London City Airport

Master Plan - Surface Access

Technical Report

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Executive Summary

The following technical report describes the assessment undertaken to test the effects of growth at London City Airport (LCY) to 11 million passengers per annum by 2035 on the surface transport network around the Airport.

The assessment has tested the impact of demand growth and changes in mode share into the future and how these will affect: the capacity of the highway network around the Airport; the Airport forecourt; car parking at the Airport; as well as line loading and the performance of the DLR station.

Key findings of this assessment with respect to the Draft Master Plan to 2035 are as follows:

- Analysis shows that all road junctions in the vicinity of the Airport perform below capacity assuming 2035 demand and future year mode share targets.
- The CADP forecourt provides sufficient drop-off and pick-up spaces to accommodate 2035 demand, owing to changes in peak period demand patterns and a shift to more sustainable transport modes.
- Even when considering a 70% increase in passenger demand to 2035 and a doubling of staff at the Airport, car parking can be limited to a 20% increase when compared to CADP. However, this is dependent on LCY working with partners and stakeholders, including TfL, to help deliver public transport enhancements such as increased frequencies and earlier services on the DLR. With these enhancements, an increase of 250 parking spaces is required, equivalent to a total of 1,500 spaces and these could be provided by modifying the single decked car park to multi-storey use.
- Even when considering a 72% mode share by DLR, London City Airport DLR Station can still accommodate 2035 demand at an appropriate Level of Service.

The capacity assessment shows that, once CADP and other planned transport upgrades (DLR and Crossrail) are completed, there will be sufficient capacity on the DLR, the LCY forecourt and on the local road network to accommodate up to 11 million passengers per year by 2035.

Even so, LCY is committed to mitigating the effects of surface access and to promoting sustainable and cleaner, healthier travel. As such, the Draft Master Plan also considers the following:

- Additional car parking spaces will have electric charging facilities as part of the airport's commitment to reduce its CO2 emissions. This is in line with the London Plan, which states that 1 in 5 parking spaces will need to provide an electrical charging point in the future to encourage the uptake of EVs.
- LCY will work with and support TfL to improve bus services in the area to complement the current 473 and 474 bus services, in particular along North Woolwich Road and as part of the Silvertown Tunnel project. LCY is also keen to explore the feasibility of a Royal Docks/Silvertown bus shuttle service with other partners in the Royal Docks, potentially running North Woolwich

Road, Albert Road, Woolwich Manor Way and Victoria Dock Road. This type of service could provide wider connectivity benefits for the local area.

- In terms of walking and cycling, LCY supports and is contributing to a network of higher quality walking and cycle routes for the area. As part of this Draft Master Plan, LCY will provide an additional 103 cycle parking spaces (from 72 to 175) and is looking to enhance the footpath and cycleway infrastructure into the Airport from the west along A112 Connaught Road, to augment the London Borough of Newham's cycle strategy.

1 Introduction

This technical report describes the assessment undertaken to test the effects of growth at LCY to 11 million passengers per annum by 2035 on the surface transport network around the Airport.

The assessment has tested the impact of demand growth and changes in mode share into the future and how these will affect: the capacity of the highway network around the Airport; the Airport forecourt; car parking at the Airport; as well as line loading and the performance of the DLR station. This technical analysis has informed the surface access section of the Draft Master Plan.

The components of the surface access analysis presented in this report include:

- **Landside demand model** – a spreadsheet-based assessment tool used to generate passenger and staff demand by mode and also the number of vehicles using the forecourt at peak times (as per Section 3.3)
- **Highway and junction capacity assessment –** the effect of airport growth on the highway network has been assessed using local traffic models (Linsig and Junctions9), as per Section 4.
- **Forecourt sizing and layout** – the forecourt will be the fulcrum for private car, taxi and private hire pick-up and drop-off demand, buses, as well as walking and cycling modes. Using the landside passenger demand model, Arup has estimated forecourt requirements to 2035, as reported in Section 5.
- **Parking by passengers and staff** – an assessment of parking demand and provision in Section 0.
- **Bus provision** for the Airport is described in Section 7.
- **DLR line and station capacity** – demand for the DLR has been estimated using the landside passenger demand model based on peak hour passenger and employee demand and mode share. A dynamic model has been used to assess the Level of Service implications for the station and potential line loading impacts, as per Section 8.
- **Crossrail connection** – in terms of Crossrail, LCY is actively pursuing a multi-staged approach to maximising the benefit and connectivity associated with the Elisabeth Line. This includes acknowledgement of and support for a TfL bus service between the Airport and Custom House / Excel Arena; promoting the Stratford Crossrail/DLR interchange; supporting enhancements to the Poplar/Canary Wharf interchange being explored by Canary Wharf Group and TfL; as well as furthering technical feasibility and business case support for a dedicated station for Silvertown to the south of the airport, potentially as part of the Crossrail to Ebbsfleet extension – as per Section 9.
- **Walking and cycling networks** – walking and cycling networks are described in Section 10

Conclusions and next steps, alongside suggested mitigation measures, are provided in Section 11.

2 Engagement and Site Visits

Arup has engaged with LCY through development of the surface access assessment. We have also undertaken a number of site inspections to familiarise ourselves with peak period conditions. In addition, Arup has also engaged with GLA and TfL alongside LCY at various meetings.

A chronology of key meetings and workshops is provided below:

- Inception meeting on surface access and site inspection on 25th June 2018
- An early engagement and information session with GLA and TfL on 8th August 2018 at City Hall to describe the context for the Draft Master Plan.
- Site inspection between 06:30 and 08:00 on 24th September 2018, in particular to witness first-hand the current congestion in the forecourt as well as the performance of the western Hartmann Road junctions during the morning peak. Passenger behaviour in the DLR station was also observed and recorded.
- A Draft Master Plan: Option Evaluation Workshop held at Civil Aviation House on 15th October 2018. Key points raised in relation to surface access at the workshop included clarification of forecourt estimates and how these had been derived (as described in Section 5 of this report) as well as comments on indicative spatial layouts of the forecourt.
- An information exchange meeting with TfL on 24th October 2018 – this meeting was set up to establish from TfL assumptions underpinning the modelling in the Mayor's Transport Strategy (MTS).
- This final version of the technical report includes additional work related to buses, walking and cycling in line with the recently published Draft Master Plan.

3 Landside Demand Model

3.1 2035 Demand

Airside passenger demand data to 2035 has been provided by York Aviation and has been used for all surface access assessment work in this report.

The initial assessment was based on the original forecast of 10.4 million passengers per annum by 2035 but has also considered a higher peak forecast of up to 11 million passengers per annum by 2035. This latter scenario is now the agreed demand scenario for this Draft Master Plan.

For reference, projected CADP demand was equivalent to 6 million passengers per annum by 2025.

3.2 Surface Access Scenarios

The following surface access scenarios were tested:

- CADP demand and mode share for AM and PM to be the reference case for the capacity analysis.
- 2035 demand at:
    - Current year (2018) mode share.
    - CADP mode share (2025).
    - 2035 Future Year mode share.

    Mode shares are detailed in Section 3.3.2. The rationale for testing 2035 demand at different mode shares was to assess the mode shift required to achieve certain levels of performance on the transport network at 11 million passengers per annum.

3.3 Landside Demand Model

Arup has built a landside demand model which takes the airside demand generated by York Aviation and turns this into landside demand for both passengers and staff/employees.

It then splits this demand by mode and then into vehicles in order to inform demand/capacity analysis of surface access infrastructure and the forecourt.

The landside demand model forms the basis of all of the demand/capacity assessment undertaken by Arup providing a single and consistent source of demand data for testing.

The inputs to the landside demand model include the following:

- Airside demand generated by York Aviation.
- Landside profiles to turn airside passengers into passengers on the surface transport network i.e. reflecting that departing passengers will be travelling to the airport over a period of time before flight departure and arriving

passengers will spend time being processed through the terminal before arriving landside to take transport from the airport. These profiles are described in Section 3.3.1.

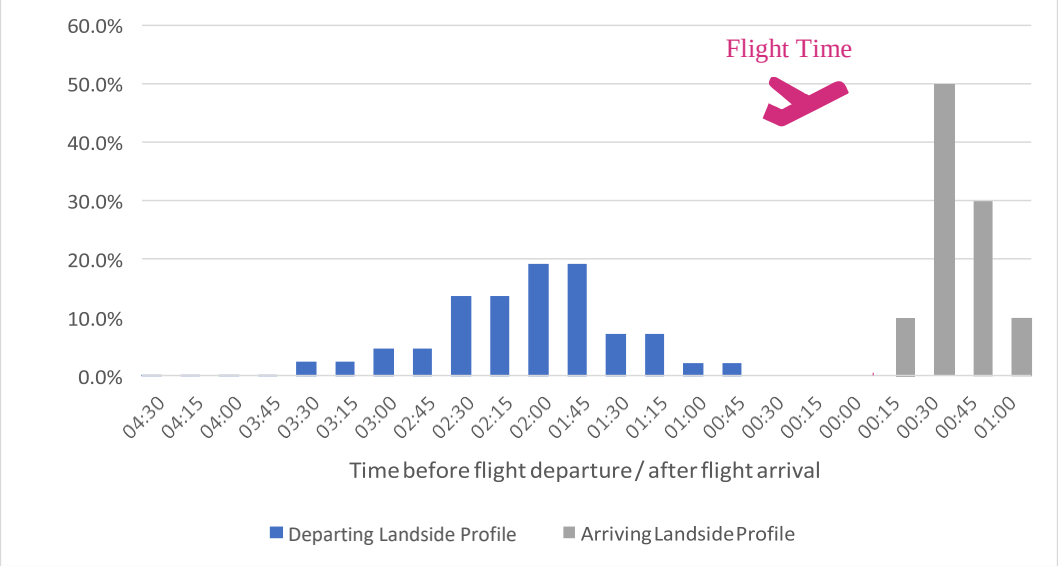
- Passenger to staff ratio – we have used the same passenger to staff ratio as the CADP Transport Assessment (TA) which is 9%. Staff flows are assumed to be tidal – into the airport in the AM peak and out of the Airport in the PM peak as agreed with LCY.
- Mode shares have been provided by LCY. These mode share assumptions are described in more detail in Section 3.3.2.
- Vehicle capacities – have been assumed using typical planning metrics, documented capacities and data from LCY as per Section 3.3.3
- Dwell times – the number of vehicles in the forecourt at any one time is driven by length of dwell. Dwell time assumptions are described in Section 3.3.4.

3.3.1 Landside Profiles

In terms of landside profiles, LCY provided the departure profile for CADP, based on Summer 2016 data collection. This shows that around 65% of departing passengers show up at the airport between 2.5 hours and 1.5 hours before departure.

Arup has made an assumption with regard to the arrivals profile with all passengers exiting the terminal within 1 hour after flight arrival. This is based on Arup experience of LCY rather than any surveyed data. It includes a peak of 50% of all arrivals reaching the landside between 15 and 30 minutes after flight arrival which is considered conservative.

Figure 1: Landside Departure and Arrival Profiles



3.3.2 Mode Shares

LCY has provided a range of actual and mode share targets to Arup for both passengers and employees, including current mode share (2018), CADP mode share and 2035 Future Year mode share.

In order to be robust, Arup has tested all of these different mode shares in its landside demand model and in capacity testing.

Table 1: Passenger Mode Shares

	2018 Mode Split	**CADP Mode Split**	**2035 Future Mode Split**
DLR	64%	70%	72%
Bus	1%	3%	5%
Walk	<1%	1%	1.5%
Cycle	<1%	1%	1.5%
Black Taxi	4%	3%	3%
Minicab	12%	11%	9%
Ride Sharing Service (Uber)	6%	5%	4%
Car (Parking and drop off / pick	12%	5%	3%
Motorcycle	<1%	<1%	<1%
Transfer	1%	1%	1%
Total	**100%**	**100%**	**100%**

Staff mode shares have been adjusted for future years to reflect a higher proportion of staff and employees arriving at the airport by sustainable modes in line with LCY's targets.

Table 2: Staff Mode Shares

	2018 Mode Split	CADP Mode Split	2035 Future Mode Split
DLR	29%	33%	37%
Taxi / Mini Cab / Shuttle	1%	2%	3%
Car	57%	40%	25%
Car with Passenger	1%	8%	13%
Bus	6%	7%	9%
Walk	2%	4%	5%
Cycle	3%	5%	7%
Motorcycle	<1%	<1%	<1%
Other	<1%	<1%	<1%
Total	**100%**	**100%**	**100%**

3.3.3 Vehicle Occupancy

The passenger and staff vehicle occupancies used in the landside demand model are as per Table 3.

Table 3: Vehicle occupancy

Mode	Occupancy
Private Hire Vehicle	1.3
Private Car	1.0
Bus	20.0
Taxi	1.0

3.3.4 Dwell Times

Vehicle dwell times used in the landside demand model are as per Table 4. When considering forecourt sizing, Arup has also sensitivity tested data provided by LCY, as described in Section 5.

Table 4: Dwell times

Mode	Dwell (mins)
Private Hire Vehicle	3.0
Private Car – Forecourt	3.0
Private Car - Rental / Car Park	Variable
Bus	6.0
Taxi	3.0

4 Highway and Junction Assessment

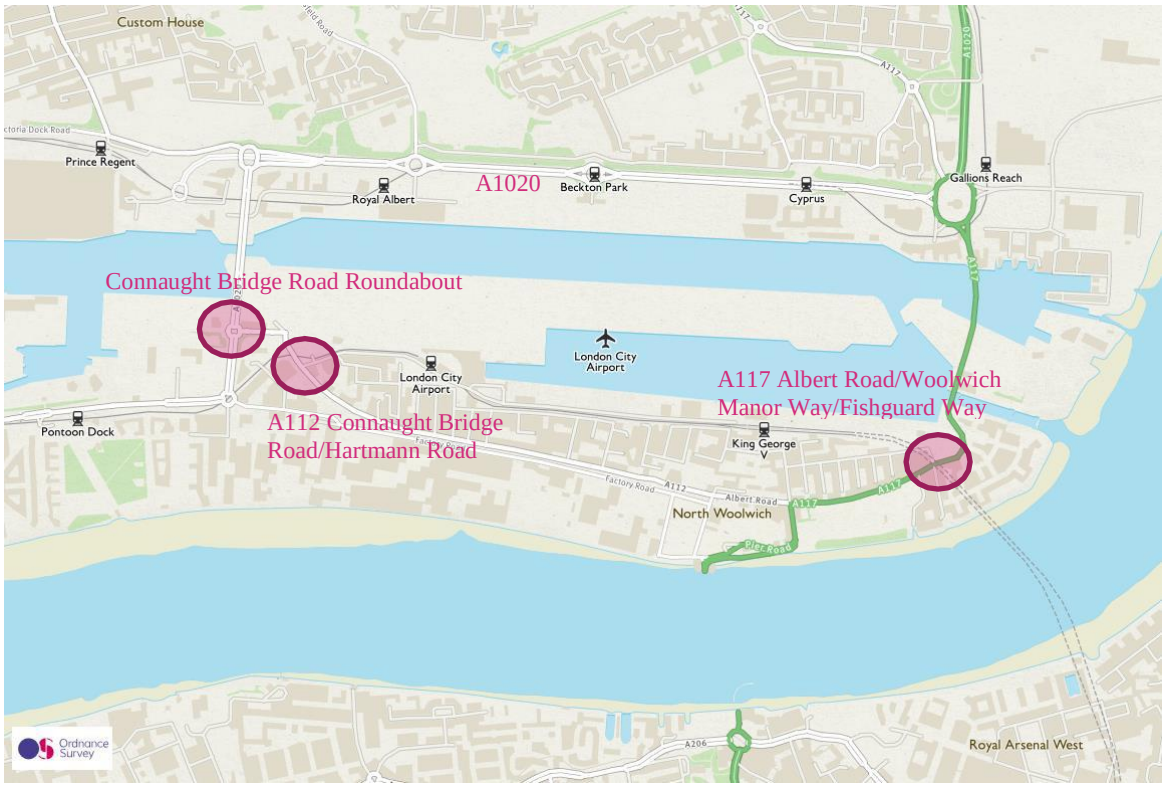
4.1 Scope of Assessment

Arup has tested the following three highway junctions in Junctions9 and LinSig as follows:

- Connaught Bridge Road Roundabout (Junctions9);
- A112 Connaught Bridge Road/Hartmann Road (LinSig); and
- A117 Albert Road/Woolwich Manor Way/Fishguard Way (LinSig).

In the absence of survey data for the wider network, Arup has also referenced the Transport Assessment in the ABP Development planning application to understand potential growth impacts on the wider highway network around LCY, in particular along the A1020 between Connaught Bridge Road and Gallions Reach Roundabout.

Figure 2: Highway network around LCY, including junctions analysed



4.2 Survey Data

Demand has been taken from 2015 survey information used as part of the CADP planning application. This comprises Manually Classified Counts undertaken by AXIOM Traffic Limited in May 2015.

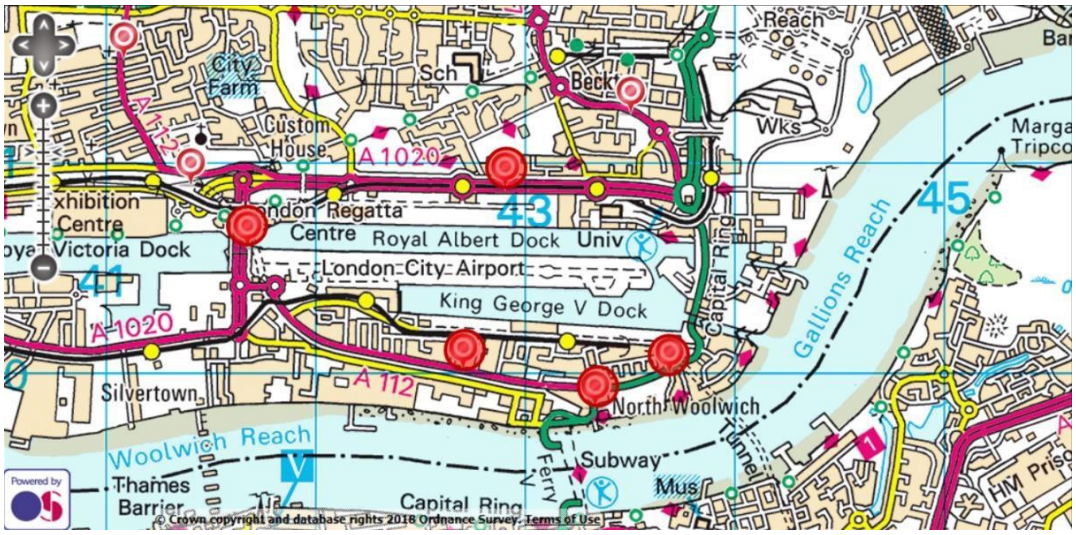
4.3 Background Traffic

4.3.1 Overview

Background traffic has been estimated from the AXIOM survey data by removing movements into / out of the airport using the passenger and staff distribution data in the CADP TA and the *Planning Feasibility Review: Surface Access*, November 2016.

In order to understand how background traffic might be growing and to estimate future traffic levels, analysis has been undertaken on Average Annual Daily Traffic (AADT) at five DfT count points around the Airport.

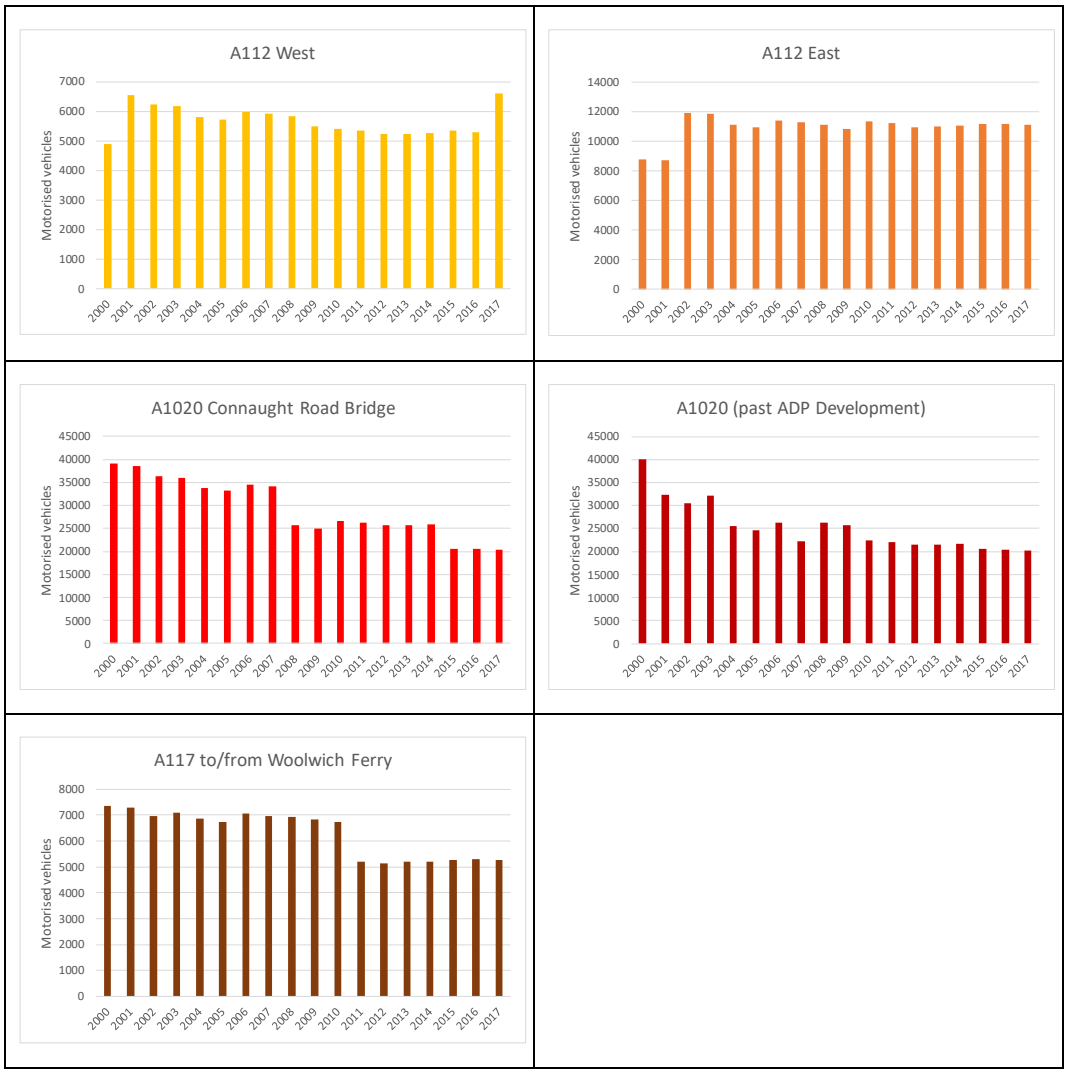
Figure 3: DfT Count Points around LCY



Analysis indicates that traffic has remained either at the same level or reduced since 2000, as shown in Figure 4. Given this context and noting that the Mayor's Transport Strategy (MTS) envisages 80% of trips by sustainable modes by 2041, the surface access assessment therefore assumes no growth in background traffic for 2035 for the capacity analysis.

Having discussed this approach with TfL in October 2018, TfL indicated that it would expect some growth at least short-term, reflecting the development which is taking place in East London and in particular Royal Docks/Silvertown. TfL indicated that it would expect 5% growth in traffic on the road network over the next 5 years, given more people living and working the area. However, the assessment for this Draft Master Plan is longer term, out to 2035. The short-term traffic growth envisaged by TfL for this area is likely to be negated by the mode share targets in the MTS by 2035. However, for any planning application, strategic modelling is recommended to fully evaluate and understand the level of background traffic and assignment in the area.

Figure 4: Background traffic levels around LCY



4.3.2 Cumulative Impacts

APB Royal Docks Development

In terms of cumulative impacts on the A1020 and surrounding highway network, the planning application for the ABP Royal Docks development shows 2028 traffic flows with the development as per Table 5.

Table 5: ABP Royal Docks Transport Assessment, 2028 two-way flows

	2028 AM Peak Hour 2-way	**2028 PM Peak Hour 2-way**
Connaught Bridge Road	1475	2444
Royal Albert Way (East)	1614	2638
Royal Albert Way (West)	1549	2510

The Design Manual for Roads and Bridges (DMRB) states that two lane carriageways such as Connaught Bridge Road and Royal Albert Way can carry

over 3000 vehicles per hour in each direction[1], indicating spare capacity for growth at LCY into the future to 2035.

Silvertown Quays

The analysis includes development traffic from committed schemes e.g. AM and PM peak hour development flows for Silvertown Quays have been taken from the CADP TA.

4.3.3 Next steps

In the event that detailed proposals and a planning application are brought forward, building on this LCY Draft Master Plan, the highway network and specifically key junctions around LCY would need to be surveyed.

Strategic assignment modelling and potentially local capacity modelling would need to be built on observed flows to satisfy TfL and other stakeholders and to demonstrate future transport effects.

In particular, resilience in relation to disruption on the A13 would need to be considered, though it is noted that the performance A13 is a wider issue related to traffic in this part of London.

4.4 Airport Traffic

4.4.1 Vehicle Trips

The landside demand model generates passengers, employees and vehicles related to arriving and departing schedule information. However, this does not reflect the number of vehicle trips to or from the Airport for the junction assessment.

For example, a kiss-and-fly passenger may only generate one vehicle entering into the forecourt to drop that passenger off. However, once that departing passenger has been dropped off, that same vehicle will then need to make a second trip to exit the forecourt – so there is only one vehicle but two trips. This is important when considering all the different vehicle movements into and out of the Airport, as shown in Figure 5.

For passenger pick and drop-off, the modelling assumes two trips as per the example above.

Passengers and staff to or from the car park are assumed to be one trip e.g. an arriving passenger walks to the car park, picks up a vehicle and this vehicle equates to one trip exiting the Airport.

For taxis dropping off, the modelling assumes 1.5 trips as a taxi may choose to exit (i.e. two trips) or go to the rank and queue to pick-up an arriving passenger (i.e. one trip as the vehicle is not exiting the Airport straight away). This approach is also true of private hire.

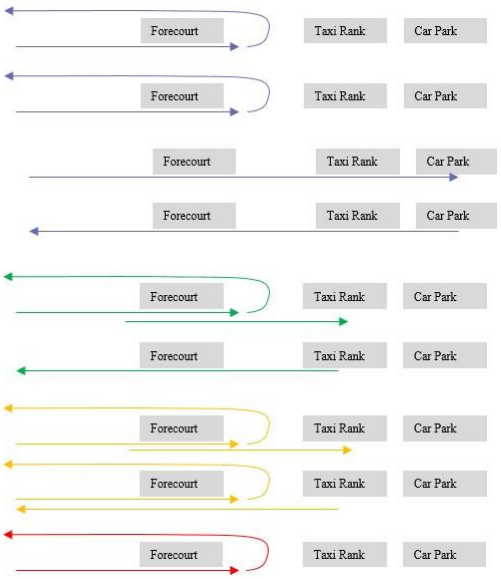
[1] Dual carriageway, generally 40mph.

Taxis picking up are assumed to comprise one trip, coming from the rank, through the forecourt and then out.

Trips into the Airport are split 70:30 from west and east in line with LCY data on catchment areas. This distribution and assignment would need to be confirmed by strategic modelling for any planning application. An assessment of a more balanced split has also been assessed, as per Section 4.5.4

Figure 5: Vehicle trips into and out of the Airport

Passenger Drop-off	- 2 trips (in/out)
Passenger Pick-Up	- 2 trips (in/out)
Passenger/staff to Car Park	- 1 trip (in)
Passenger/staff from Car Park	- 1 trip (out)
Taxi Dropping-Off	- 1.5 trips (in/out)
Taxi Picking-Up	- 1 trip (out)
Private Hire Dropping Off	- 1.5 trips (in/out)
Private Hire Picking Up	- 1.5 trips (in/out)
Bus	- 2 trips (in/out)



4.4.2 Peak Hours

The following peak hours have been assessed:

- 08:00 – 09:00 and 17:00 – 18:00 for comparison with CADP.
- 07:45 – 08:45 and 16:45 – 17:45 which are the 2035 landside peak hours for this Draft Master Plan based on the updated flight schedules.

4.5 Results

The results tables in this section show Degree of Saturation for each junction assuming 2035 demand. Degree of Saturation (DoS) is a measure of demand against capacity. 85% is typically regarded as likely to mean traffic congestion, although anecdotally many junctions in London operate over 90%. Over 100% is likely to mean a breakdown in flow and traffic queuing.

4.5.1 Connaught Bridge Road Roundabout

Connaught Bridge Roundabout, also known as the Athena Roundabout, is located to the west of the airport. It has four arms, with the airport served via the eastern arm of the junction, adjacent to the airside boundary and Airport's Jet Centre.

Figure 6: Connaught Bridge Road Roundabout

4.5.1.1 2035 Results

The table shows the DoS at Connaught Bridge Road Roundabout for 2035 demand at current, CADP and future mode shares. The current mode share has the least public transport use and is therefore the most conservative. The future mode share reflects LCY's 2017 ASAS.

Table 6: Connaught Bridge Road Roundabout, 2035 Results from Junctions9, DoS

A112 Connaught Bridge Road Roundabout	AM			PM		
Approach	2035 DoS			2035 DoS		
	Current	CADP	Future	Current	CADP	Future
Connaught Bridge Road North	< 80%	< 80%	< 80%	< 80%	< 80%	< 80%
Connaught Bridge Road East	< 90%	< 85%	< 80%	< 80%	< 80%	< 80%
Connaught Bridge Road South	< 80%	< 80%	< 80%	< 80%	< 80%	< 80%
Connaught Bridge Road West	< 80%	< 80%	< 80%	< 80%	< 80%	< 80%

The analysis shows the junction performing just over capacity on the eastern arm in the AM peak assuming the current Airport mode share at 2035. However, assuming CADP mode shares or the Future Year mode share that LCY is targeting, the junction is shown to perform at or below capacity without mitigation. Indeed. conditions are improved with the Future Year mode share such that the DoS is less than 85% for all arms of the roundabout. Accordingly, it can be concluded that no mitigation is required and therefore no changes are proposed to the junction as a result of the 2035 Draft Master Plan.

4.5.2 A112 Connaught Rd / Hartmann Rd

A112 Connaught Road / Hartmann Road is a junction located to the west of the airport. Hartmann Road connects directly to the Airport's forecourt operation.

Figure 7: A112 Connaught Rd / Hartmann Rd Junction

4.5.2.1 2035 Results

The table shows the DoS at the A112 Connaught Road / Hartmann Road Junction for 2035 demand at current, CADP and Future Year mode shares.

Table 7: A112 Connaught Road / Hartmann Road Junction, 2035 Results from LinSig, DoS

A112 Connaught Road / Hartmann Road Junction	AM			PM		
Approach / DoS	2035 DoS			2035 DoS		
	Current	CADP	Future	Current	CADP	Future
Connaught Road North	< 80%	< 80%	< 80%	< 85%	< 80%	< 80%
Hartmann Road	< 85%	< 85%	< 80%	< 85%	< 80%	< 80%
Connaught Road South	< 85%	< 80%	< 80%	< 80%	< 80%	< 80%

It can be seen from Table 7 that the junction is performing at or below capacity without mitigation for all mode share scenarios. Accordingly, it can be concluded that no mitigation is required and therefore no changes are proposed to the junction as a result of the 2035 Draft Master Plan.

4.5.3 A117 Albert Rd / Woolwich Manor Way / Fishguard Way

A117 Albert Rd / Woolwich Manor Way / Fishguard Way is a junction located to the east of the airport. Hartmann Road forms the western arm into the junction and connects the junction directly to the Airport's forecourt operation.

Figure 8: A117 Albert Rd / Woolwich Manor Way / Fishguard Way

4.5.3.1 2035 Results

Table 8 shows the DoS at the A117 Albert Rd / Woolwich Manor Way / Fishguard Way junction for 2035 demand at current, CADP and Future Year mode shares.

Table 8: A117 Albert Rd / Woolwich Manor Way / Fishguard Way, 2035 Results from LinSig, DoS

A117 Albert Road / Woolwich Manor Way / Fishguard Way	AM			PM		
Approach / DoS	2035 DoS			2035 DoS		
	Current	CADP	Future	Current	CADP	Future
Woolwich Manor Way	< 90%	< 80%	< 80%	< 80%	< 80%	< 80%
Fishguard Way	< 80%	< 80%	< 80%	< 80%	< 80%	< 80%
Albert Road	< 80%	< 80%	< 80%	< 80%	< 80%	< 80%
Hartmann Road	< 80%	< 80%	< 80%	< 80%	< 80%	< 80%

It can be seen that, in 2035, the junction is performing at or below capacity without mitigation for the CADP and future year mode share scenarios. Accordingly, it can be concluded that no mitigation is required and therefore no changes are proposed to the junction as a result of the 2035 Draft Master Plan.

4.5.3.2 TfL Proposed Roundabout

It is understood that TfL proposes a roundabout for this junction though it is understood that currently this junction arrangement does not have the full support of all stakeholders, including London Borough of Newham.

Initial modelling of the roundabout in Junctions9 indicates that the roundabout will operate below capacity to 2035, though we would need to confirm the exact configuration of the roundabout with TfL to be certain of this.

4.5.4 Balanced Scenario

Arup has also undertaken an assessment of balanced traffic flows assuming drop-off from the west, and pick-up and car parking movements from the east, for the AM peak only.

At 2035, the modelling indicates that all junctions will perform at or below capacity when considering the CADP and Future Year mode shares.

Table 9: Connaught Bridge Road Roundabout, Balanced Scenario, 2035 Results from Junctions9, DoS

A112 Connaught Bridge Road Roundabout	AM			PM		
Approach	2035 DoS			2035 DoS		
	Current	CADP	Future	Current	CADP	Future
Connaught Bridge Road North	< 80%	< 80%	< 80%	< 80%	< 80%	< 80%
Connaught Bridge Road East	< 80%	< 80%	< 80%	< 80%	< 80%	< 80%
Connaught Bridge Road South	< 80%	< 80%	< 80%	< 80%	< 80%	< 80%
Connaught Bridge Road West	< 80%	< 80%	< 80%	< 80%	< 80%	< 80%

Table 10: A112 Connaught Road / Hartmann Road Junction, Balanced Scenario, 2035 Results from LinSig, DoS

A112 Connaught Road / Hartmann Road Junction	AM			PM		
Approach / DoS	2035 DoS			2035 DoS		
	Current	CADP	Future	Current	CADP	Future
Connaught Road North	< 80%	< 80%	< 80%	< 80%	< 80%	< 80%
Hartmann Road	< 80%	< 80%	< 80%	< 80%	< 80%	< 80%
Connaught Road South	< 80%	< 80%	< 80%	< 80%	< 80%	< 80%
		88s Cycle Time			*88s Cycle Time*	

Table 11: A117 Albert Road / Woolwich Manor Way / Fishguard Way, Balanced Scenario, 2035 Results from LinSig, DoS

A117 Albert Road / Woolwich Manor Way / Fishguard Way	AM			PM		
Approach / DoS	2035 DoS			2035 DoS		
	Current	CADP	Future	Current	CADP	Future
Woolwich Manor Way	< 90%	< 80%	< 80%	< 80%	< 80%	< 80%
Fishguard Way	< 80%	< 80%	< 80%	< 80%	< 80%	< 80%
Albert Road	< 80%	< 80%	< 80%	< 80%	< 80%	< 80%
Hartmann Road	< 85%	< 80%	< 80%	< 80%	< 80%	< 80%
		88s Cycle Time			*88s Cycle Time*	

Whilst wayfinding and signage could be used to encourage this more balanced operation, the 70:30 catchment area split is likely to mean that more frequent users will continue to use the routes into the Airport that they are familiar with. This could potentially lead to some crossover movements on Hartmann Road i.e. someone coming to drop-off a passenger who lives in Dagenham coming in along Hartmann Road from the east to drop-off on the west and then heading back out to the east, rather than coming in from the west.

Strategic modelling and local highway modelling would be required to respectively test the assignment and congestion issues this might cause, and the package of measures which would be most successful at delivering effective rebalancing.

5 Terminal Forecourt

5.1 Forecourt Requirements

5.1.1 CADP Provision

CADP proposes a new and significantly expanded passenger forecourt area to the south and east of an extended passenger terminal, with a 30m wide landscaped vehicle free zone in front of the terminal reflecting ASIAD security requirements.

Forecourt provision, in terms of number of spaces, is shown in the table below.

Figure 9: CADP Forecourt Requirements

	Existing Forecourt	Proposed Forecourt
Car pick-up / drop-off spaces	8	48
Black taxi pick-up spaces	200	336*
Black taxi drop-off spaces	8	10
Bus stops	3	3
Bus stand	1	1

** Total in forecourt, taxi feeder queue and park*

5.1.2 2035 Requirements

When considering forecourt requirements at 2035, analysis indicates numbers lower than CADP provision for private pick-up and drop-off and comparable for taxis, as per Table 12. Note, the combined total of pick-up and drop-off will not necessarily sum to be the combined requirement as the pick-up and drop-off columns align with respective one-way arrival and departure peaks and the combined requirement with the two-way peak.

Table 12: 2035 Forecourt Requirements

2035	PickUp	DropOff	Combined
Private Hire Vehicle	16	14	27
Private Car - Forecourt	9	8	15
All Private Vehicles	**25**	**22**	**42**
Taxi	10	9	17
Bus	1	1	2

5.1.3 Considerations

The above numbers may seem counter-intuitive given growth forecasts to 2035 and indeed these numbers were challenged by LCY at the Draft Master Plan: Option Evaluation Workshop on 15th October 2018. Accordingly Arup and LCY had a further information exchange about the forecourt and, in particular, the assumptions used. LCY shared its analysis of 2035 forecourt requirements.

The key difference between the Arup and LCY analyses are as follows:

- Vehicles entering the forecourt – LCY has tested 32% and 40% of demand entering the forecourt by 2035. When taking the CADP mode share and applying this to 2035 demand, our analysis generates at most 30% of demand into the forecourt. This feels like an appropriate worst case to 2035 given LCY's Future Year mode share aspirations as well as the requirements of the MTS.
- Dwell times – LCY has used drop-off times of 1.32 minutes and pick-up times of 5.0 minutes, whereas Arup's landside demand model uses standard planning dwell time assumptions of 3 minutes for drop-off and pick-up. The analysis in this report assumes standard dwell times from other benchmarks, reflecting that LCY is moving towards a more balanced operation with a greater leisure passenger split.
- When applying the LCY data in the Arup landside model, this gives lower requirements for drop-off and higher requirements for pick up, though the overall quantum of spaces required remains broadly the same.

5.2 Spatial Impacts

Owing to changes in peak period demand patterns and a shift to more sustainable transport modes, the CADP forecourt is therefore estimated to have sufficient capacity to accommodate future demand to 2035, as shown Table 12 above.

- The CADP layout provides for 48 private pick-up and drop-off spaces as compared to a 2035 requirement of 42 spaces.
- 10 taxi pick-up spaces are provided and 10 are required in 2035 (as well as ranking east along Hartman Road for over 300 taxis.
- 10 taxi drop-off spaces as compared to a 2035 requirement for 9 spaces.
- 3 bus bays as compared to a 2035 capacity requirement for 2 bays. A third bay provides for an additional service or bus layover.

In summary, analysis indicates that the significant investment in the forecourt now will be enough to accommodate future demand to 2035.

6 Car Parking

6.1 Demand

LCY provided Arup with commercial projections for car parking demand, both passengers and staff, to 2022. When extrapolating this level of provision to 2035, this generates the potential need for over 2,200 car parking spaces by 2035 as shown graphically in Figure 10. However, these unconstrained demand projections do not reflect LCY's sustainability goals and mode share targets (as described in Section 3.3.2).

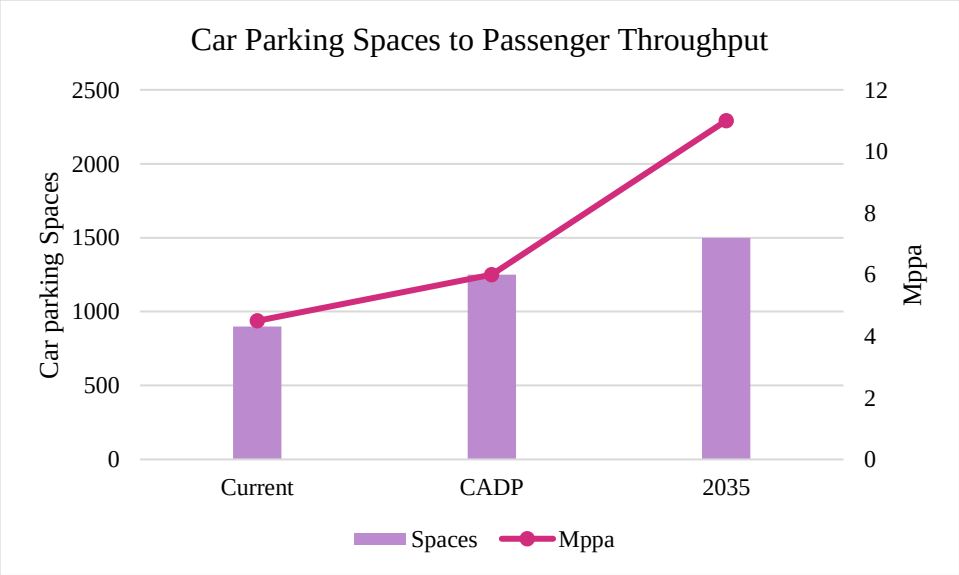
6.2 Provision

Even when considering a 70% increase in passenger demand to 2035 and a doubling of staff at the Airport, car parking can be limited to an additional 250 spaces, or a 20% increase when compared to CADP. However, this is dependent on LCY working with partners and stakeholders, including TfL, to help deliver public transport enhancements such as increased frequencies and earlier services on the DLR.

With these enhancements, an increase of only 250 parking spaces is required, equivalent to a total of 1,500 spaces and these could be provided by modifying the single decked car park to multi-storey use.

As per Figure 10, limiting provision to 1500 spaces is akin to the level of provision required for an airport of only 7 million passengers per annum. Demand through LCY will be 11 million passengers per annum by 2035.

Figure 10: Car Park Spaces as compared to Passenger Throughput (Mppa)



6.3 Electric Vehicles

LCY is actively promoting making road-based modes at the airport more sustainable. This Draft Master Plan is starting from a baseline provision of up to 54 fast charging units for Electronic Vehicles (EVs) as well as capacity for 9 rapid charge units (50KW) for the black taxi feeder park.

The Draft Master Plan will allow for provision of higher levels of charging infrastructure as the market for EVs in London evolves and grows. Accordingly all additional car parking spaces will all have electric charging facilities as part of the airport's commitment to reduce its CO_2 emissions. This is in line with the London Plan, which states that 1 in 5 parking spaces will need to provide an electrical charging point in the future to encourage the uptake of EVs.

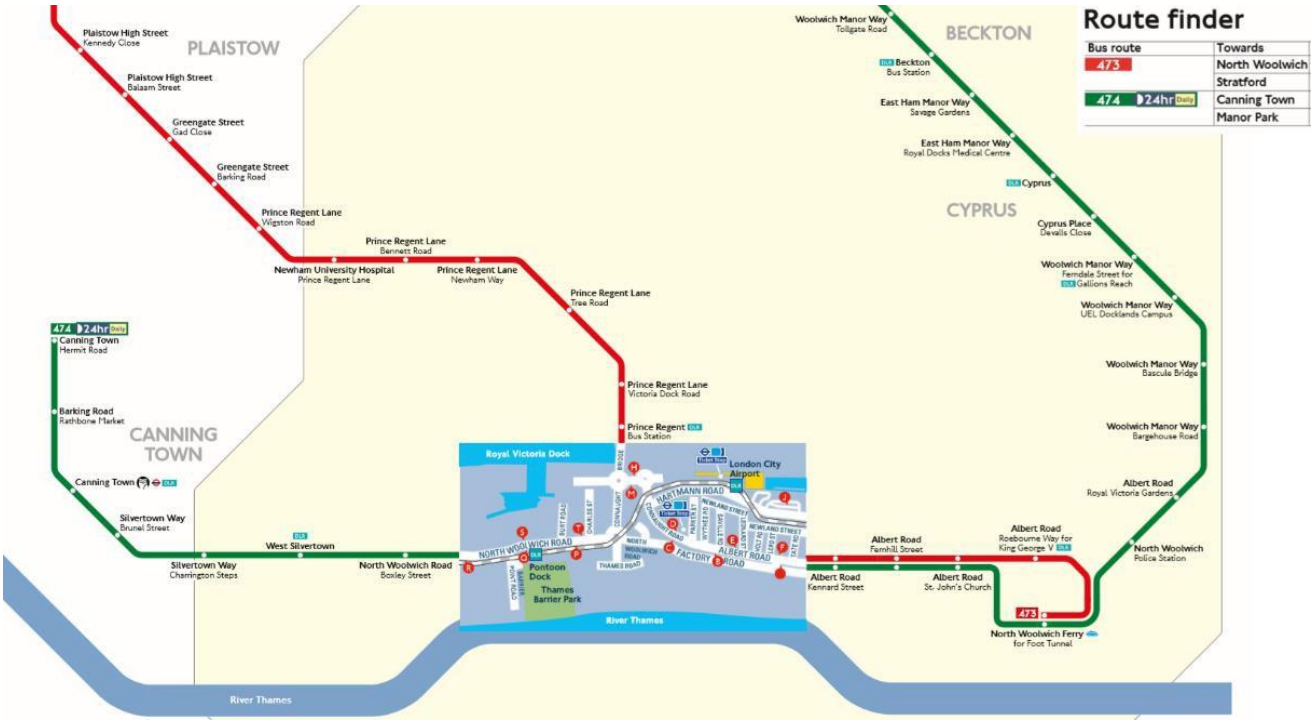
7 Buses

7.1 Current Bus Services

The Airport is currently served by two bus routes:

- The 473, running from North Woolwich to Stratford every 9 to 15 minutes; and
- The 24 hour 474 bus service, running from Canning Town to Manor Park, generally every 10 to 15 minutes.

Figure 11: Extract from TfL Bus Spider Diagram for London City Airport



Passenger mode share by bus is currently low at around 1%, with DLR providing routes into the city and higher frequencies which better match with passenger requirements.

However, bus mode share for staff is much higher at 6% and LCY is supportive of measures to increase bus mode share, potentially up to 9% or more of staff trips into the future.

Both of the current bus services provide a public transport alternative to car for those employees starting on early shifts at the Airport, with the first 473 bus service from 04:25 (to 00:15) and the 474 running 24 hours.

7.2 Rerouting of 474 Bus for Crossrail

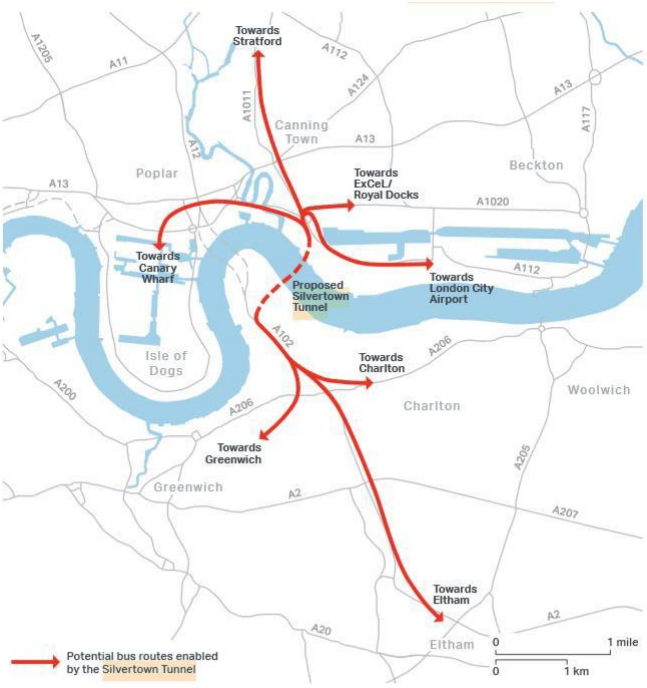
As part of delivering Crossrail, TfL has committed to re-routing the 474 bus service. The 474 will still run between Canning Town and Manor Park, serving North Woolwich and East Ham. However, when Crossrail opens, the revised bus service will serve Custom House and Keir Hardie Estate rather than North Woolwich Road. The 330 bus service will be rerouted to serve North Woolwich Road to make up for the change to the 474 routing.

With a bus service connecting to Custom House and operating approximately every 10 minutes, it is estimated that the 474 service could provide for more than 10% mode share to LCY by 2035.

7.3 Silvertown Tunnel – Additional Bus Service

LCY understands and supports TfL providing additional bus services along North Woolwich Road and into the local area as part of the Silvertown Tunnel project. The exact routing for these services has yet to be defined but forms part of the 2018 MTS.

Figure 12: Potential new routes enabled by the Silvertown Tunnel Project, Mayor's Transport Strategy



7.4 Royal Docks Shuttle

As the Silvertown Quays development takes shape alongside more mature developments in the Royal Docks, LCY will look to support and contribute towards a Royal Docks/Silvertown bus shuttle service, potentially running North Woolwich Road, Albert Road, Woolwich Manor Way and Victoria Dock Road. This type of service could provide wider connectivity benefits for the local area.

8 DLR Station

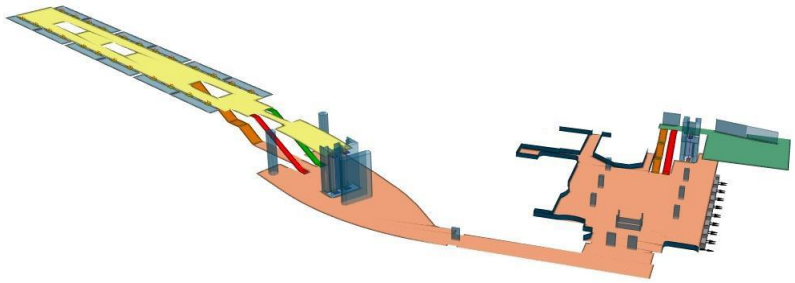
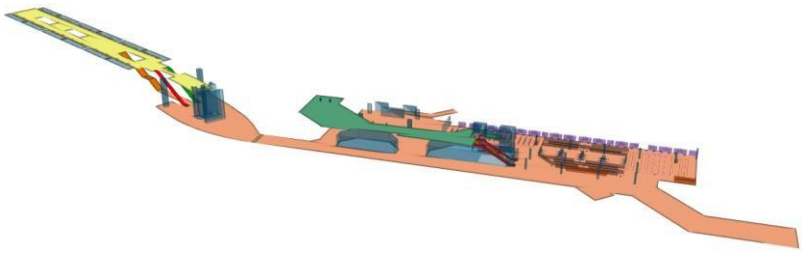
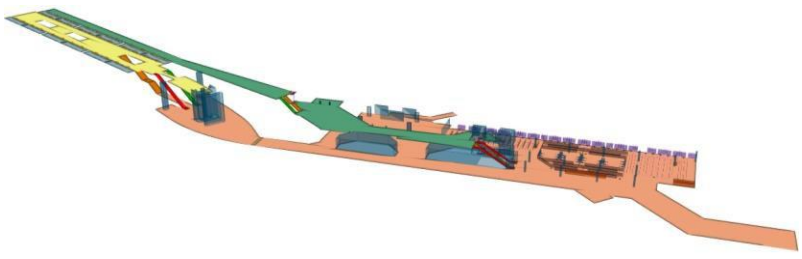
An assessment of crowding on the DLR and in the London City Airport DLR station has been undertaken using a dynamic pedestrian simulation tool, MassMotion.

8.1 Inputs and Assumptions

8.1.1 Station Layout

The DLR Station has been assessed in terms of three configurations – existing, CADP layout (i.e. with terminal changes) and with an additional DLR platform, a potential option to better integrate the station and terminal. These are shown in Figure 14.

Figure 13: London City Airport DLR Station

The existing station layout	
Changes to the terminal layout assuming CADP	
With a third DLR platform to the north for use by alighting passengers without bags only	

8.1.2 Mode Share

The station and the capacity of DLR train services has been tested to 2035 using a range of mode share assumptions, up to 72% of passengers by DLR.

8.1.3 Line Loading

The line loading assessment includes TfL 2026 line load data as per the CADP TA and as provided in Figure 17. It is likely that this data predates Crossrail being a committed scheme and it is noted that the latest MTS shows lower line loadings, with Crossrail relieving peak direction demand on the DLR past London City Airport, as discussed later in Section 8.3.

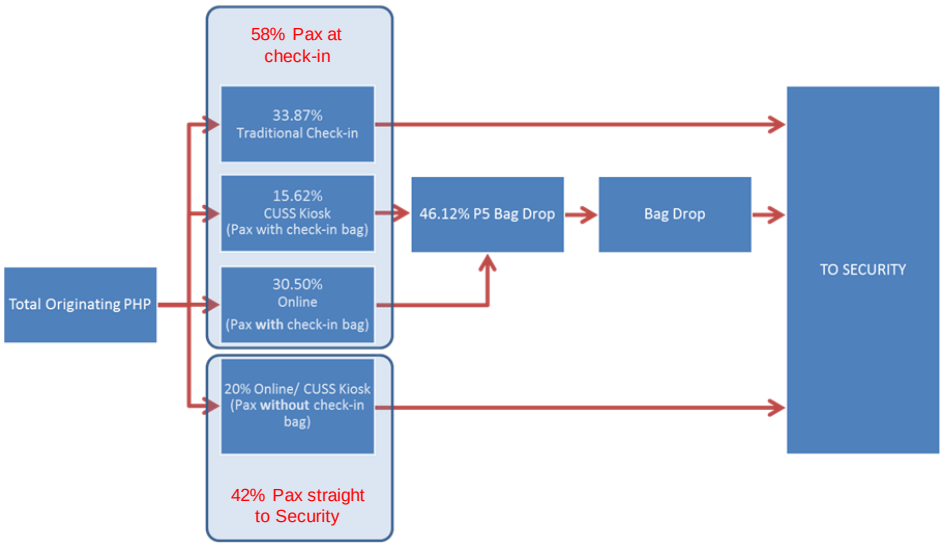
Figure 14: London City Airport – DLR Line Loading

Link	DLR Passengers
Canning Town → West Silvertown	4,268
West Silvertown → Pontoon Dock	4,110
Pontoon Dock → London City Airport	1,669
London City Airport → King George V	843
King George V → Woolwich Arsenal	923
Woolwich Arsenal → King George V	2,191
King George V → London City Airport	2,548
London City Airport → Pontoon Dock	3,919
Pontoon Dock → West Silvertown	5,284
West Silvertown → Canning Town	5,799

8.1.4 Passenger Types

The passenger mix will influence how the DLR station is used. Modelling reflects a balanced scenario of 58% passengers using check-in and 42% heading straight to security, as per Figure 15.

Figure 15: Passenger Mix - Balanced Check-In Scenario (58:42)



In terms of the modelling results, a higher proportion of passengers going straight to security increases use of a potential third platform and would therefore improve conditions in the DLR station if a third platform were to be provided.

8.1.5 Escalators, Stairs and Lifts

Based on site observations, passengers using the London City Airport DLR station predominantly use escalators for access and egress. For the purposes of modelling, it is assumed that 20% of passengers with check-in baggage will use a lift, whilst the remaining 80% will use the escalator. This has been applied to both CADP and 2035 datasets.

A maximum flow rate of 60 passengers/minute is assumed on escalators i.e. all passengers standing on the escalators, which aligns with site observations.

Current stair usage is low and is typically in response to queuing at the escalator.

Figure 16: DLR Station – Escalator queue (forming on left) and minimal stair usage

Lift usage was low on the days when observations were made, potentially owing to the business peaks observed. There could potentially be an impact on lift usage and capacity at the DLR station with higher leisure use in the future. This will need to be monitored subject to the passenger mix, bags-per-passenger ratios and destinations served from LCY.

Some crowding occurs at the eastern end of westbound platform i.e. the platform for DLR services into the city, in particular in the AM peak. There is some platform "clutter" but also the position of the stairs creates localised narrowing of the platform which exacerbates this congestion.

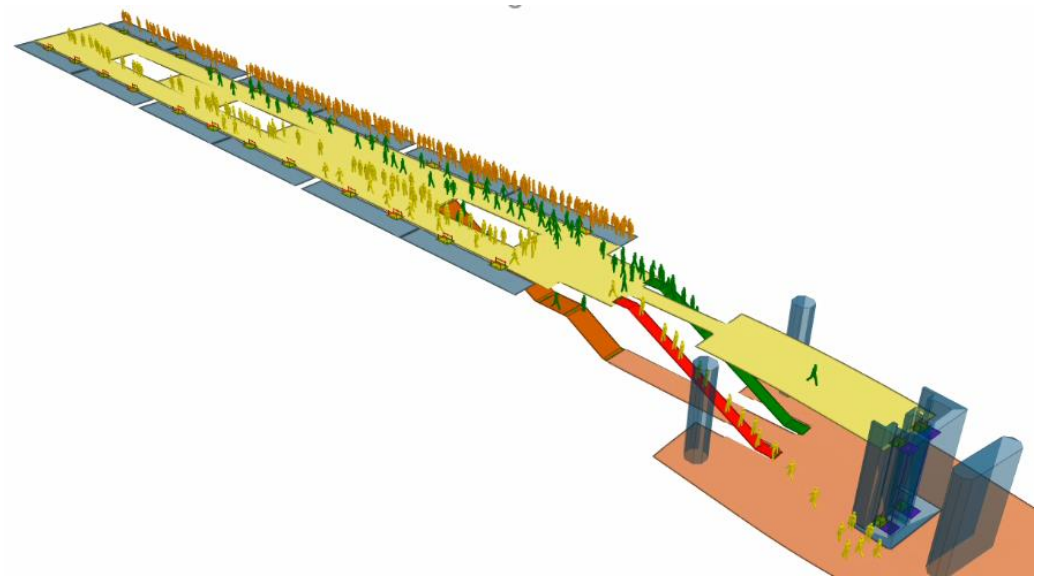
Figure 17: DLR Station – Narrowing of waiting space on westbound platform

8.1.6 MassMotion

London City Airport DLR station has been assessed using MassMotion.

MassMotion is a 3D agent-based simulation tool used to analyse complex pedestrian environments through its emergent wayfinding capability, whereby people within the model choose between various routes depending on congestion and distance to travel.

Figure 18: London City Airport DLR Station in MassMotion



MassMotion provides 3D visualisations and analysis to inform the design process, illustrating how changes to building design and the environment influence pedestrian behaviours. The analysis can be presented within the simulation

through use of Fruin or International Air Transport Association (IATA) Level of Service density mapping, data on journey and dwell times and by tracking pedestrian paths.

8.2 Results

8.2.1 Assessment Criteria

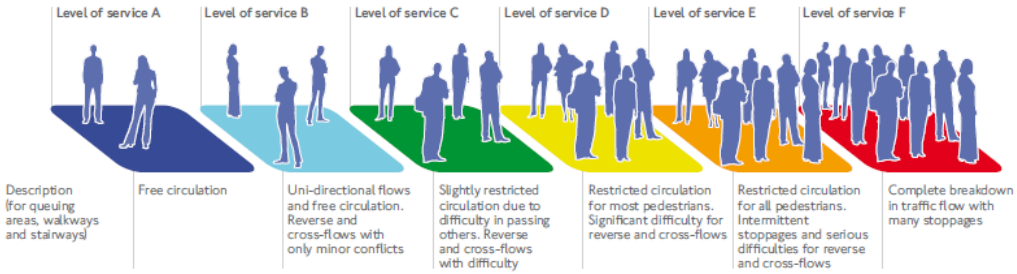
Levels of Service

In the 1970s and 1980s, John Fruin pioneered pedestrian planning analysis and the development of Level of Service criteria for pedestrians – previously Level of Service metrics had only been used to describe vehicular traffic flow by highways agencies.

Fruin Level of Service (LoS) describes pedestrian movement, relating density of pedestrians and flow rates for walkways and circulation areas, stairs and in queues, with LoS A representing free flow and LoS F a complete breakdown in circulation.

Fruin describes LoS C as being free flow, assuming a normal walking speed with opportunity to overtake. However, there is potential for pedestrian conflicts where crossing movements and counter-flows exist. LoS C is typically used for designing transport interchanges as it provides a balance between congestion, design and operations. TfL therefore typically recommends LoS C or better for the design of new stations and station enhancements. For station platforms, TfL recommends 0.93m^2 for its platforms, equivalent to Fruin LoS B/C for queuing environments.

Figure 19: Level of Service Ranges



Source: London Underground Ltd, Station Planning Standards and Guidelines, Level of Service Ranges

For airports, IATA has taken the Fruin standards and augmented these over several iterations over the last 20 years to create airport passenger-related standards (reflecting groups and baggage requirements).

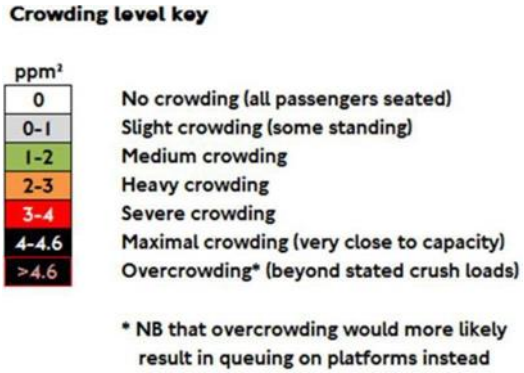
In general, the IATA standards are more onerous than Fruin reflecting that airport passengers have bags and travel in groups. IATA guidance recommends between 1.3m^2 and 1.8m^2 per passenger for queuing environments in the check-in hall, in line with IATA Airport Development Reference Manual, 10th Edition. This is equivalent to Fruin LoS A. The analysis has used this higher queuing space requirement for the DLR station platform given that passengers will have bags.

The analysis undertaken shows both the IATA and Fruin Level of Service ranges.

Line Loading

Line loading and crowding for this analysis has been based on the TfL ranges and terminology shown in Figure 20.

Figure 20: TfL Crowding Levels

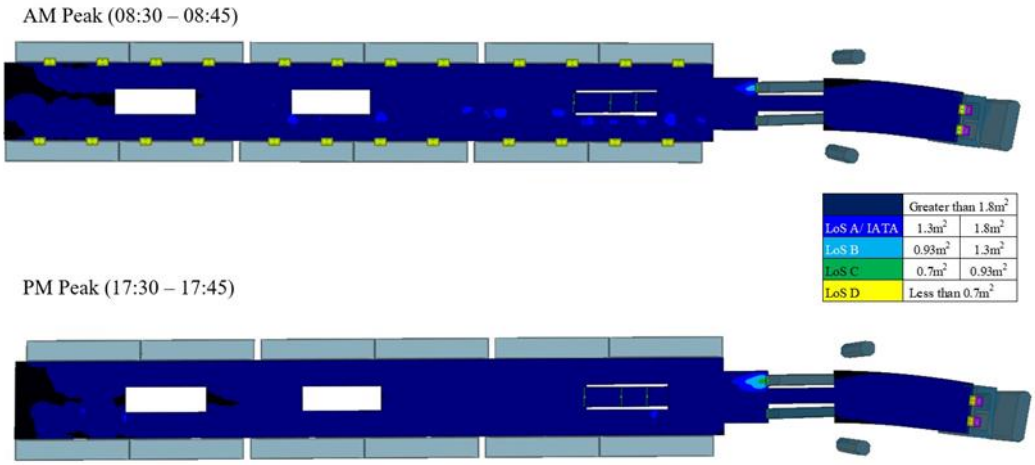


8.2.2 Base Station Layout / CADP Mode Share / CADP Demand

The current station layout has been assessed assuming CADP demand and CADP mode share as the base and reference case. The plots show average queuing LoS across the peak 15 minutes for 2025 when CADP will be complete.

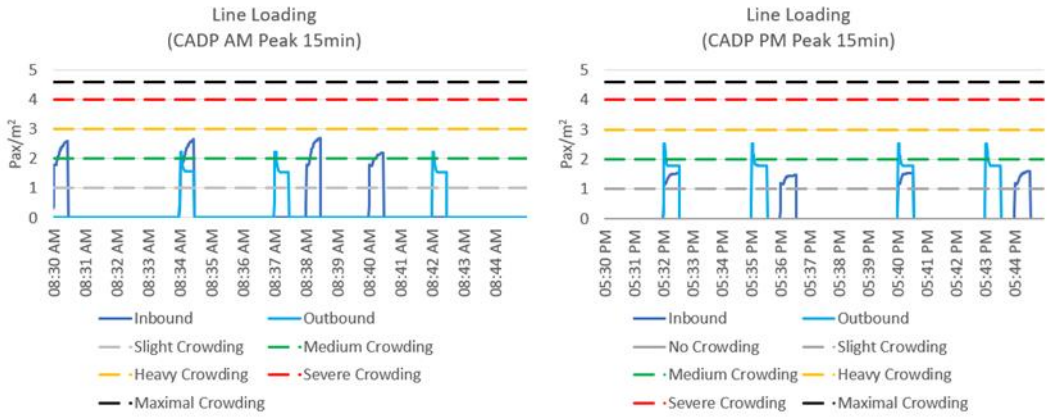
It can be seen from Figure 21 that passengers will experience conditions of LoS B (queuing) or better for both peaks under CADP. The model shows some minor queuing at the top of the down escalator.

Figure 21: Base Station Layout / CADP Demand / Average peak 15 minute LoS (Fruin Queuing)



Line loading analysis indicates that crowding on DLR trains will be medium in the morning peak in the westbound direction (i.e. into the city) and light in the eastbound direction. This level of crowding is reversed in the PM peak. This crowding is predominantly driven by background commuter flows.

Figure 22: Base Station Layout / CADP Demand / Line Loading



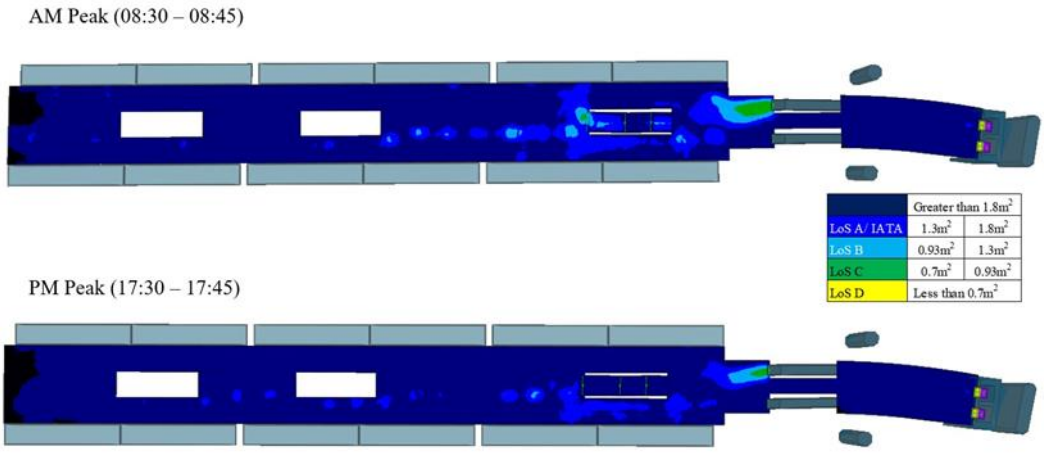
8.2.3 CADP Station Layout / 72% DLR Mode Share / 2035 Demand

The current station layout has been assessed assuming 2035 demand and an 72% DLR mode share. The plots show average LoS across the peak 15 minutes.

In 2035, passengers will experience higher densities at the eastern end of the westbound platform in the morning and evening peaks, though still at Fruin LoS B or better. Signage and announcements can be used to encourage passengers to move down the westbound platform where there is more space.

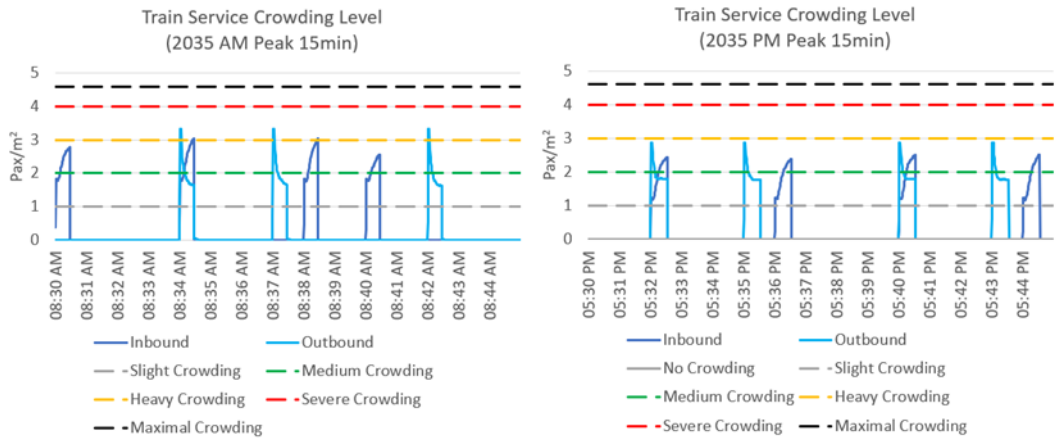
The model also shows some queuing at the top of the down escalator and this blocks back towards the first train door on the eastbound platform.

Figure 23: CADP Station Layout / 2035 Demand / 72% DLR Mode Share / Average peak 15 minute LoS (Fruin Queuing)



Under this demand scenario, line loading data from the model indicates that crowding will be medium to heavy in both peaks in both directions.

Figure 24: CADP Station Layout / 2035 Demand / 72% DLR Mode Share / Line Loading



8.2.4 New Platform Layout / 2035 York Demand / 72% DLR

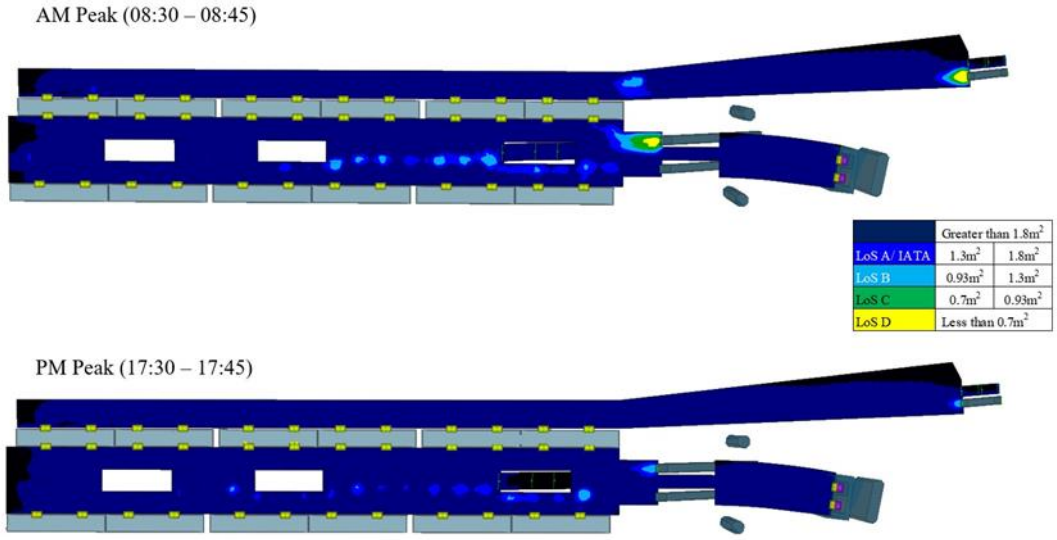
A test has been run assuming 2035 demand and a 72% DLR mode share but with a modified station layout reflecting a new, third platform to the north for use by alighting passengers without bags only. This provides these passengers with a direct route to security with one level change rather than two with the current or CADP layouts. The plots show average LoS across the peak 15 minutes for 2035.

In 2035, passengers will still experience higher densities at the eastern end of the westbound platform in the morning and evening peaks but conditions are improved as 42% of passengers (i.e. those without bags) arriving on eastbound services now exit to the north. Signage and announcements can be used to encourage passengers to move down the westbound platform where there is more space.

The model also shows some queuing at the top of the down escalator in the AM peak but this is significantly improved in the PM peak owing to the third platform.

Line loading data is comparable to the test without a third platform.

Figure 25: New Platform Layout / 2035 Demand / 72% DLR / Average peak 15 minute LoS (Fruin Queuing)



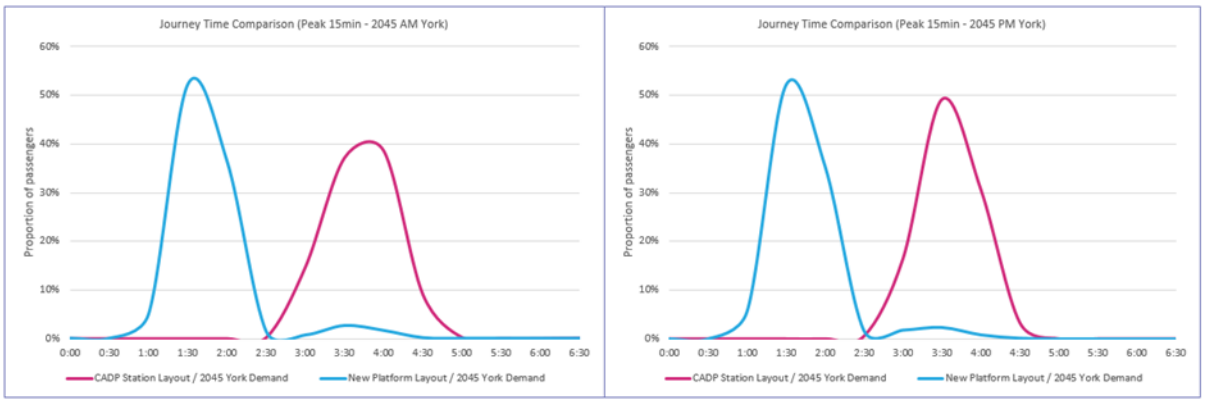
8.3 Conclusions and Considerations

Even when considering a 72% mode share by DLR, London City Airport DLR Station can still accommodate 2035 demand at acceptable levels both assuming IATA and Fruin Level of Service ranges.

A third platform provides an opportunity to reduce congestion but is not a capacity requirement, even in 2035.

In addition to congestion relief, the new platform provides for faster journey times from DLR to gate with direct access to security in the terminal for those passengers without bags.

Figure 26: AM and PM peak journey times assuming the CADP and Third Platform layouts (minutes)



As per Figure 26, the new platform shows a 2.5 minute saving on average, with the fastest passenger to security with new platform arriving there in 30 seconds and almost all passengers without bags arriving at security in less than 2.5 minutes. The first passenger to arrive at security assuming the current DLR station

and future CADP terminal will take 2.5 minutes and the last passenger up to 5 minutes.

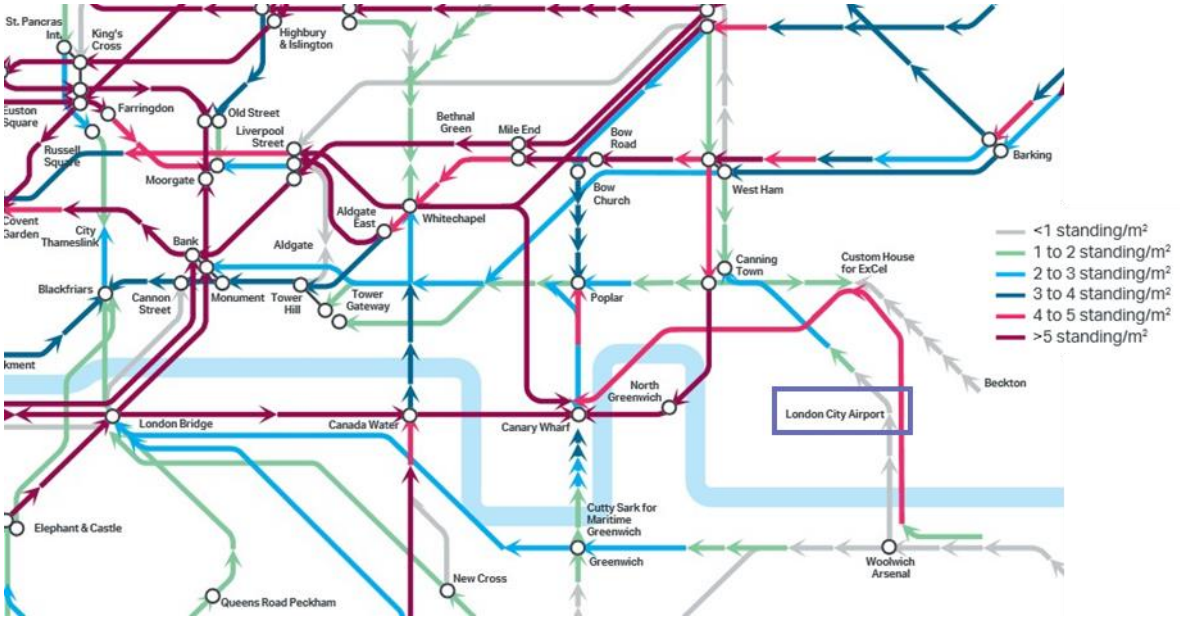
The modelling undertaken by Arup is based on the current DLR frequency (15 trains per hour in each direction) and rolling stock. The modelling shows the station performing at or better than accepted LoS. However, line loading will be between medium and heavy, with between 3 and 4 people per m^2 in peaks periods.

Recent announcements indicate that Crossrail will be delayed until 2021 and new DLR rolling stock and higher frequencies may not come online until 2023. Moreover, Silvertown Tunnel with additional bus services may not open until 2025. These delays will impact short-term on the line loadings on the DLR at the Airport. However, from 2021 onwards, improvements should be realised, with the latest MTS showing Crossrail providing significant relief to the DLR in the peak directions, into the city in the morning and out of the city in the evening peak.

The MTS shows line loading reducing to less than 1 person per m^2 on the DLR past LCY out to 2041, indicating significant capacity for future growth.

Note, that the line loading will not impact on conditions on the DLR station itself but relates to space onboard DLR trains. The MassMotion model gives the boarding and alighting demand onto the DLR services. The line load already assumed on these services is taken from the TfL assessment at the time of the CADP work (as per Section 8.1.3) so does not assume any of the benefit associated with Crossrail.

Figure 27: Extract from Figure 32 of the MTS showing Crowding after the implementation of Committed Schemes



9 Crossrail

9.1 Connectivity and catchment

LCY is supportive of Crossrail and the journey time improvements and increased catchment area that this new line will open up for the Airport across London and the South East. Preliminary analysis undertaken by Arup indicates a significant increase in catchment associated with Crossrail, assuming a station at Custom House/Excel, as shown by the journey time isochrones in the figures below.

Figure 28: LCY Catchment without Crossrail at Custom House/Excel

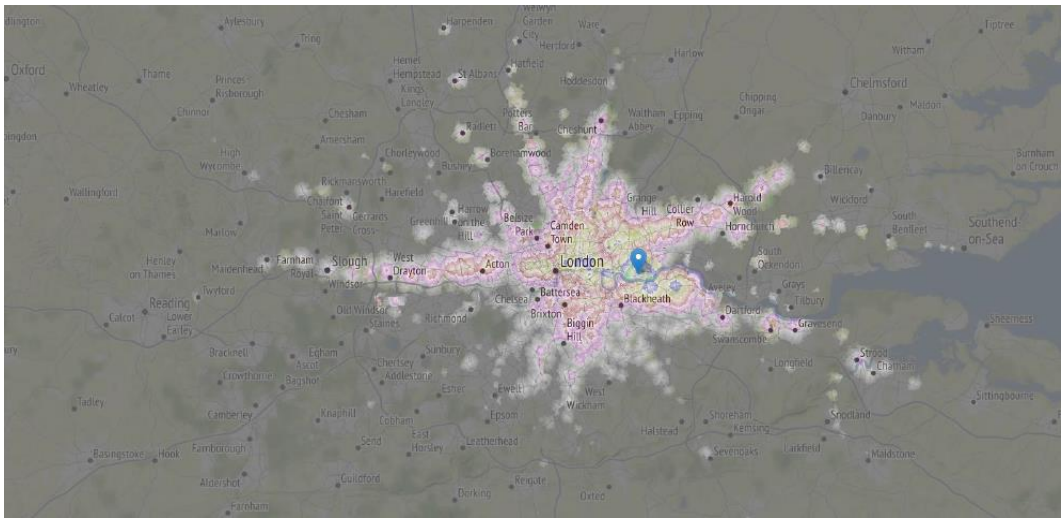
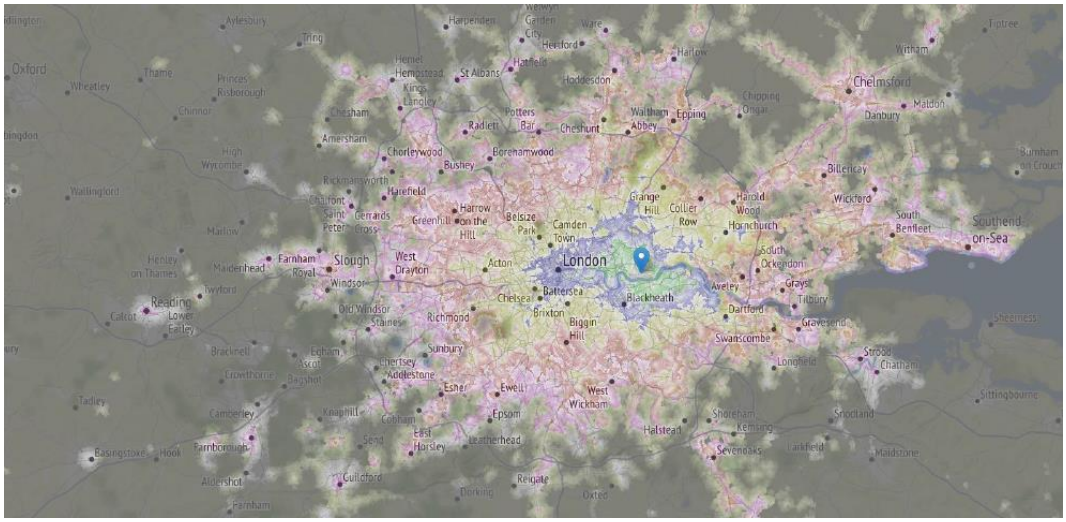


Figure 29: LCY Catchment with Crossrail at Custom House/Excel



The Draft Master Plan and revised ASAS will acknowledge a multi-staged approach to maximising the connectivity that Crossrail will bring to the Airport, as follows:

- Enhancing connectivity to Custom House/Excel Arena. This will predominantly be delivered through the change to the 474 bus routing that has already been committed by TfL.

- Supporting enhancements to the Poplar/Canary Wharf interchange being explored by Canary Wharf Group and TfL as well as promoting the Stratford Crossrail/DLR interchange by working with TfL on promoting this route to LCY.
- In line with the Crossrail to Ebbsfleet extension, promotion of a dedicated station for Silvertown to the south of the airport (close to where the old North London Line station used to be, 200m from the terminal).

9.2 Silvertown Crossrail Station

Whilst not part of the assessment and not required for the growth of the Airport to 2035, a new Crossrail Station at Silvertown adjacent to the Airport would provide a significant opportunity to create an outstanding interchange. This would improve connectivity from East London to the Estuary, which would benefit residents and businesses, as well as unlocking significant strategic regional benefits, including additional housing across the region.

The London Borough of Newham has recognised the potential benefits of a new Crossrail station close to the airport and have identified the potential benefit of a new dedicated station in its Local Plan and Infrastructure Delivery Plan. A new station could be part of any future changes to the Elizabeth Line, such as the Abbey Wood to Ebbsfleet extension and the airport is working with the promoters of the scheme, Crossrail to Ebbsfleet Partnership, to include it within the next stages of the feasibility and design development process. The airport will also seek to engage with TfL as the proposals are developed in more detail.

10 Walking and Cycling

Although only a small proportion of air passengers travel to the airport on foot (predominantly from nearby hotels) or by bicycle, these modes are important for employee travel. According to the 2017 ASAS, 3% of staff at the airport regularly cycle to work. However, there is potential for a significant uplift in cycling with 65% of employees living locally to the Airport.

10.1 Walking

10.1.1 Western end of Hartmann Road

At the western end of Hartmann Road, pavements are generally of an appropriate width and are in good condition. Appropriate pedestrian crossings are provided at key intersections.

However, at the Hartmann Road / Connaught Road junction, it is noted that pavement provision and signage mean pedestrians arriving from the west are made to cross from north side of Hartmann Road to the south side and then back across to the north side to access the terminal. This creates unnecessary conflict points between pedestrians and vehicles entering and exiting the forecourt and travelling on Hartmann Road – as per Figure 30. As demand increases, these crossing points will exacerbate unnecessary congestion on the road network west of the terminal.

Figure 30: Pedestrian crossing and routing along Hartmann Road

A potential solution could be to create a continuous pedestrian (and possible cycle) route on the north side of Hartmann Road from Connaught Road all the way to the terminal. This would mean removing landscaping and bringing the route underneath the DLR track, potentially requiring the airside boundary wall to also be shifted subject to a detailed understanding of available space.

Figure 31: Potential route of continuous pedestrian (cycle) link along north side of Hartmann Road

10.1.2 Central section of Hartmann Road

The central section of Hartmann Road has good pedestrian infrastructure along the edge of the current forecourt and behind Civil Aviation House.

Figure 32: Looking west along Hartmann Road to the south of Civil Aviation House

Future eastward expansion through both CADP and this Draft Master Plan will consider and improve on pedestrian (and cycle) infrastructure along Hartman Road. This is already partially realised through CADP which will create new pedestrian and cycle infrastructure towards the proposed hotel development to the east, as shown in the following images.

Figure 33: CADP Proposals, Aerial

Figure 34: CADP Proposals, Looking east towards the Hotel

10.2 Cycling

Whilst unlikely to be a major mode for passengers, even by 2035, cycling offers significant opportunities for LCY in relation to staff and employees, in particular when considering the aim in the MTS for more than 80% of journeys in London to be by sustainable modes by 2041.

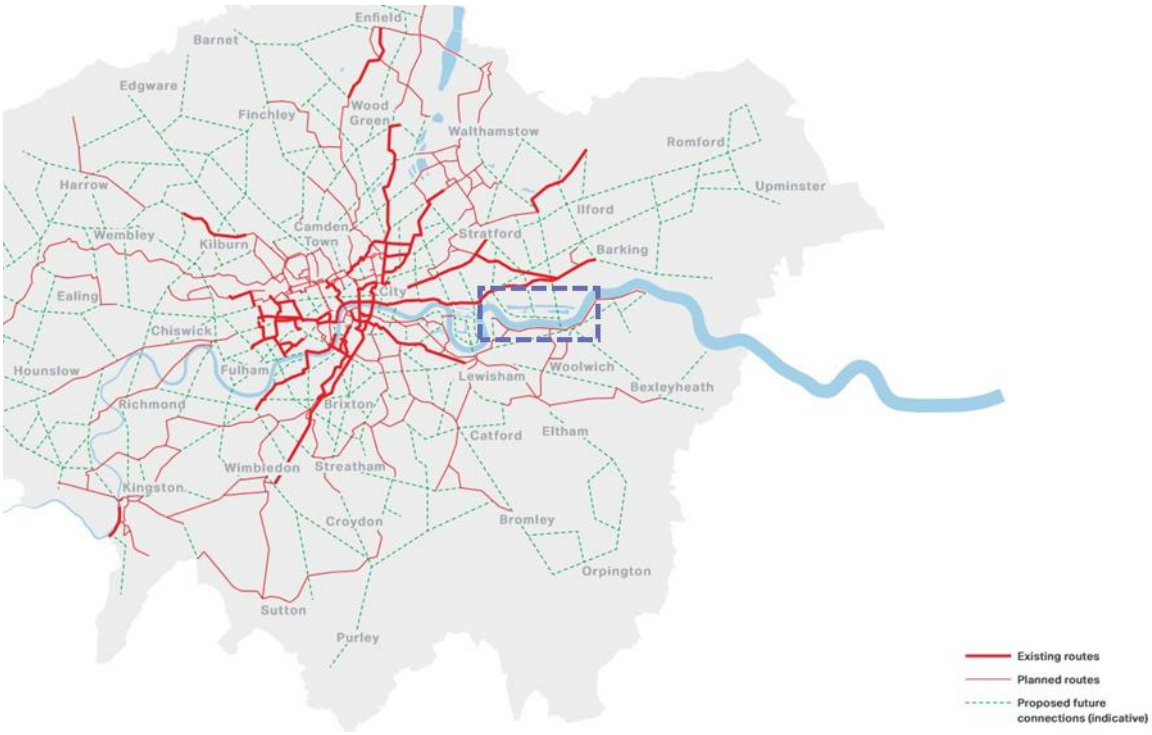
10.2.1 Cycling in the Mayor's Transport Strategy

In relation to cycling, Proposal 3 of the MTS states that the "The Mayor, through TfL and the boroughs, will: a) Deliver a London-wide strategic cycle network, with new, high quality, safe routes and improved infrastructure to tackle barriers

to cycling for both shorter and longer trips. By 2041, 70 per cent of Londoners will live within 400 metres of the strategic cycle network".

At this stage, the MTS shows current provision to the north of LCY on the A13 Newham Way and indicative future connections but does not include any planned routes in the vicinity of the Airport.

Figure 35: Recommended London-Wide Strategic Cycle Network To 2041



10.2.2 10.2.2 Newham Cycle Strategy, 2017/18

The Newham Cycle Strategy 2017/18 sets out its vision to encourage more sustainable and active travel across the Borough looking ahead to 2022 and beyond and considering how to enhance and provide a better quality network or "grid" of routes with the best possible Cycling Level of Service (CLoS)[2].

The target is 5% of all trips across the Borough to be made by bicycle and, in that context, it should be noted that 3% of LCY's staff already cycle to work. This is in spite of the low quality of the cycle infrastructure available to them, with low to average CLoS shown for most routes at and around the Airport.

The cycle strategy sets out a series of short-, medium- and long-term measures and infrastructure interventions to improve the cycling environment in Newham.

[2] The CLoS score rates 33 characteristics of cycle infrastructure and environment, building on six design principles of safety, directness, coherence, comfort, attractiveness, and adaptability. 48 out of 100 points relate to safety, making it the most important criterion.

Figure 36: Newham Cycling Levels of Service, 2016

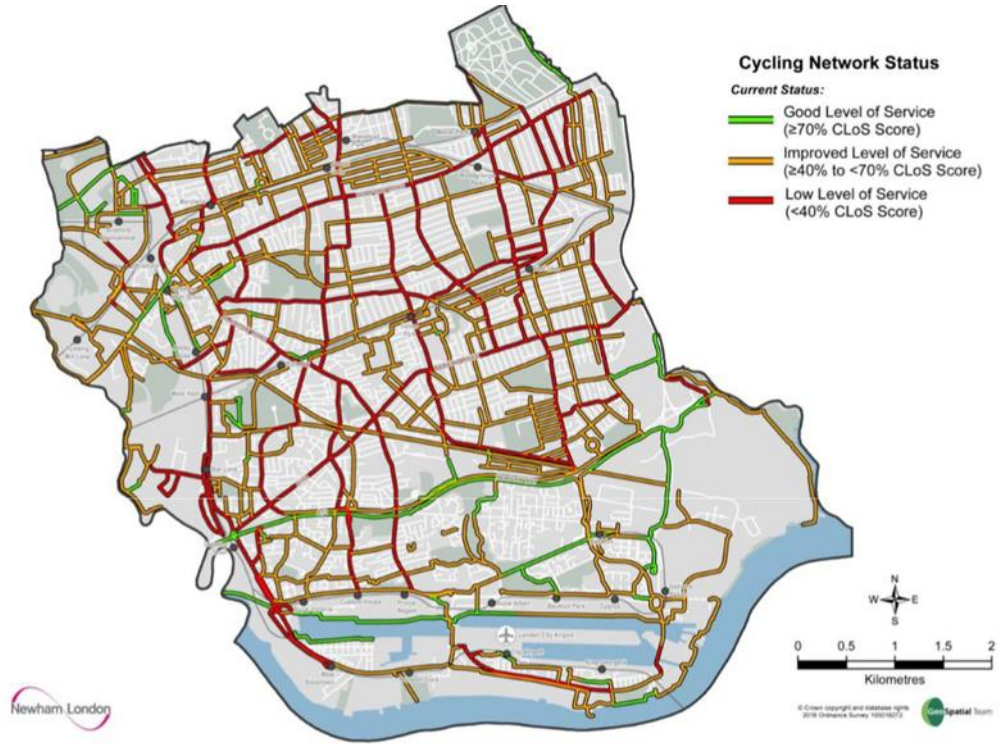
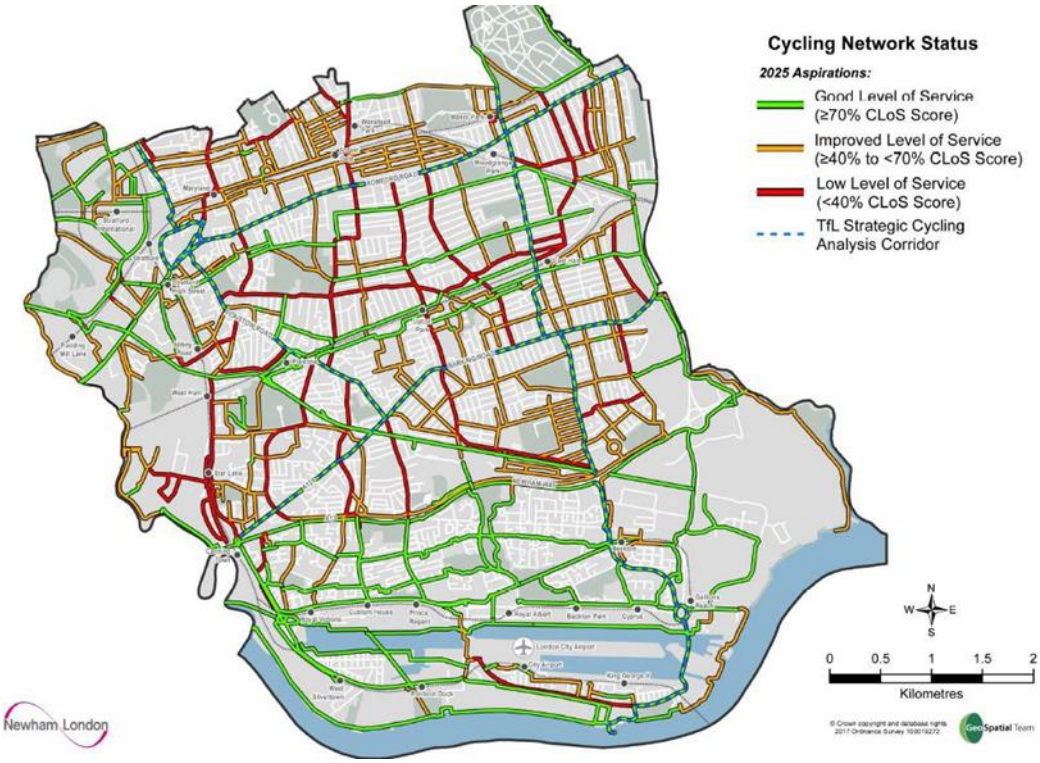


Figure 37: Newham Cycling Levels of Service, 2025



As shown in Figure 37, this investment will lead to major improvements on strategic cycle corridors around LCY with a good CLoS shown along the A1020 and A117. However, the A112 and Hartmann Road as well as local connections in Silvertown still show average to low CLoS, even after 2022.

In terms of walking and cycling, LCY supports and is contributing to a network of higher quality walking and cycle routes for the area.

CADP will make Hartmann Road 20mph making this a more attractive route for cyclists.

As part of this Draft Master Plan, LCY will provide an additional 100 cycle parking spaces (from 72 to 175) and is looking to enhance the footpath and cycleway infrastructure into the Airport from the west along A112 Connaught Road, to augment the London Borough of Newham's cycle strategy.

11 Conclusions and Next Steps

The following technical report describes analysis undertaken to test the effects of growth at London City Airport (LCY) to 11 million passengers by 2035 on the surface transport network around the Airport.

The assessment has tested the impact of demand growth and changes in mode share into the future and how these will affect: the capacity of the highway network around the Airport; the Airport forecourt; car parking at the Airport; as well as line loading and the performance of the DLR station.

Key findings of this assessment with respect to the Draft Master Plan to 2035 are as follows:

- Analysis shows that all road junctions in the vicinity of the Airport perform below capacity assuming 2035 demand and future year mode share targets.
- The CADP forecourt provides sufficient drop-off and pick-up spaces to accommodate 2035 demand, owing to changes in peak period demand patterns and a shift to more sustainable transport modes.
- Even when considering a 70% increase in passenger demand to 2035 and a doubling of staff at the Airport, car parking can be limited to a 20% increase when compared to CADP. However, this is dependent on LCY working with partners and stakeholders, including TfL, to help deliver public transport enhancements such as increased frequencies and earlier services on the DLR. With these enhancements, an increase of 250 parking spaces is required, equivalent to a total of 1,500 spaces and these could be provided by modifying the single decked car park to multi-storey use.
- Even when considering a 72% mode share by DLR, London City Airport DLR Station can still accommodate 2035 demand at an appropriate Level of Service.

The capacity assessment shows that, once CADP and other planned transport upgrades (DLR and Crossrail) are completed, there will be sufficient capacity on the DLR, the LCY forecourt and on the local road network to accommodate up to 11 million passengers per year by 2035.

Even so, LCY is committed to mitigating the effects of surface access and to promoting sustainable and cleaner, healthier travel. As such, the Draft Master Plan also considers the following:

- Additional car parking spaces will have electric charging facilities as part of the airport's commitment to reduce its CO_2 emissions. This is in line with the London Plan, which states that 1 in 5 parking spaces will need to provide an electrical charging point in the future to encourage the uptake of EVs.
- LCY will work with and support TfL to improve bus services in the area to complement the current 473 and 474 bus services, in particular along North Woolwich Road and as part of the Silvertown Tunnel project. LCY is also keen to explore the feasibility of a Royal Docks/Silvertown bus shuttle service with other partners in the Royal Docks, potentially running North Woolwich

Road, Albert Road, Woolwich Manor Way and Victoria Dock Road. This type of service could provide wider connectivity benefits for the local area.

- In terms of walking and cycling, LCY supports and is contributing to a network of higher quality walking and cycle routes for the area. As part of this Draft Master Plan, LCY will provide an additional 103 cycle parking spaces (from 72 to 175) and is looking to enhance the footpath and cycleway into the Airport from the west along A112 Connaught Road, to augment the London Borough of Newham's cycle strategy.

In the event that detailed proposals and a planning application are brought forward, building on this LCY Draft Master Plan, modelling will need to be undertaken using TfL's suite of strategic models[3] to demonstrate that the effects of growth at the Airport can be accommodated, to confirm mode share targets can be achieved and to demonstrate the appropriateness of any mitigation that is proposed.

[3] https://tfl.gov.uk/corporate/publications-and-reports/strategic-transport-and-land-use-models