



## **London City Airport Development Plan (CADP)**

### **The Business Case for Sustainable Infrastructure**

Prof. S.N. Pollalis, E. Hagistavrou  
The Zofnass Program at Harvard

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Prof. Spiro N. Pollalis prepared this case study with researcher Evgenia Hagistavrou at the Zofnass Program as the basis for research and class discussion rather than to illustrate either effective or ineffective handling of the design, the construction, or an administrative situation.

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## INTRODUCTION

In Spring 2020, the London City Airport (LCY) is undergoing a transformative £500 million expansion project, the City Airport Development Programme (CADP). CADP responds to the need for increased airport capacity to meet the forecast for travel demand through 2030. The expansion project **is a result of consecutive reviews and updates** to keep up with increasing demand as well as to keep up with a changing aviation policy in the UK, local policy requirements, and technology advances.

Airports respond to service needs by increasing capacity. LCY showcases how a space-constrained airport responds to increased demand, makes the best use of its existing runway, and leverages technology's potential. Moreover, as increased capacity has inevitable environmental trade-offs in terms of noise, air quality, and climate change, the case explores LCY's approach for a balanced environmental, social, and economic performance. In parallel, it provides an insight into how pursuing sustainability and resilience reduces risks and maximizes long-term returns for investors.

## THE AIRPORT

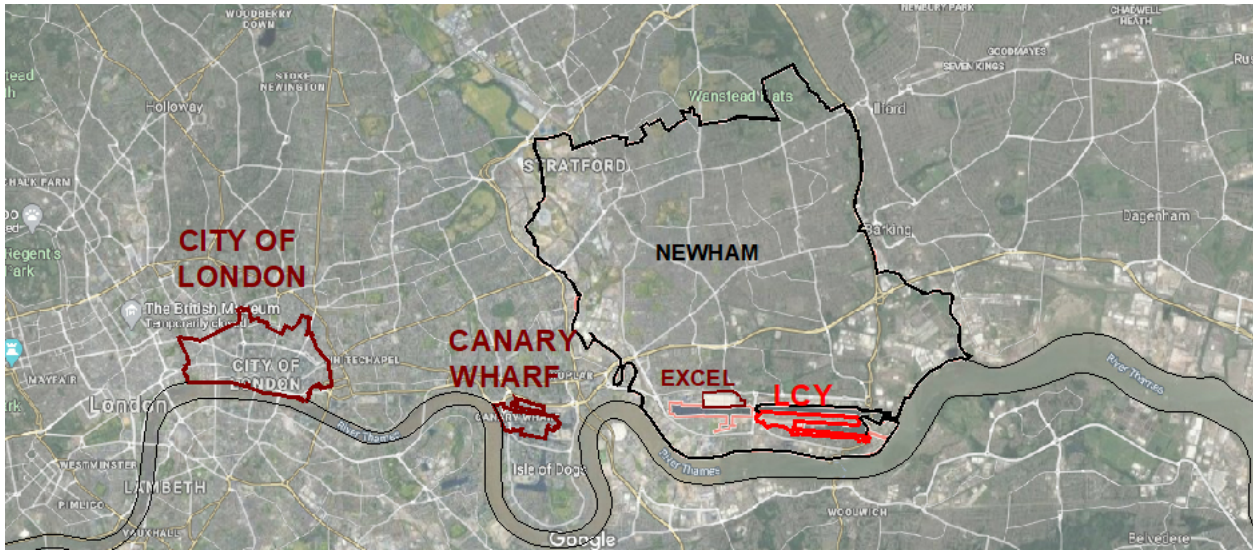
The London City Airport (LCY) is the smallest of the five London airports and an important transport link for the City of London (the ancient city center, home to the UK's financial hub). LCY opened in 1987 with a plan to connect businesses in the City and the newly established Canary Wharf with the UK and European markets.

As London's most central airport, it has seen its demand steadily increase. Initially, it served only two destinations, but currently it has 45 destinations across the UK, Europe, and the US. In 2006, LCY handled 2.4 million passengers. In 2019, LCY exceeded 5 million passengers.<sup>1</sup>

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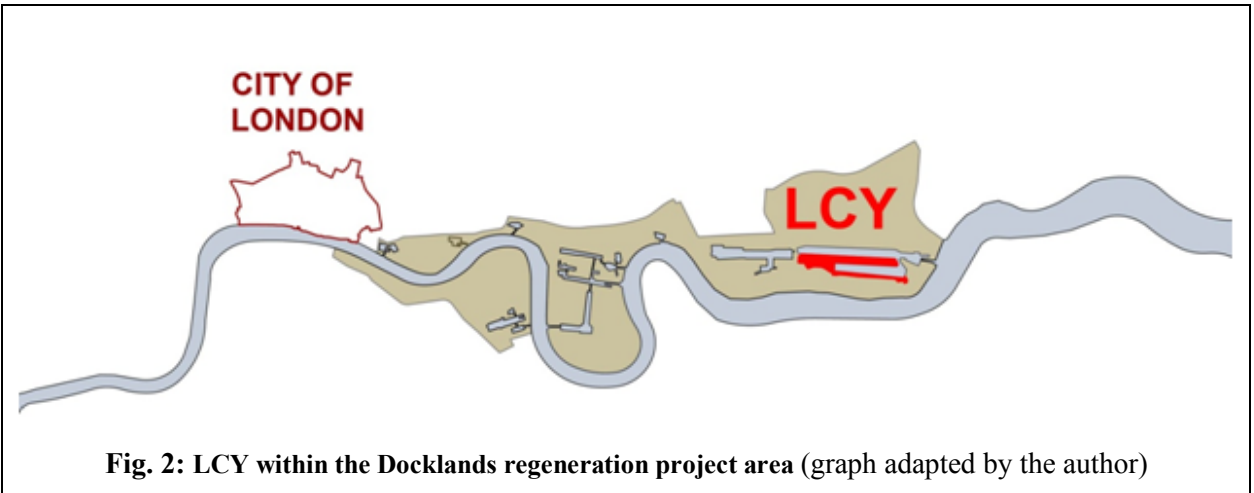
<sup>1</sup> "Embedding Sustainability into London City Airport: The City Airport Development Programme," presented in Zofnass program workshop: Sustainable Infrastructure for Preventing Climate Change, Panel 4, part A: Investing towards Adaptation and Resilience, November 5, 2019.

**The site**



**Fig. 1: Site location** (graph by the author)

LCY’s location has always been both an advantage and a constraint, adding to the airport’s singularity. The airport is located in eastern London’s Royal Docks, in a site that had initially been a port. Built in Victorian times, the Royal Docks were part of the London Docklands, an enclosed docks system with locks to keep the water level steady in the tidal River Thames, which was London’s major port infrastructure and its main sea outlet up to the 1960s. Lacking sufficient capacity and port depth to accommodate modern container ships, the Docklands was later abandoned and turned into an extensive derelict brownfield.



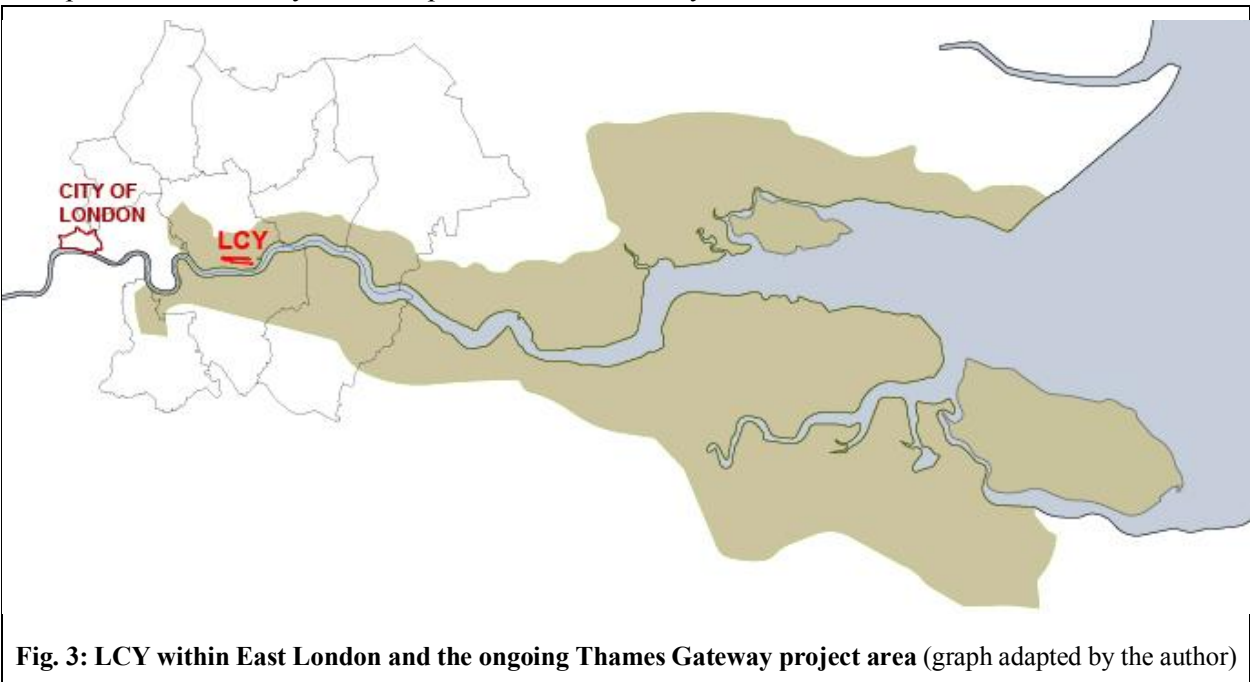
**Fig. 2: LCY within the Docklands regeneration project area** (graph adapted by the author)

Plans for a new inner-city London airport first surfaced in late 1981, an integral part of a large-scale regeneration project for the Docklands.<sup>2</sup> As the flagship project in the area, the airport changed perceptions

<sup>2</sup> In 1981, the London Docklands Development Corporation (LDDC) was established to regenerate the depressed area of the Docklands economically and socially, attracting private investment. LDDC realized a large-scale regeneration project and created new landmarks, including Canary Wharf, Surrey Quays shopping center, ExCeL Exhibition Centre, London Arena, and the Docklands Light Railway and the London City Airport.

and gave potential developers and tenants confidence to invest in the area, with results such as Canary Wharf, London's new business center, and ExCeL, the Exhibition and Conference Centre. **Due to its unique location, the airport from the outset aimed to serve a niche business market.**<sup>3</sup> It sits 3 miles from Canary Wharf and 6 miles from the City of London. LCY continued to focus primarily on the business travel market in a continuously growing business and financial services area. Its route network focuses on major business centers. Approximately two-thirds of its passengers are business-related.

Docklands extends toward brownfields to the east, part of the ongoing Thames Gateway regeneration project, a key for sustaining London's growth and competitiveness. Significant housing-led mixed-use developments have already been completed or are under way in the area.



**Fig. 3: LCY within East London and the ongoing Thames Gateway project area** (graph adapted by the author)

The draft London Plan of March 2016 identified the Royal Docks & Beckton Riverside as an “Opportunity Area” capable of accommodating significant further growth. This area aims to become a new London quarter, creating a world-class business, industrial, cultural, and residential district, potentially delivering 30,000 homes and 41,500 jobs.<sup>4</sup>

The airport both serves and stimulates development in its area. “The Royal Docks area benefits from the presence of existing industry and attractors such as ExCeL and LCY, and will soon have an Elizabeth line train station at the Custom House.”

LCY has also acted as a catalyst for improved transport links such as bus routes and notably the Docklands Light Railway (DLR) extension. LCY passengers provide more than 50% of DLR's users, making the railway financially viable. This line has greatly improved accessibility for residents in east London boroughs, who had previously used buses. “The Gateway to London, the inward investment promotion arm

<sup>3</sup> Master plan 2006.

<sup>4</sup><https://www.london.gov.uk/what-we-do/planning/implementing-london-plan/opportunity-areas/opportunity-areas/royal-docks-beckton-riverside-opportunity-area>

of the Thames Gateway Partnership, considers LCY vital in attracting new investment to the area, and suggests that it would be 80% less successful in attracting new office developments if the airport did not exist.”<sup>5</sup>

## Site constraints

LCY is surrounded by water, adjacent to two road bridges and the River Thames, so growth opportunities are limited. The airport has only a single runway of relatively short length.<sup>6</sup> Originally 1,030 m long, the runway was extended once in 1992 to its current length of 1,199 m.<sup>7</sup> For purposes of comparison, Heathrow has two runways, 3,902 m and 3,658 m long, and Gatwick has a main runway 3,316 m long.

The airport is in a dense urban area, next to existing and planned future high-rise buildings. So it could only function as a short take-off and landing airport (a “stolport”). Planes must approach the runway at a steep angle to minimize noise to the local community.

LCY has had few alterations over the years to optimize performance. Extending the runway or adding a second runway would be uneconomic and impractical; in addition to the site’s limited width, there would not be sufficient airspace due to the tall buildings at Canary Wharf.

The runway capacity is directly linked to the maximum possible aircraft movements per hour.<sup>8</sup> As there is no parallel taxiway, aircraft arriving or departing have to backtrack on the runway to take off or to taxi to the apron. Moreover, the short runway and the steep, quieter approach, which is a requisite of the airport’s planning approval, means that only a few aircraft types can use the airport.<sup>9</sup>

In 2003, a new runway holding point was built at the eastern end of the runway for three planes, and a new link was introduced to improve the efficiency of the runway, especially during peak hours. These additions allowed aircraft movements to rise from 15 to 32 per hour.

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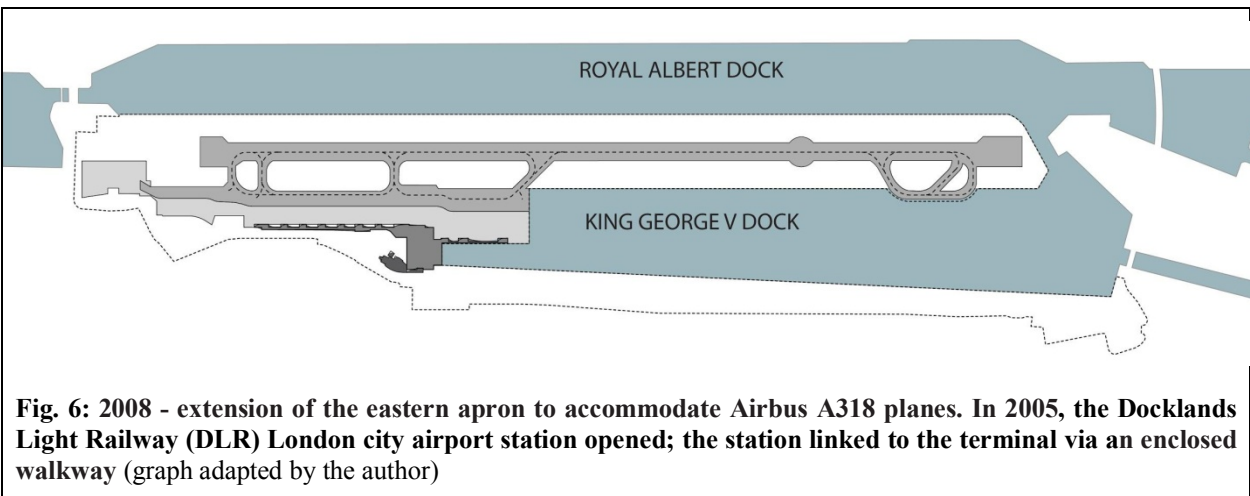
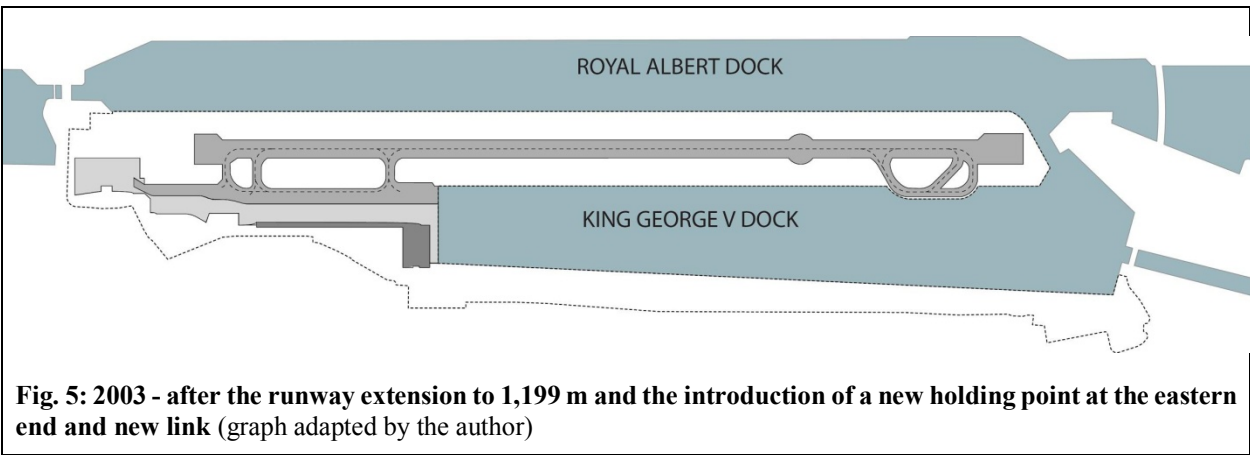
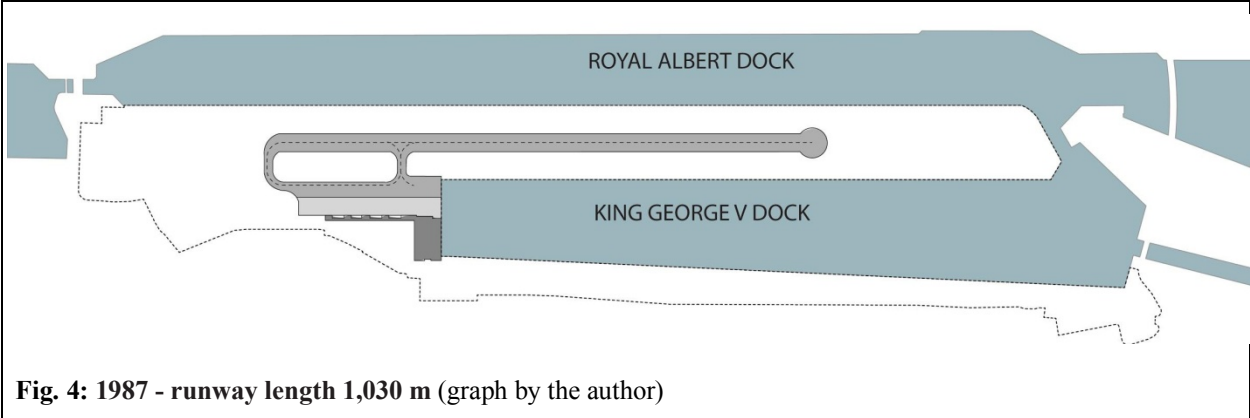
<sup>5</sup> Ibid.

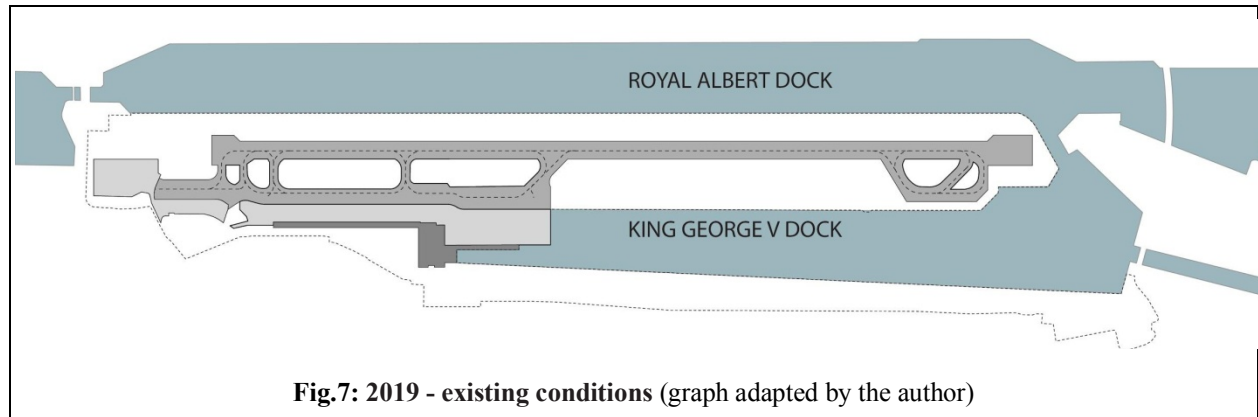
<sup>6</sup> LCY believes that the theoretical capacity of its runway, operating for about 14 hours a day, five full and two half-days a week, can handle 215,000 aircraft movements per year. Today's activity, therefore, represents approximately 33% of the theoretical annual runway capacity. On this basis, there is ample runway capacity at the airport to meet foreseeable future demand. (Source: Masterplan 2006.)

<sup>7</sup> The existing runway has a declared take-off run available (TORA) length of 1,199 meters. Planes take off and land in either an easterly (Runway 09) or westerly (Runway 27) direction, depending on the wind direction. The total paved area extends to 1,508 m.

<sup>8</sup> An aircraft movement is an aircraft take-off or landing at an airport. For airport traffic purposes, one arrival and one departure are counted as two movements.

<sup>9</sup> Specific size, up to the size of a British Aerospace 146 (BAe 146) Regional Jet.





LCY currently operates within a set of strict and comprehensive noise and environmental controls. Current operating hours include an 8-hour nighttime curfew on all flights from 22.30 to 06.30 and a 24-hour weekend closure between 12.30 on Saturday to 12.30 on Sunday, introduced in 1998.<sup>10</sup> Flight numbers are also limited on weekends and bank holidays as well as in the first and last half hours daily.<sup>11</sup> The operating restrictions were agreed between LCY and the London Borough of Newham in 2015 as part of the CADP planning permit. The agreement also included the condition that LCY would fund a resource inside the local authority to monitor adherence to the restrictions.

## LCY's capacity

Currently, LCY accounts for almost 2.7% of London's total airport capacity. LCY handled nearly 1.1 million domestic passengers in 2018, which is 23% of LCY's total passengers, a higher proportion than for any other London airport. As determined by its current planning permit, the airport's current capacity is 6.5 million annual passengers (mppa) and 111,000 annual air transport movements (ATMs). This capacity will be reached in 2022.<sup>12</sup>

## London City Airport Ltd

Like all UK airports, LCY is privately owned. It was built and operated by Mowlem, a large development and construction company in the UK. In 1995, it was acquired by Irish financier Dermot Desmond, and then it was purchased by a consortium of AIG Financial Products and Global Infrastructure Partners (GIP). Currently, it is owned by established long-term infrastructure investors such as AIMCo, OMERS, Ontario Teachers' Pension Plan, and Wren House Infrastructure Management.

London City Airport Ltd, a private limited company, is the airport's long-term operator, operating according to the International Civil Aviation Organization (ICAO). Compliance provides the license to operate, which is ensured and issued by the Civil Aviation Authority (CAA) in the UK. LCY needs to satisfy and

<sup>10</sup> LCY is the only airport in London with reduced operating hours. Heathrow, Stansted, and Luton are operating 24hrs. However, they also have nighttime restrictions, consisting of a noise quota limiting the number of take-offs and landings as well as the type of aircrafts operating at night.

<sup>11</sup> Draft Master Plan 2019

<sup>12</sup> Draft Master Plan 2019.



continually adhere to the CAA's safety standards, subject to an annual audit. **Any future development of the airport will always be subject to CAA approval.**<sup>13</sup> Under the Airports Act 1986, CAA is responsible for the economic regulation of any airport with an annual turnover of at least £1 billion in two of three consecutive years.<sup>14</sup> Thus, LCY is not currently subject to economic regulation by CAA.<sup>15</sup>

As a private company, London City Airport Ltd welcomes investors. According to Feriel Feghoul, Asset Manager at Wren House Infrastructure and member of the London City Airport Audit Committee, "With the demand for the airport anticipated to increase dramatically, the management team and shareholders cannot stand still. Long-term thinking is needed to ensure the airport can serve London to 2035 and beyond."<sup>16</sup>

Despite its strategic location, LCY faces competitive risks:

- passenger switching to other airports that serve similar destinations as LCY,
- airline operators switching to other airports, subject to operating slot availability at those airports,
- operational disruption risks – circumstances that can pose short-term risks to the airport's normal operations, such as adverse weather conditions.

Additionally, there is a risk of securing planning permits for growth. Changes to the planning legislation, national aviation policy, or the impact of anti-aviation pressure groups could impact the airport's ability to deliver its growth vision set out in its 2006 master plan.

The company has a "clear strategy to grow passenger volumes, both business and leisure, maintaining its unique customer proposition of speed and convenience, while delivering high levels of customer service."<sup>17</sup> LCY boasts shorter check-in times than any other airport in London,<sup>18</sup> and offers a "20/15 passenger proposition," a promise that passengers will get from curbside to gate within 20 minutes at departure and from arrivals hall to surface transport within 15 minutes on arrival, a promise made possible by its compact terminal. LCY is considered one of the most punctual and convenient airports in the UK.

## THE EXPANSION PROGRAM

### Increased demand for aviation

Currently, there is little spare capacity at peak times across the London airports. The London airport system is forecast to be full by mid-2030s if additional capacity is not provided. The Department for Transport

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<sup>13</sup> Master Plan 2006.

<sup>14</sup> House of Commons, Transport – Thirteenth Report published. The report was ordered by the House of Commons to be printed October 25, 2006.

<sup>15</sup> In the UK only the "dominant airports" – airports with market dominance or "substantial market power," Heathrow, Gatwick, Stansted, and Manchester – are regulated and must be granted a license on conditions relating to prices, service quality, and operational resilience.

<sup>16</sup> "Embedding Sustainability into London City Airport: The City Airport Development Programme," presented in Zofnass program workshop: Sustainable Infrastructure for Preventing Climate Change, Panel 4, part A: Investing towards Adaptation and Resilience, November 5, 2019.

<sup>17</sup> London City Airport Limited, Strategic report, directors' report and financial statements, December 2018.

<sup>18</sup> LCY website.

(DfT) forecasts that, in an unconstrained market, the demand for air travel in the UK could grow from 270 million passengers in 2016 to 355 million by 2030 and 420 million by 2040.<sup>19</sup> However, DfT's forecast also shows a significant constraint to achieving these forecasts based on airport capacity in London and the southeast of England.<sup>20</sup> The constrained projections show that leisure passengers will be squeezed out of the market by airport constraints.

The draft London plan identifies the area where LCY sits as having significant development capacity to accommodate new housing, commercial development, and infrastructure of all types. The draft plan supports the case for additional aviation capacity in the southeast for passenger and freight needs. The condition is that the aviation industry meets its environmental trade-offs with respect to noise, air quality, and climate change.<sup>21</sup>

The local community in Newham's Local Plan supports the optimization of the airport's capacity to continue to act as a catalyst for the regeneration of the area and as an employment hub. Currently, over 2,200 people are working at the airport; almost two-thirds live nearby.

## Aviation policy

The Department for Transport forecasts national air passenger demand and requires airports to present master plans to meet these forecasts. Two documents published by DfT determined the LCY's ongoing development:

- the 2003 Aviation White Paper, "The Future of Air Transport," which set out a strategic framework for the development of airport capacity in the UK;
- the 2018 Green Paper<sup>22</sup> "Aviation 2050: The Future of UK Aviation," which replaced the 2003 policy paper.

The 2003 paper addressed the developments in air transport, while the 2018 paper emphasizes the climate change mitigation commitments and Brexit: "As we leave the European Union, the UK's future prosperity depends on our ability to reach out to the rest of the world, to forge new trade links, to connect and compete." The 2018 paper provides the main policy document giving strategic direction for the future development of air travel. It focuses on:

- the contribution towards the UK's climate change commitments,
- innovative solutions and incentives to reduce carbon and congestion and improve air quality,
- noise limits and setting noise caps on future growth for a fair balance between the industry and communities, and lowering the noise insulation policy threshold beyond the current 63dB LAeq 16hr contour to 60dB LAeq 16hr,
- enhancement of the passenger experience,
- airports being made more accessible to all,
- improved safety.

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<sup>19</sup> Ibid.

<sup>20</sup> Ibid.

<sup>21</sup> Ibid.

<sup>22</sup> A Green Paper in the UK is a preliminary report of government proposals published to stimulate discussion.

## Local economic policy context

London is frequently ranked in the world's top 10 cities in the more robust indices of competitiveness, especially for its economic strength and innovation. In PWC's Cities of Opportunity Report, London ranks high in technology readiness, economic power, and city gateway, all of which underline its stature as a thriving center of the world economy. It also ranks London as number one amongst world cities for airport connectivity.

London's competitive proposition is the "ease of doing business" and being "a top city for the location of global teams." London remains the number one location for global companies and revenue-generating innovation. In London, industries such as financial services, professional services, and, increasingly, technology are densely clustered in the center. The connectivity and proximity of services found in the City make it attractive to overseas firms. "They're willing to jump on a plane and come here, and spend three, four hours going through a deal structure in a huge amount of detail because of everything else that's on offer around us."<sup>23</sup>

To remain competitive in a continuously changing global geography of commerce, the Mayor's economic plan for London targets growth sectors such as financial and business services, manufacturing, life sciences, and the technology and digital industry. These sectors, along with tourism, are significant contributors to the London economy and are the largest generators of air travel demand. Strong growth is also projected in East London. The population in Newham, where the airport is located, is expected to grow by 31%, to over 100,000 people by 2035. Moreover, Newham's office space is set to increase quicker than that of any other borough in London. Eleven regeneration schemes in proximity to the airport are highlighted in LCY's master plan.

## The regulatory context for implementing an expansion plan

DfT regulates security standards both at an operational level and at the facilities level. DfT requirements relate to the segregation of arriving and departing passengers, baggage screening, and airside access arrangements. As part of the development plan, LCY must apply for a planning permit by the local authority, Newham Council's Strategic Development Committee. Once the committee grants the permit, it is referred to the Mayor of London for his consideration and approval by the Secretary of State. The Planning Agreement between LCY and LBN (London Borough of Newham) covers a broad and complex range of areas including noise and air quality monitoring and mitigation programs; sustainability and environmental strategies; transport and surface access planning; education, employment, and training programs; and financial contributions by LCY to local community programs and infrastructure projects.<sup>24</sup>

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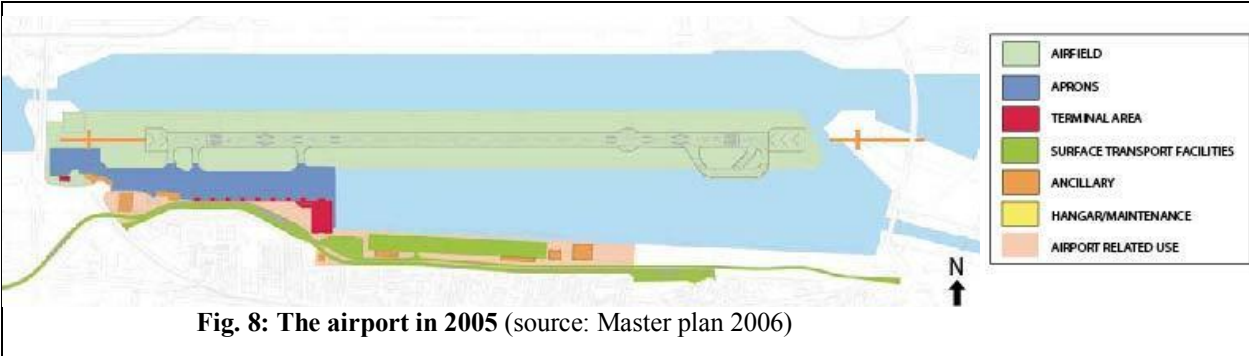
<sup>23</sup> "Locate, Create and Innovate: London in a Changing World."

<sup>24</sup> Annual performance report 2011. Planning agreements provide a long-term framework for delivering planning consents, which are expected to be in place for several years. In the initial periods, much of the work will be to put in place the strategies, systems, and processes which, once established, will drive the delivery of the provisions of the planning agreement in future years. This planning agreement is no different in this respect. Many of the activities in this report relate to the establishment of the necessary strategies, systems, and processes as set out in the agreement.

## CADP

### Responding to demand – Reviews and updates of expansion plans

The need for expansion was identified in 2003 when the DfT published its Aviation White Paper, “The Future of Air Transport.” The White Paper required all UK airports to prepare master plans through 2030, maximizing the use of their existing runway capacity and delaying, reducing, and eliminating the need to construct new runways, particularly in the southeast of England.<sup>25</sup> In response, LCY developed a master plan in 2006, setting its vision through 2030, presenting indicative ideas of phased expansion.

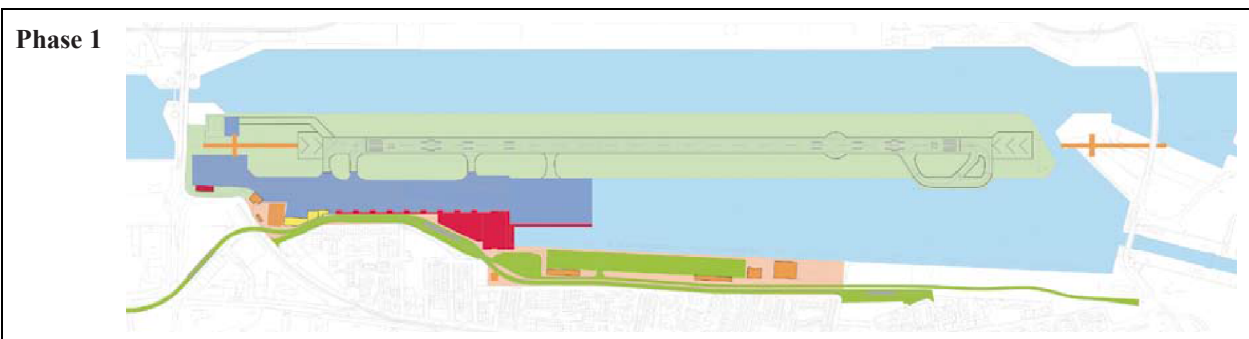


**Fig. 8: The airport in 2005** (source: Master plan 2006)

In 2005, LCY was handling almost 2.5 million passengers a year (mmpa). The 2006 LCY master plan increased the passenger capacity to:

- accommodate 3.5 mmpa by 2015 (Phase 1),
- accommodate 6 mmpa by 2025 (Phase 2), and
- accommodate 8 mmpa by 2030 (Phase 3).

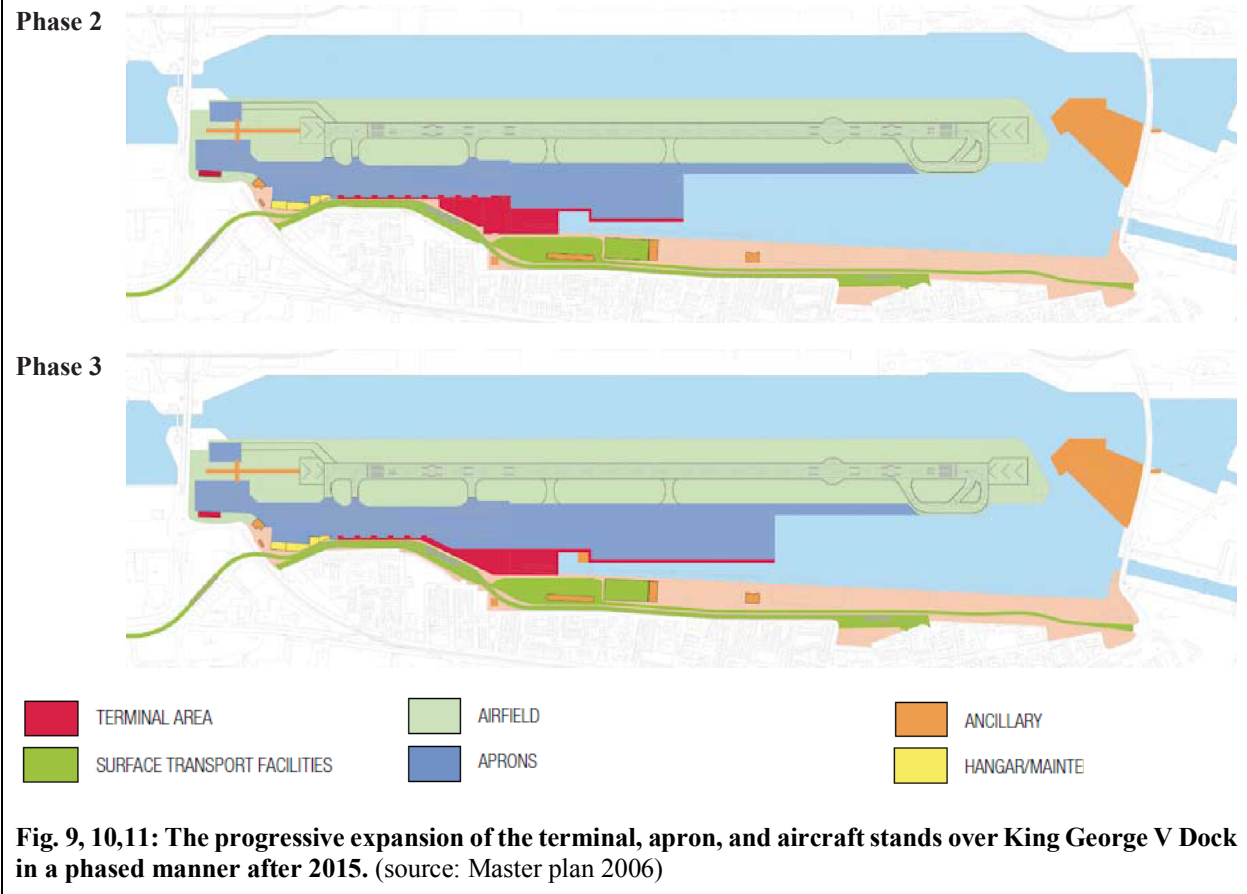
The number of permitted annual aircraft movements would increase from 70,000 in 2005 to 120,000 by 2015 and 171,000 by 2030. The planning application was submitted in 2007 to the London Borough of Newham.<sup>26</sup>



**Phase 1**

<sup>25</sup> Master Plan, November 2006.

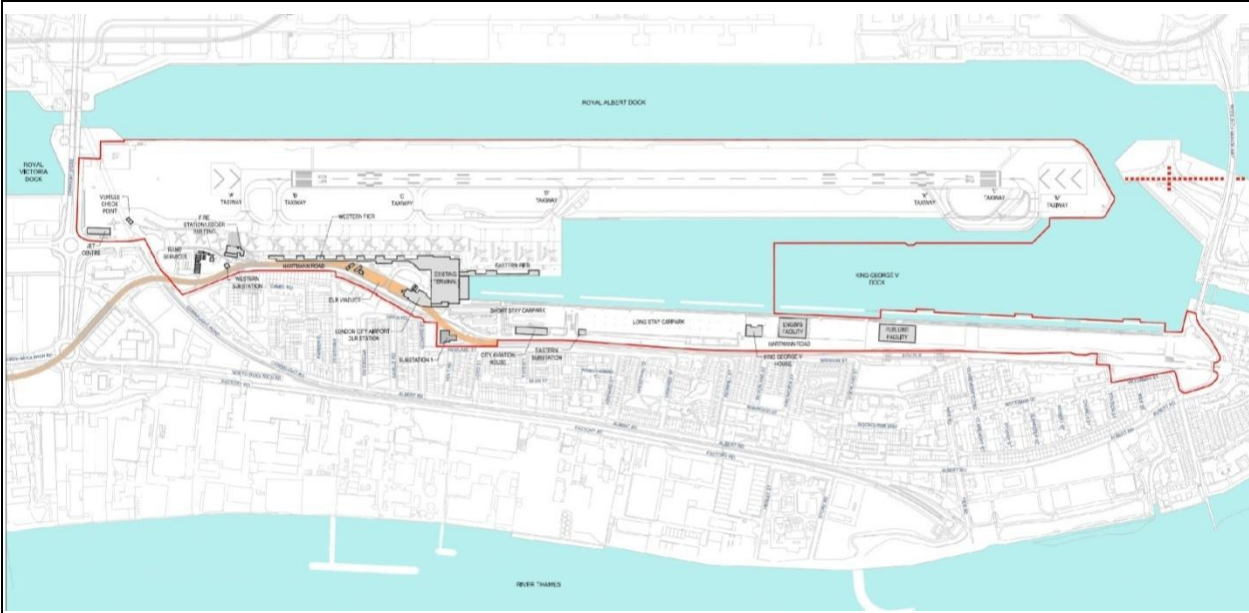
<sup>26</sup> London City Airport site, Corporate Information.



In 2012-13,<sup>27</sup> the master plan was updated with the City Airport Development Programme (CADP) – a plan for meeting the forecast in both aircraft and passenger numbers at peak and accommodating new-generation aircraft that are physically larger but more fuel-efficient and quieter than the current fleet. Increased demand projections were based on DfT's latest national air passenger demand forecasts of January 2013. CADP<sup>28</sup> is a transformative project, envisioning an investment of at least \$500 million.

<sup>27</sup> With an increasing focus on East London and the Thames Gateway, especially following the success of the London 2012 Olympic Games, the role of London City Airport as the gateway to the area, a key regenerator, and the major employer will be strengthened further. Furthermore, the airport sees the potential for the creation of over 2,500 additional on-site jobs by 2030 (with more off-site) and a continued focus on the business travel market.

<sup>28</sup> The City Airport Development Programme (CADP) comprises a full planning application to construct new passenger facilities, seven new aircraft stands and associated infrastructure (CADP1), together with a separate outline planning application for a proposed hotel (CADP2). (Source: CADP: Environmental Statement Non-Technical Summary, July 2013.)



**Fig. 12: Airport existing plan as of 2013, showing completion of phase 1 of the 2006 master plan**

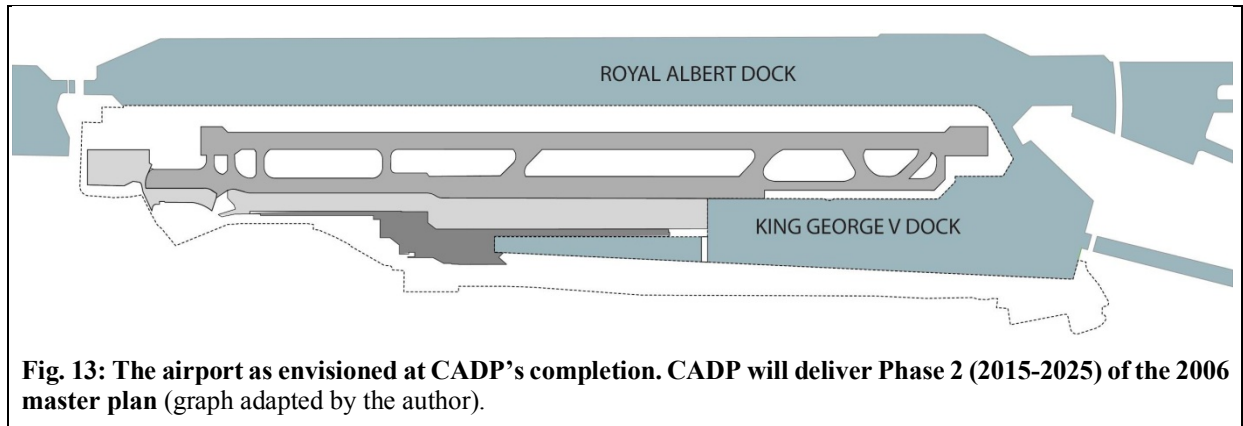
The need for the CADP planning application as an update of the 2009 permission was based on three fundamental capacity issues:

**CADP Challenges and Solutions: Peaks, Planes, and People<sup>29</sup>**

1	<p><b>Business travelers (the majority of passengers) want to travel in the morning and evening</b> – the airport runway is almost full during the peak period. New routes need peak runway slots and new stands.</p>	<p>Parallel taxi lane, increasing peak runway utilization, and new stands.</p>
2	<p><b>Next-generation aircraft are getting larger</b> – e.g., the Bombardier CS100 will be at the airport in 2016; this aircraft will not fit on current stands.</p>	<p>New and upgraded wider stands. More pressure on the efficient use of the runway, the availability of adequately sized stands and maneuvering space, and other airport infrastructure.</p>
3	<p><b>Larger aircraft</b> and increased demand for business travel means <b>more passengers</b> – current terminal infrastructure is nearing capacity; without extra space, growth will be constrained.</p>	<p>Extended terminal and ancillary infrastructure (matching terminal capacity to passenger numbers).</p>

In July, the planning permit was granted by authorities for a £344 million expansion plan following an appeal and public inquiry, which was held in March/April 2016. The permit included an increased number of planning controls compared to the previous 2009 permit, with 97 conditions and almost 100 obligations covering various issues such as operations, construction mitigation, environment, employment, surface access, and a program of regular reporting. Also, as part of the CADP permit, a new limit of 45 scheduled movements per hour was introduced, and the annual movement limit of 120,000 ATMs has reduced to 111,000.

<sup>29</sup> CADP: Environmental Statement Non-Technical Summary, July 2013.



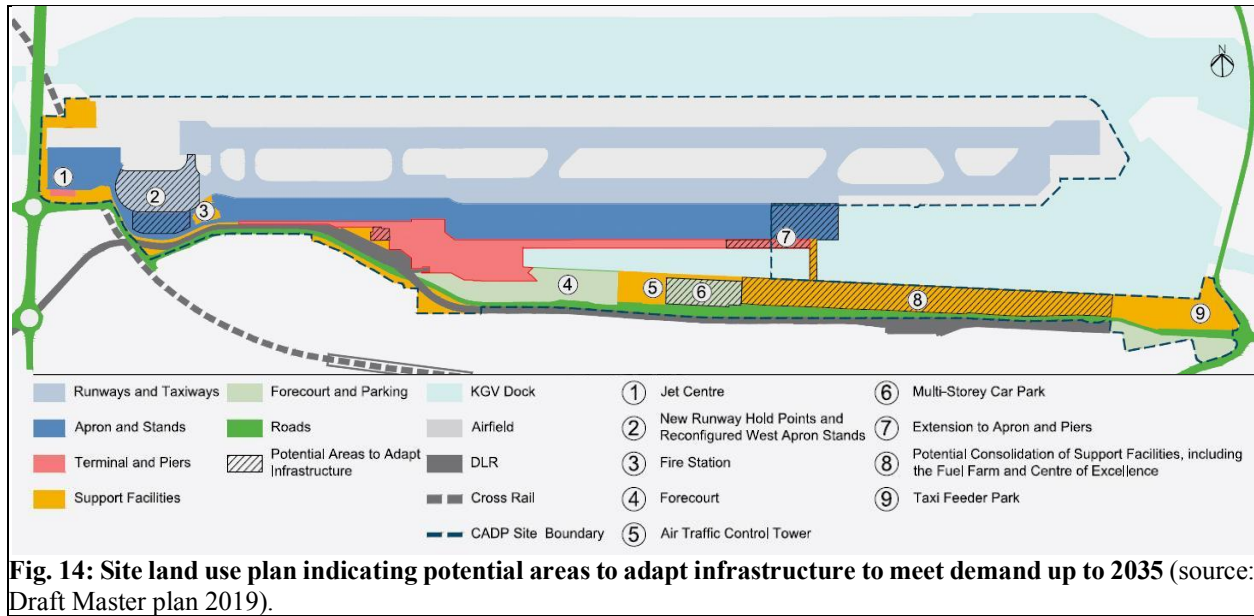
**Fig. 13: The airport as envisioned at CADP's completion. CADP will deliver Phase 2 (2015-2025) of the 2006 master plan** (graph adapted by the author).

In 2019, LCY published a draft master plan as a response to the most recent DfT Green Paper “Aviation 2050.” **Based on changes in government policy and the emerging demand, LCY considered an update of Phase 3.** The number of passengers had been higher than anticipated in 2006, but the number of flights had been less than forecast. This trend is evident from the airport’s 6.4% year-on-year growth in passenger numbers in 2018, which was delivered with approximately 80,000 aircraft movements, almost the same as in the previous year.<sup>30</sup> It is the result of a higher proportion of jets, including quieter, cleaner, new-generation types, strength in demand, the introduction of new airlines, and fewer private aviation flights.

LCY updated its forecasts for 2030 and now predicts that demand will increase to 9.8 million passengers annually by 2030, accommodated by 137,000 movements, including 5,000 business movements, 20% fewer ATMs than had been anticipated in 2006. The forecast for 2035 is that demand will increase to 11 million passengers annually accommodated by 151,000 ATMs. **This forecast represents 4.3% of the total demand for the five key London airports, up from 2.7% today.**

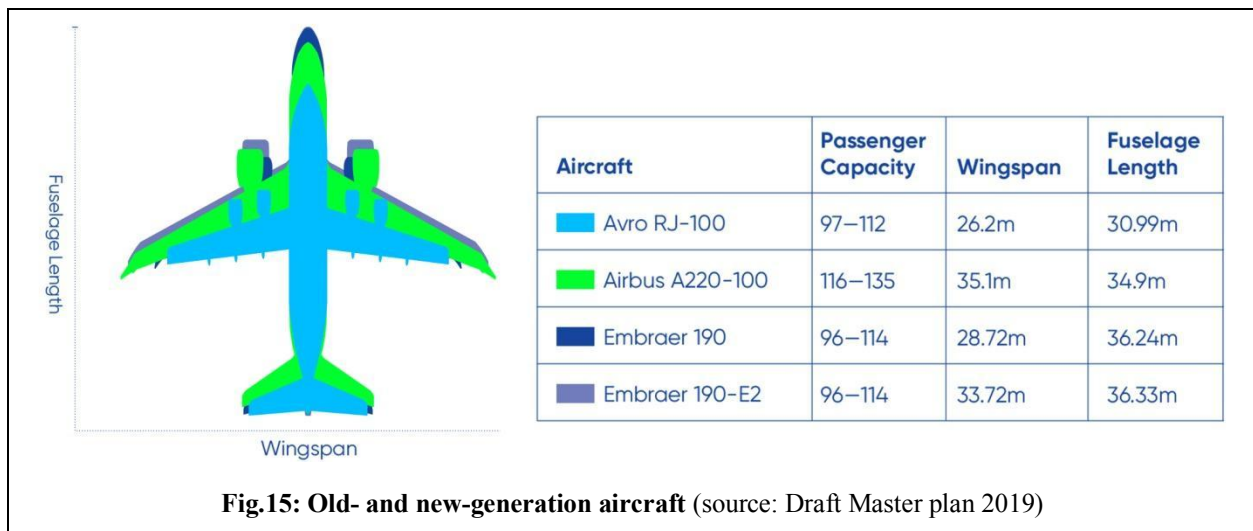
LCY draft plan is consistent with Government policy **to make the best use of its existing infrastructure while maintaining an 8-hour nighttime curfew on flights and staying within the current noise contour area limit.** There is no plan for a new runway or extending the length of the runway or significantly extending beyond the existing site boundary.

<sup>30</sup> Master plan 2019



### Enablers: Technology advances

The plan for the growth of LCY is a **management of interdependencies**: increased demand and growth in passenger volumes and increases in air traffic movements. Increased air traffic movements generate more noise, taking LCY closer to its 57dp noise contour cap within an area of 9.1 km<sup>2</sup> around the airport. To accommodate growth within the noise contour cap, airlines introduce next-generation aircraft, which require wider stands.<sup>31</sup> New generation aircraft are up to 17% more fuel-efficient and open up new destinations by having a longer range. Also, there is higher passenger capacity with the same number of aircraft movements.



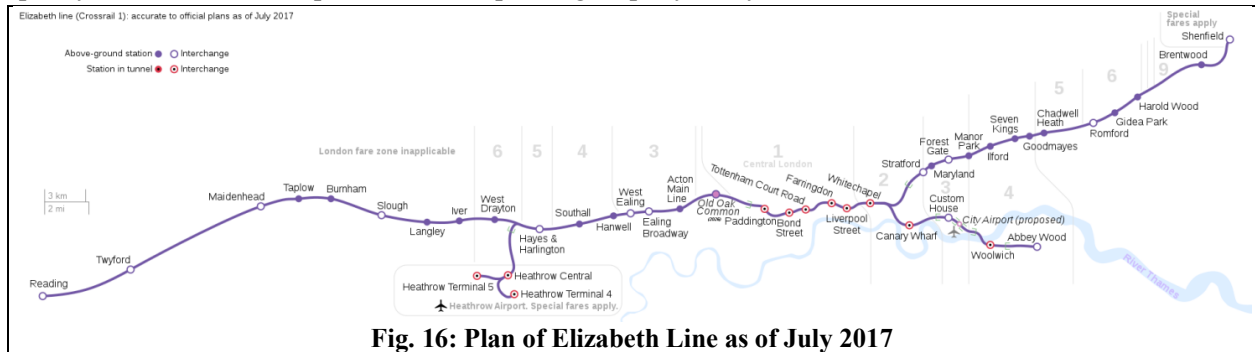
<sup>31</sup> “Embedding Sustainability into London City Airport: The City Airport Development Programme,” presented in Zofnass program workshop: Sustainable Infrastructure for Preventing Climate Change, Panel 4, Part A: Investing towards Adaptation and Resilience, November 5, 2019.



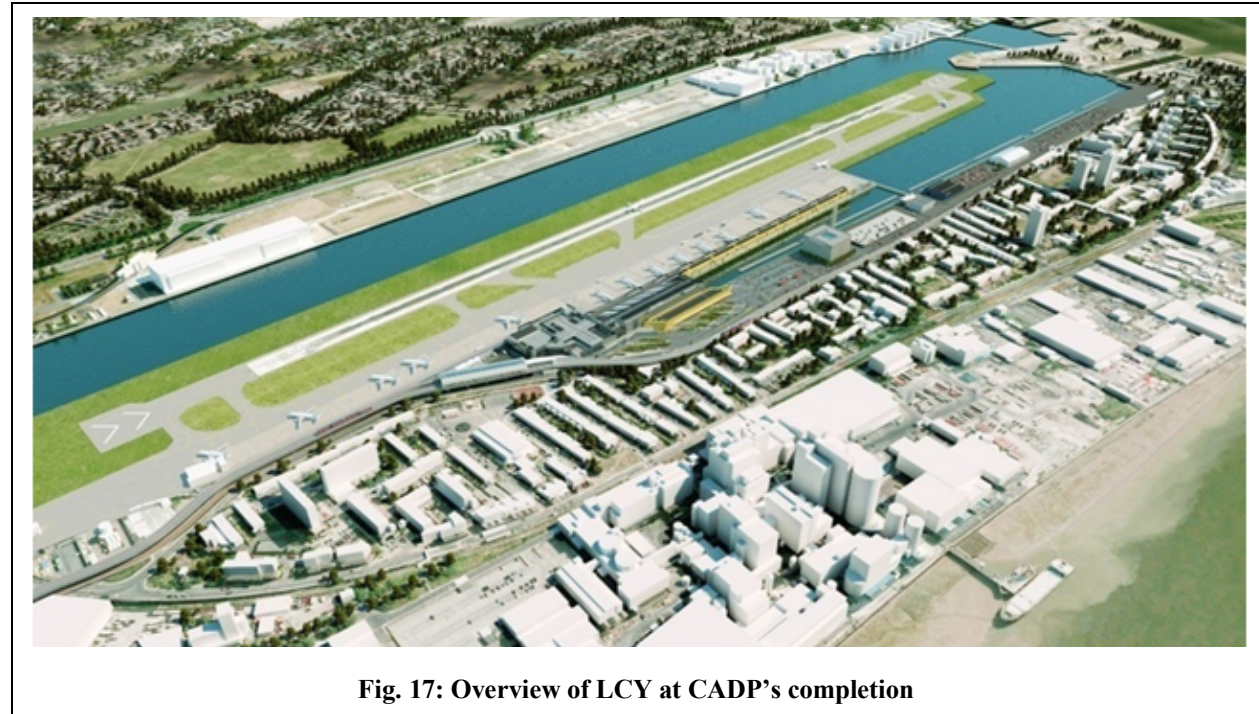
### Enablers: Improved accessibility

The increased number of passengers using the airport requires adequate accessibility to maintain the “20/15 passenger proposition.” Since the opening of the Docklands Light Railway (DLR) station at the airport in 2005, LCY has been an easily accessible airport. The DLR offers a high-frequency service into central London (every 4 minutes at peak times) connecting with the Underground network and rail. Passengers can be at Canary Wharf within 15 minutes of getting on the DLR and in the City of London within 21 minutes. 69% of the passengers access LCY via public transport.

As part of the CADP application, a surface access capacity assessment shows that after CADP and planned ground transport upgrades are completed (DLR and Crossrail-Elizabeth Line), there will be sufficient capacity to accommodate up to 11 million passengers per year by 2035.



### CADP Program components



**CADP proposes to extend LCY eastwards by constructing a concrete deck on piles over approximately 7.54 hectares (ha) of King George V Dock (24 hectares).**

Works on CADP started in 2017, to be completed by 2022. The first delivered component is the UK's first **remote digital air traffic control tower**. Its construction was completed in 2018, and the tower is fully operational. The digital tower enhances the safety and growth of operations with a 360-degree view of the airfield at a higher level of detail than the human eye and improves air traffic management. **A new full-length parallel taxiway**,<sup>32</sup> running from east to west, will reduce the time for aircraft to stay on the runway, removing the current back-track. The taxi lane will connect the runway directly with the aircraft stands and will increase the capacity to 45 ATMs per hour.

The airport has 19 approved stands for scheduled aircraft. **Eight new stands** are proposed on a deck to the east of the existing apron over King George V Dock, to allow next-generation aircraft to park in a nose-in configuration to minimize space.<sup>33</sup>

As part of CADP, **easterly and westerly extensions of the terminal** will triple its size to 51,000 m<sup>2</sup> from 17,000 m<sup>2</sup>. Retail space will grow from 1,600 m<sup>2</sup> to 5,000 m<sup>2</sup>. The compact configuration of the facility will allow short check-in and boarding times compared to other airports.

New aircraft stands, the extended taxi lane, and the Eastern Terminal Extension will be on the deck over King George V Dock. The design contract was awarded to London-based architectural firm Pascall+Watson.



**Fig. 18: Drop-off area** (source: Bechtel)



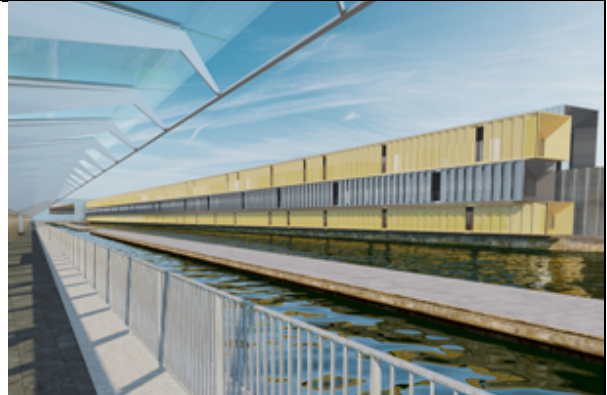
**Fig. 19: New aircraft stands** (source: Bechtel)

<sup>32</sup> Defined path at an airport established for the taxiing of aircraft and intended to provide a link between one part of the airport and another including stands, apron areas, and the runway.

<sup>33</sup> Draft Master Plan 2015-2035.



**Fig. 20: Terminal front entrance** (source: Bechtel)



**Fig. 21: East pier of terminal** (source: Bechtel)



**Fig. 22: Retail space** (source: Bechtel)



**Fig. 23: Connection to DLR** (source: Bechtel)



**Fig. 24: Departure lounge** (source: Bechtel)



**Fig.25: Check-in** (source: Bechtel)

(images source: Bechtel)

## Project schedule – Current status



**Fig. 26: Piling and deck works over King George V Dock** (source: BAM Nuttall)

In June 2017, LCY appointed Bechtel as Construction Manager of the CADP program. BAM Nuttall was appointed the subcontractor for the deck. The phased construction started in 2017, with LCY in full operation. Minimizing disruption for passengers, airlines, and the community and keeping to the airport's "20/15 passenger proposition" during construction is a logistic challenge for the project team. It required detailed sequencing of works and delimitation of construction site areas. According to Mick Stafford, Senior Delivery Project Manager for construction planning of LCY, back-of-the-house works and relocations of services so as not to airport operations are "of equal importance as the construction project, if not more."

Stafford calls it an "extremely busy project," with overlapped tasks to optimize the construction schedule. BAM Nuttall established a partnership with sensor equipment start-up Converge, funded by a grant from Innovate UK, for "sensors that give accurate predictions of when the concrete reaches its required strength, so the contractor knows when to get on with the next part of the job." It is the first commercial application of the technology, and predictions prove to be 95% accurate to the degree that the team does not need core laboratory testing anymore.<sup>34</sup>

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<sup>34</sup> Emily Ashwell, "Smart Concrete Saving Time at London City Airport," posted at [new.civilengineer.com](http://new.civilengineer.com) on January 20, 2020.

**Table 1: Indicative schedule of construction works<sup>35</sup>**

CONSTRUCTION WORKS	2017				2018				2019				2020				2021				2022			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Enabling works				■	■																			
Digital Air Traffic Control Tower					■	■	■	■																
Forecourt reconfiguration						■	■																	
Piling & Decking							■	■	■	■	■	■												
West Terminal extension								■	■	■	■	■	■											
8 new stands									■	■	■	■	■	■	■									
East Pier Phase 1										■	■	■	■											
Taxiway														■	■	■	■							
East pier Phase 2											■	■	■	■										
East Terminal extension Phase 1															■	■	■	■	■	■	■	■	■	

Over 1,000 large-diameter bored concrete piles with steel casings were installed, supporting the 75,000 m<sup>2</sup> concrete deck. The deck consists of precast reinforced concrete planks with an in situ concrete overlay spanning onto precast concrete beams. The average water depth is approximately 10 m, with the piles approximately 20 m long. Modular pontoons supported the installation of the piles. In Spring 2020, 90% of the piles were complete and the planks were in place.

## SUSTAINABLE PERFORMANCE

### Policy framework for sustainability

The planning agreement between LCY and the London Borough of Newham is in line with national and regional plans for sustainability and resilience for new developments. The London Plan includes several policies for sustainable design and construction, with targets for energy efficiency and the utilization of renewable energy, as well as the adoption of sustainable design criteria. Moreover, there are recognized targets for sustainability based on BREEAM.<sup>36</sup>

Government policy directly regulates noise limits and air quality standards. The applicable standards for noise are:

- the Noise Policy Statement for England (2010),
- the National Planning Practice Guidance (2014),
- the National Planning Policy Framework (2019),
- the Aviation Policy Framework of 2013 and the Aviation 2050.

<sup>35</sup> Indicative Schedule of works, source: LCY website.

<sup>36</sup> BREEAM is a sustainability assessment tool (<https://www.breeam.com/>).

Moreover, government policy concerning sound insulation currently requires that airports offer protection to nearby residential buildings, schools, and hospitals exposed to air noise exposure levels of 63 dB LAeq for 16 hours or more. Further extension of noise insulation thresholds is under consultation.<sup>37</sup>

The Air Quality Strategy for England, Scotland, Wales, and Northern Ireland provides the framework for ensuring compliance with the air quality limits based on a combination of international, national, and local measures to reduce emissions and improve air quality. The air quality limit values set by the European legislation have been national law in the UK.<sup>38</sup>

Wider environmental, social, and economic impacts ensuring sustainable development and operations were not obligatory by government policy. However, they were conditional to the CADP permit: “No Phase of the development shall commence until a Sustainability and Biodiversity Strategy has been submitted to and approved in writing by the local planning authority in respect of that Phase.”<sup>39</sup>

Moreover, airports are required to “provide a full assessment of emissions, drawing on all feasible, cost-effective measures to limit their climate impact, demonstrating that their projects will not have a material impact on the government’s ability to meet its carbon reduction targets.”<sup>40</sup> By signing the Paris Agreement, the UK has committed to tackling climate change and has set a zero-carbon target for 2050, which has been legislated by the UK Government.<sup>41</sup> London was one of the first cities to develop plans compatible with the Paris Agreement and move towards becoming a zero-carbon city by 2050. However, despite the Government's commitment to set a clear and appropriate level of ambition for the aviation sector, currently **no UK policy mandates aviation sector-specific emissions reduction targets**; reductions are made wherever they are most cost-effective across the economy.<sup>42</sup>

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<sup>37</sup> The Government is currently consulting on whether to extend the noise insulation policy threshold to the 60 dB LAeq, 16h contour. Also, the Government is consulting on a new minimum threshold of an increase of 3 dB LAeq, which would make the 54 dB LAeq, 16h contour or above the new eligibility criterion for assistance to households with noise insulation, for airspace changes that lead to significantly increased overflight. (Source: Bickerdike Allen Partners, London City airport master plan noise assessment report, April 2019.)

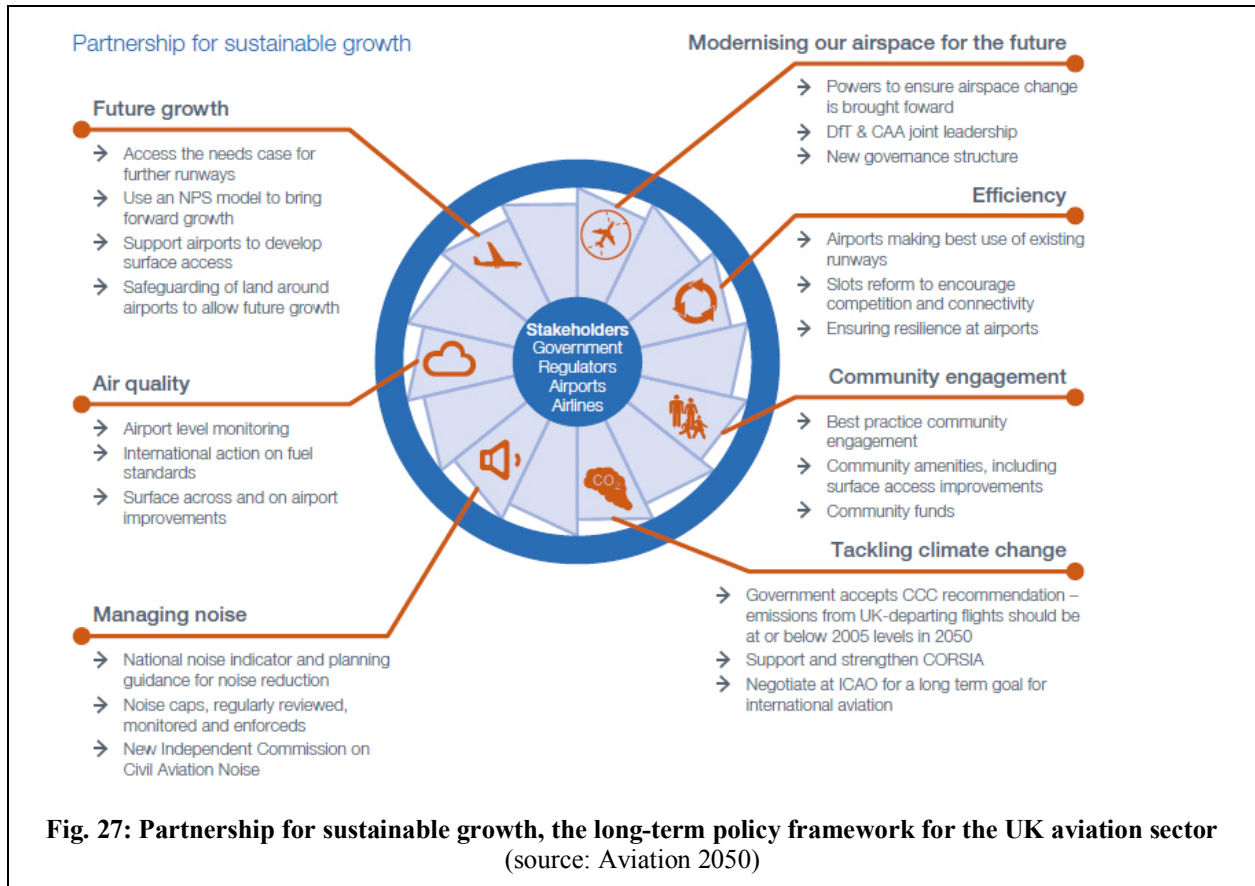
<sup>38</sup> ARUP, London City Airport master plan Air Quality Assessment, April 2019.

<sup>39</sup> City Airport Development Programme (CADP1) Condition 56: Sustainability and Biodiversity Strategy, March 2017.

<sup>40</sup> RPS, technical note on carbon and greenhouse gas emissions; in support of the London City Airport master plan 2020-2035, May 2019.

<sup>41</sup> On June 12, 2019, the Government announced that it would amend the 2008 Climate Change Act so that the UK will have zero carbon by 2050 rather than adopting an 80% reduction in emissions by this date.

<sup>42</sup> RPS, technical note on carbon and greenhouse gas emissions; in support of the London City Airport master plan 2020-2035, May 2019.



Sustainability strengthened the CADP planning application. LCY worked with consultants to develop environmental, social, and economic impact assessments of the proposed development as well as the impacts of the no-development scenario. The strategies adopted aimed to better balance trade-offs. CADP aims to achieve a BREEAM certification of “very good.” The sustainability strategy sets priorities and principles to ensure “sustainable and responsible growth,” including:

- jobs and community,
- make best use of the existing runway,
- connectivity,
- noise,
- carbon emissions,
- air quality.

## Environmental sustainability

### Noise mitigation strategy

Operating within the permitted noise contour envelope is a requisite for the airport’s license to operate, and it is subject to monitoring. LCY has put in place monitoring mechanisms as well as an Incentives and Penalties Scheme to encourage airlines to operate their aircraft more quietly. Moreover, LCY seeks to reduce the area and number of people that would otherwise fall within the contour.

The airport operates with a **steeper approach** with a glide slope of 5.5 degrees that reduces noise impacts on local communities under the arrival flight paths.<sup>43</sup>

- Operating within a noise quota count annual budget is based on the noise performance of individual aircraft types.
- The airport operates a **comprehensive Sound Insulation (SI) Scheme** for residential dwellings and public buildings, tiered so that those closest to the airport receive a higher specification of insulation. The trigger for eligibility for treatment is currently the lowest of any UK airport.<sup>44</sup>

## Air quality strategy

LCY **operates within National Air Quality Limits**. It has been recognized as the UK's best-performing airport in terms of public and sustainable ground transport use to and from the airport. Currently, 69% of passengers take public transport to and from the airport. LCY's target for 2035 is to reach 80% public transport use by passengers, and the airport is working for extended DLR operating hours. Other features of the air quality strategy include:

- carrying out **comprehensive air quality monitoring** onsite, including monitoring ambient air quality and sharing the results with the local authority. Near real-time data are available online and the findings are reported annually;
- operating an Air Quality Management Strategy to improve performance against UK air quality objectives for all pollutants monitored;
- all vehicles owned by the airport will be London Ultra Low Emissions Zone-compliant by December 2020;
- all airside vehicles will have a permanent vehicle pass to be electric (or zero emissions) or will use renewable fuels by 2030;
- provision of 300 parking spaces with electric charging points, as well as the provision for electric charging or zero-emission vehicles on all parking spaces by 2035;
- all future stands will be equipped with fixed electrical ground power;
- use of gas-fired combined heat and power (CHP) systems to suit the airport's baseload profiles and photovoltaic panels on the terminal building roof;
- provision of ultra-low NO<sub>x</sub> boilers and CHP systems that include 95% catalytic reduction of emissions.

## Carbon emissions and climate change

The need to address climate change has become more urgent than ever. An airport contributes to climate change from sources such as emissions from aircraft on the ground, in landing, and take-off; emissions from airport buildings; ground operations including airside vehicles and ground power units; surface access transport; construction and refurbishment work; and the consumption of water, energy, and natural resources by its activities and those of suppliers and tenants based at the airport.

Though the UK has committed to a net-zero GHG target for 2050, "fully decarbonizing aviation is going to be difficult. The zero-carbon pathway assumes there will be 10% residual emissions from aviation, old

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<sup>43</sup> Glide slope: the path of descent for an aircraft preparing to land, usually 3 degrees to minimize fuel consumption.

<sup>44</sup> Further details are available in LCY's 2018- 2023 Noise Action Plan on LCY website.



building stock, and the industry. **These need to be offset through negative emissions technologies such as carbon capture and storage.**<sup>45</sup>

LCY is committed to becoming the UK's most sustainable airport and has set a goal of reaching net-zero carbon emissions by 2050, consistent with UK and London commitments. Moreover, it aims to achieve this target without offsetting carbon. LCY coordinates with airlines and manufacturers on the hybrid and electric aircraft agenda.

LCY is minimizing carbon emissions in its operations, from high-efficiency runway lighting to low-carbon energy systems. It has been working with airlines to use new-technology aircraft, which are fuel-efficient and emit fewer carbon emissions per passenger per flight. The airport also promotes increased public and sustainable transport usage by staff and passengers, and works with the National Air Traffic Services (NATS), the air navigation service provider in the UK, to deliver their predicted annual savings in fuel burn and CO<sub>2</sub> emissions through participation in the Government's airspace modernization process "Our Future Skies."

LCY has already reached an essential milestone in receiving a Level 3+ (carbon neutrality) status from the Airport Carbon Accreditation Programme, the highest accreditation, in recognition of its work in managing, reducing, and offsetting the CO<sub>2</sub> emissions under its control.

### **Minimizing construction impact**

The effects of the construction of CADP were evaluated, and mitigation and control measures were recommended in a Construction Environmental Management Plan (CEMP), with which all contractors have to comply. Sustainable procurement was embedded in construction contracts.

Using building information modeling (BIM), the planned duration of construction was optimized, and potential environmental impact was managed, enabling energy performance modeling and minimizing waste during construction. More specifically,

- the deck structures have been designed for maximum offsite fabrication;
- piling was transported via barges, thus reducing carbon emissions associated with traditional road transport;
- to date, over 22,000 tons of material has been removed with barges, saving the equivalent of 1,178 lorry journeys by road and 2,083 tons of CO<sub>2</sub> emissions.

### **Dock water quality and biodiversity**

The airport site has had an effective site-wide drainage system in place for years, to minimize the volume of surface runoff into the surrounding water. As part of CADP, new airside and landside surface water drainage systems attenuate runoff to the surface drainage system, and divert clean rainwater for discharge back into King George V Dock or recycling; and new interceptors and other pollution abatement equipment are planned to be installed.<sup>46</sup>

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<sup>45</sup> "Zero Carbon London: A 1.5°C Compatible Plan," 2018.

<sup>46</sup> City Airport Development Programme (CADP1) Condition 56: Sustainability and Biodiversity Strategy, March 2017.

The site of LCY has “a low ecological and biodiversity value, largely as a result of being an intensively managed airport facility that, by necessity, discourages animals, including foraging and breeding birds, which may disrupt or endanger safe operations.”<sup>47</sup> As part of its sustainability strategy, LCY is taking measures to protect wildlife and enhance habitat management. In 2017, LCY installed an artificial fish refugia (submerged wire mesh panels) in the dock before the construction to compensate for the loss of sections of the dock wall during construction. The refugia provides a food source and shelter, contributing to long-term biodiversity and ecological health.

## **Social and economic sustainability**

To understand LCY’s importance and contribution to the long-term economic and social well-being of the area, LCA appointed York Aviation and the University of East London to undertake a detailed economic and social impact assessment of the airport that was presented in 2013 as part of the CADP Need Statement. The assessment concluded that allowing the airport to reach its optimum potential would make a valuable contribution to London and the local area. Failure to allow LCY to expand its infrastructure would have adversely impacted business travel demand. The use of alternative airports for the unmet need would result in lost productive working time, with economic implications.

### **Economic contribution to the broader economy**

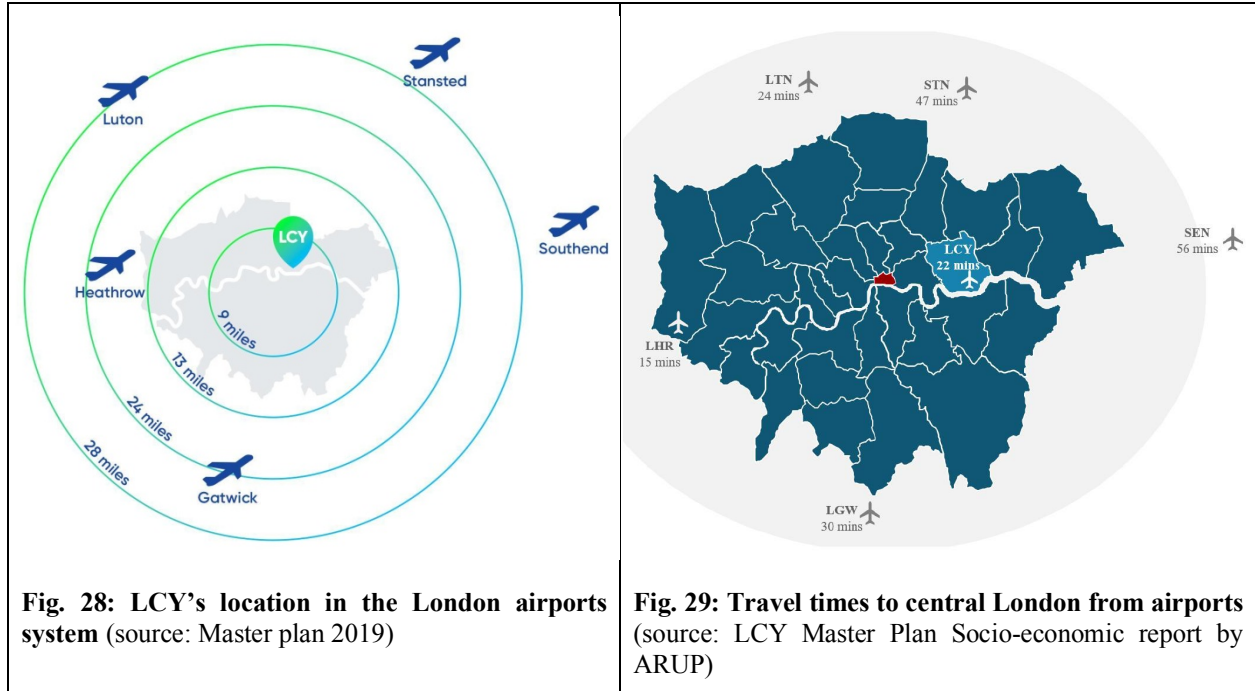
The economic need for the development is founded in the vital role that LCY plays in serving the air travel needs of the City of London, Canary Wharf, Central London, and East London.

The importance of LCY needs to be seen within the context of overarching policies seeking to rebalance the growth of London's economy towards the east. The airport opened in 1987 and **was an essential part of the proposition** that brought inward investment to the area. Its development has been symbiotic with the creation of the second center for the financial services sector in Canary Wharf and, due to its strategic location in the heart of East London, it can also serve the developing economic base in the wider Thames Gateway region. The presence of an airport has been and still is a strong selling point for inward investors.

The airport is highly valued by its business users and companies across East London and the City. It has the highest share of business trips of all airports serving London. In 2012, an estimated £239 million worth of business travel passed through the airport.

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<sup>47</sup> Ibid.



In addition to providing access to key European markets, LCY also has the highest share of domestic flights of all airports serving London, playing a pivotal role in connecting cities across the UK and facilitating trade within the country. In both 2017 and 2018, 20% of the passengers at LCY were on UK flights, compared to an average of 7% for the other London airports.

However, LCY's proposition is not limited to business travel. In 2018, for the first time, there was an equal split of 50% leisure and 50% business passengers. The broader mix of passengers also supports a more extensive range of destinations. It allows airlines to optimize their services, focusing on key business routes at peak times of the week, and offering leisure connections to benefit the local population and inbound tourism in off-peak periods.<sup>48</sup>

In 2019, the direct economic impact of LCY was approximately £760 million, and it is expected to reach £1.5 billion after CADP is completed in 2022.

### Leveraging transport investment<sup>49</sup>

LCY was a significant factor in the impetus to construct and extend the Docklands transport network, especially building the DLR station at the airport and then extending the line to Woolwich Arsenal. The DLR extension south of the river would not have been viable and would not have been constructed without the stimulus that the airport provided to the opening of the line. The result is that many new sites along this route have been opened up for regeneration opportunities. An efficient transport network also facilitates

<sup>48</sup> The expected increase in leisure flying will be necessary for airlines as they seek to replace their existing fleets with newer, quieter aircraft types. The increased number of leisure passengers will allow more seats to be filled on these aircraft in off-peak times, helping underpin the business case for the investment in more environmentally attractive aircraft, while at the same time keeping fares lower for the benefit of all passengers.

<sup>49</sup> York Aviation, City Airport Development Programme Need Statement, 2013.

access to jobs for local people. It extends the catchment area for jobs in East London; for example, access for those living in Greenwich and Bexley would have remained much more difficult without the DLR.

A survey carried out by the University of East London to capture the residents' everyday experiences of the airport, and their views on its integration into the area, showed that **improved local transport links was the most mentioned benefit and a key reason for considering LCY a good neighbor.**<sup>50</sup>

### **Economic and social contribution to the local community**

The social impacts of the airport on its surroundings are, to a large degree, related to the financial impact. Social benefits are more focused on the local community of East London, for which LCY is a crucial asset. The local community is characterized by:

- significant projected population increases,
- significant projected employment growth,
- low but rising per capita income,
- low (but growing) productivity given its size and proximity to central London,
- lower job density (ratio of jobs to population) compared to the London average, and
- lower levels of skills compared to the London average.

The economy of the local community has been underperforming compared to the rest of London. Despite improvements in recent years in the socioeconomic conditions of the area, the airport's immediate employment catchment area still shows signs of deprivation. In Newham, job density (jobs per resident) is half of the London-wide average. LCY is one of the largest employers in the area, currently directly generating around 2,000 full-time equivalent (FTE) jobs. Out of these, 65% of jobs are held by local residents. Moreover, LCY spends £34.5 million on local businesses as part of its supply chain.

CADP supports employment growth, both in terms of the number of jobs and also in proactively helping local people to work. Overall, the proposed development will facilitate the creation of additional employment:

- up to 2,100 new onsite jobs at the airport (1,800 FTE jobs),
- another 700 new indirect and induced FTE jobs in the local area (excluding construction jobs that peaked at 800 in 2018), and
- £210 million in annual economic output measured as gross value added (GVA) through direct, indirect, and induced employment opportunities.

The airport will develop targets for local employment following the example of CADP – which (for October 2017) aimed for at least 40% of recruits for onsite employment to be residents of Newham, and at least 70% to be filled by residents within the area.

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<sup>50</sup> Master plan 2006.

## Impact of not investing beyond CADP

A Socio-Economic Assessment Report<sup>51</sup> was commissioned to Arup as part of the master plan of 2019 that updates planning through 2035. The report updates the work by York Aviation and demonstrates the positive local and broader socioeconomic impacts of the proposed 69% increase in passenger growth.

It is interesting to focus on the report's no-investing scenario, resulting in the airport not being able to meet demand. Not investing would result in pressures on the airport's operational capacity. Moreover, as an airport approaches capacity, indications of capacity pressures manifest themselves progressively in the form of congestion and delays, disruption to schedules, and loss of potential opportunities for new services or new destinations, which could lead to decreased connectivity for the area served by the airport. The inability to meet unconstrained passenger demand could result in higher airfares charges. Airports Commission research indicates that fares at constrained UK airports can be approximately 10% higher than at less constrained airports.

## ABBREVIATIONS

ATMs	Air transport movements
CAA	Civil Aviation Authority
CADP	City Airport Development Program
DfT	Department for Transport
DLR	Docklands Light Railway
FTE	Full-time equivalent
GVA	Gross value added
LCY	London City Airport
mppa	Million passengers per annum

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<sup>51</sup> ARUP, London City Airport Master Plan Socio-Economic Report, April 2019.