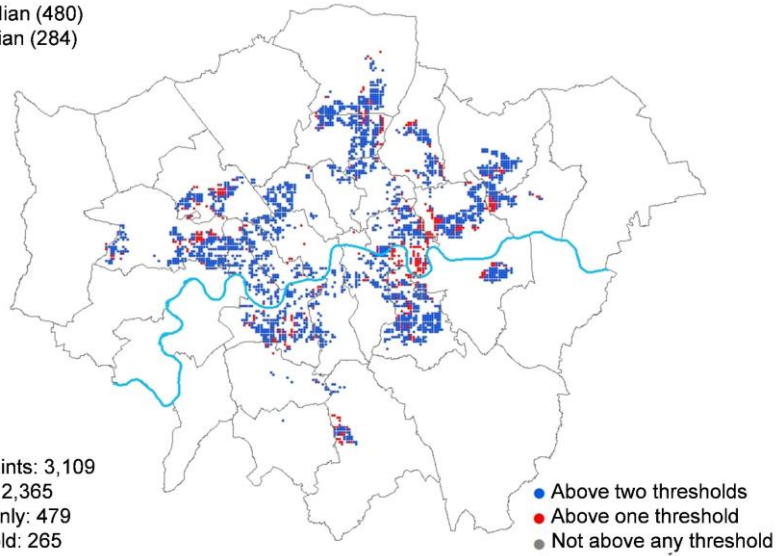
Number of selected points: 3,109
Above two thresholds: 1,120
Above one threshold only: 1,989
Not above any threshold: 0

● Above two thresholds
● Above one threshold

Sensitivity of local population to environmental conditions in the selected points

Age<18 threshold: median (480)
Age>65 threshold: median (284)

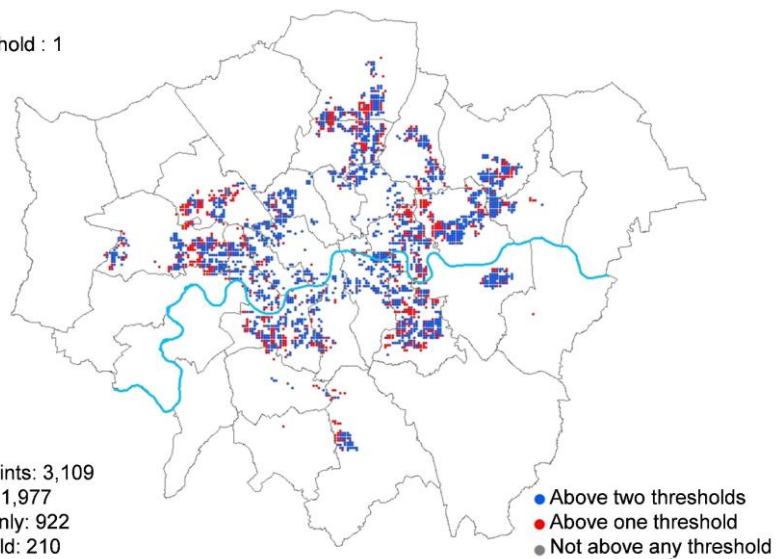
Number of selected points: 3,109
Above two thresholds: 2,365
Above one threshold only: 479
Not above any threshold: 265



Sensitivity of local land uses to environmental conditions in the selected points

Schools threshold: 1
Health institutions threshold : 1

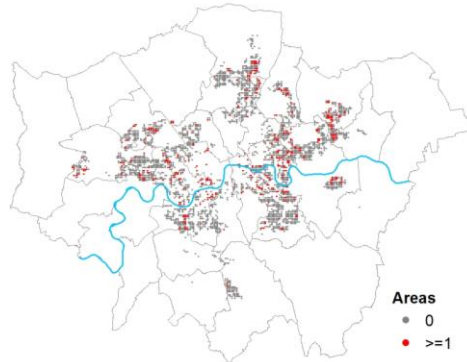
Number of selected points: 3,109
Above two thresholds: 1,977
Above one threshold only: 922
Not above any threshold: 210



Car parks OR industrial/business areas in the selected points

Indicator	Area	Data source
Number of car parks	200m	Ordnance Survey points of interest Category: 10540736 Parking
Number of industrial estates and business areas	200m	Ordnance Survey points of interest Category: 07410531 Business parks and industrial estate

Number of car parks or business areas/industrial estates within 200m



Number of selected points (without applying environmental conditions) with 1+ area: 457

Conclusions

The user and wider benefits of urban microhubs based on cargo cycle delivery **depend on location**

(demand, suitability of cycling infrastructure, availability of labour, effects of shifting from conventional vehicles to cargo cycles)

Considering these factors, the most suitable areas in London for the deployment of a microhub are those **surrounding central London** or local centres

Further information

Ancaea and Jones (2023) Developing low-carbon freight microhubs in London - Principles, benefits and locational analysis.

UCL Centre for Transport Studies

<https://discovery.ucl.ac.uk/id/eprint/10168561>



Sister report by

Centre for London

Urban logistics hubs: what are London's needs?

<https://centreforlondon.org/publication/urban-logistics-hubs>



This research was supported by

