LONDON CITY AIRPORT

City Airport Development Programme (CADP1)

Condition 58: Air Quality Management Strategy

March 2020 v4

LONDON CITY AIRPORT
AIR QUALITY MANAGEMENT STRATEGY
2020-2023

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1 INTRODUCTION

1.1. The City Airport Development Programme (CADP1) application (13/01228/FUL) was granted planning permission by the Secretaries of State for Communities and Local Government and Transport in July 2016 following an appeal and public inquiry which was held in March/April 2016.

1.2. Condition 58 of the CADP1 Permission states:

The development shall not commence until an Air Quality Management Strategy has been submitted to and approved in writing by the Local Planning Authority. The Air Quality Management Strategy shall be implemented on the commencement of the development. The Strategy shall include but not be limited to the following details:

- *Measures to manage and mitigate adverse air quality impacts (including black smut and oily deposits) due to the operation of the Airport;*
- *Measures to minimise idle and taxi times for aircraft prior to take off;*
- *Measures introducing and enforcing regulations to prevent airside vehicles being left unattended with engines running;*
- *Periodic emissions-checking of airside vehicles;*
- *A system to ensure that regular maintenance of airside vehicles is being undertaken;*
- *Measures to encourage the use by staff of the most sustainable options for travel to and from the Airport; and*
- *A linkage between air quality and the Staff Travel Plan and the Passenger Travel Plan.*

Every three years from approval of the first Air Quality Management Strategy the Strategy shall be reviewed and the reviews shall be submitted to the Local Planning Authority for approval on 1 June (or the first working day thereafter) and implemented as approved

Reason: In the interests of reducing air quality impacts in accordance with the UES.

1.3. An Air Quality Management Strategy was prepared to discharge Condition 58 of the CADP1 Permission; this covered the period 2017 – 2019 and was approved by the London Borough of Newham (LBN) in June 2017. In accordance with Condition 58, the intent was to submit a revised Air Quality Management Plan to LBN before 1 June 2020, which would cover the period 2020 to 2023. However, the Covid-19 pandemic resulted in the closure of London City Airport to all commercial operations at the beginning of April 2020, and a delay to the submission was therefore agreed with LBN. The next review will occur 3 years after the date on which LBN approve this version.

1.4. A number of other CADP1 pre-commencement conditions relate to aspects of this strategy. Where appropriate, key elements of these Plans and Strategies, insofar as they support or are directly related to this Air Quality Management Strategy, are summarised in this document. This document doesn't relate to emissions arising from construction activity, which are covered in Condition 88 (Construction Environmental Management Plan).

1.5. Progress on each measure/target will be discussed with LBN at bi-monthly meetings and set out in the Annual Performance Report each year. Any breaches of the targets will be clearly identified together with the remedial actions that were taken, or are proposed.

1.6. All targets and measures in this strategy are summarised in Box 1. They are also subject to the extent and profile of LCA's recovery from the Covid-19 pandemic, and therefore may need to be reviewed on a rolling basis with LBN. Airport activity in 2020 has not be used as a baseline due to its unusual nature. LCY reiterate its commitment to improve local air quality by continuing addressing direct and indirect emissions through, but not limited to, the initiatives included in this strategy document, its industry wide collaboration to low carbon aviation projects and by keeping abreast of ongoing research and opportunities to support further analysis of the sources and impacts of air quality on and around the airport.

BOX 1: AIR QUALITY MANAGEMENT STRATEGY (2020 – 2023)

Measure	Expected emissions / air quality benefit	Outputs / targets / KPIs	Completed by
Ground Power			
Measure 1: Maximising availability of Fixed Electrical Ground Power (FEGP).	NOx and PM_{10} emissions from Auxiliary Power Units (APUs) and Mobile Ground Power Units (MGPUs) were 4.7 and 1.1 tonnes respectively, in 2017. Measures to minimise APU and MGPU run times (and emissions) include the provision of FEGP and actions taken to ensure its availability.	London City Airport will continue to routinely record the availability of FEGP on all stands where it is has been installed, and the time taken to effect repairs until June 2021 when all diesel MGPUs will be replaced with battery MGPUs. It will also continue to record the use of FEGP within the online portal and document any contraventions of Airfield Operating Instruction AOI 07 until June 2021.	June 2021
Measure 2: Minimising APU Use.	NOx and PM_{10} emissions from APU use were 4.5 and 1.05 tonnes respectively, in 2017. Airfield Operating Instruction AOI 07 restricts the running of APUs.	London City Airport will continue to monitor the use of APU in accordance with AOI 07, and will continue to record APU use via the Airport's "Qlickview" online reporting tool. Any contraventions of the Airfield Operating Instructions, and any future requirements within the APU Strategy, will be documented.	June in each year
Measure 3: Phasing Out Diesel MGPUs.	NOx and PM_{10} emissions from diesel powered Mobile Ground Power Units (MGPUs) were 0.2 and).1 tonnes respectively, in 2017. Completely restricting their use will eliminate these emissions.	Reliance on diesel MGPUs will be phased out completely by 30 June 2021 in accordance with the requirements of Condition 46 of the CADP1 Conditions. Battery-powered units (B-MGPUs) and FEGP will remain in use	June 2021
Emissions from Aircraft Taxiing Operations			
Measure 4: Ground Engine Running Strategy – air quality implications	Ground running relates to the use if aircraft engines on stand, during taxiing, and on-hold, and accounted for 15.6 tonnes NOx and 0.35 tonnes PM10 in 2017. The Ground Engine Running Strategy is aimed at ensuring aircraft engines are operated at minimum power necessary and for as short a time as possible.	London City Airport will continue to review the outcomes of the Ground Engine Running Strategy within the quarterly reports and will prepare a report for submission to LBN on the air quality implications where ground running times exceed agreed targets.	Within 2 months of GERS quarterly reports
Measure 5: Reduced thrust during taxiing.	Taxiing accounted for 14.2 tonnes NOx and 0.3 tonnes PM_{10} in 2017. Emissions can be reduced by "Engine-Out Taxiing" in which one or more engines is switched off. However, while EOT is used, there are current safety concerns. Reduced thrust on taxiing may also be used, but is limited due to the current taxiway infrastructure.	London City Airport will work with the major airlines to explore the potential to introduce reduced thrust during taxiing. A feasibility study will be completed within six months of the new CADP taxiways becoming operational	December 2021

Measure 6: Electric Taxiing Systems	Emissions from taxiing could be reduced or potentially eliminated by the use of electric tugs or on-board electric systems	London City Airport will review emerging technologies related to Electric Taxiing Systems and will provide an updated report on feasibility**.**	December 2021
Ground Running, Testing and Maintenance			
Measure 7: Ground Engine Running, Testing and Maintenance	Emissions from engine testing accounted for 0.8 tonnes NOx in 2017.	London City Airport will continue to review the outcomes of the Ground Engine Running, Testing and Maintenance (GERT&M) Strategy and will advise on the air quality implications, specifically with regard to proposals for relocation of the engine ground run positions.	Within 2 months of the revised GERT&M Strategy
Airside Vehicles and Plant			
Measure 8: ULEZ Compliance – Airport owned vehicles	The ULEZ will require diesel cars and vans to comply with the Euro 6 emission standard which will, on average, reduce NOX emissions by 65% compared to Euro 5.	A strategy to upgrade the LCY-owned fleet to ULEZ requirements has been developed and shared with LBN. Once the ULEZ is extended London City Airport will carry out a feasibility study as to whether LCA-owned airside vehicles can be made ULEZ compliant. If this is feasible, a programme for vehicle upgrades and/or replacement will be submitted to LBN. London City Airport will also review AOI 12 to reflect the expansion of the ULEZ.	October 2021 or on extension of ULEZ
Measure 9: ULEZ Compliance – Third Party Operators	The ULEZ will require diesel cars and vans to comply with the Euro 6 emission standard which will, on average, reduce NOX emissions by 65% compared to Euro 5.	London City Airport will work with third-party operators of airside vehicles and undertake a feasibility study for achievement of full ULEZ compliance.	October 2021 or on extension of ULEZ
Measure 10: Airside Vehicle Permits (AVP) – Promote Earlier Introduction of Cleaner Vehicles	Emissions from Ground Support Equipment (principally airside vehicles) accounted for 2.7 tonnes NOx in 2017. The AVP system can be used to drive the introduction of cleaner vehicles at an earlier stage, in advance of full ULEZ compliance.	London City Airport will continue to enforce a requirement in AOI 12 that all new vehicles issued with a Airside Vehicle Permit (i.e. not renewal applications for existing AVPs), comply with the latest vehicle emissions standards for road vehicles (Euro Standards) defined as the date by which the Euro Standard comes into force for registration and the sale of new vehicles.	June in each year
Measure 11: Vehicle Emissions Testing	Failed abatement systems can lead to substantially high emissions on individual vehicles	London City Airport will continue to undertake routine annual, and periodic, random emissions testing for Airport owned and third-party airside vehicles. Where a vehicle fails, a Vehicle Defect Notice will be used; the operator will have 14 days to rectify the fault or the AVP will be withdrawn. The results of the testing will be reported to LBN on an annual basis.	June in each year
Measure 12: Introduction of	Both hybrid and electric airside	London City Airport will revise	June in each

Hybrid and Electric Vehicles	vehicles would reduce emissions (above and beyond ULEZ standards), but is dependent on the availability of suitable vehicles	the procurement process for the purchase of new vehicles owned by the Airport, with a focus on hybrid or electric alternatives. The outcome of this process will be reported on an annual basis.	year
Emissions from Black Cabs			
Measure 13:.Anti-Idling: Black cabs	Idling engines when stationary causes unnecessary pollution emissions. Vehicle Idling Action is a behaviour change campaign supported by LBN.	London City Airport will continue to monitor idling by black cabs and will report any issues to the Airport Transport Forum	Twice a year
Publicity and Promotion			
Measure 14: Review and Update Website	No direct emissions benefits, but critical in communicating with staff, passengers and members of the public, and disseminating information of air quality	London City Airport will continue to review and update the website to provide clear, concise information to the local and wider community on the performance of the Air Quality Management Strategy.	June in each year
Measure 15: RAMP Sampling.	Although subject to workplace air quality standards, staff on the RAMP are likely to be exposed to higher levels of pollution	London City Airport will continue to undertake, on a two-year basis, a RAMP employee air quality monitoring assessment with direct, individual recording apparatus	April 2021 and April 2023
Measure 16: Staff Communications.	No direct emissions benefits, but critical in communicating with staff, and in gaining support to this Strategy	London City Airport will publish an article relating to air quality and airport operations at least once per year in the airport newsletter “Inside E16” or in the staff eBulletin	June in each year
Ultra Fine Particles			
Measure 17: Emission Inventories for Ultra Fine Particles (UFPs)	There is increasing evidence related to aircraft operations and UFPs, but there is currently no robust manner in which an emissions inventory can be compiled.	London City Airport will review the emerging evidence on UFPs related to aircraft emission inventories and will provide an update on an annual basis.	June in each year
Measure 18: UFP Emissions and Sulphur Content of Aviation Fuel	Recent evidence has identified a unique size distribution of UFPs related to aviation emissions, which may potentially be linked to the high S content of aviation fuel.	London City Airport will review the emerging evidence on the link between the sulphur content of aviation fuel and UFP emissions and will work with industry partners to assess the benefits and feasibility of reducing the sulphur content of the fuel.	December 2021

2. BACKGROUND

2.1 This Air Quality Management Strategy describes:

1. Why local air quality is of relevance to London City Airport;
2. What contribution the Airport makes to local air quality conditions; and
3. What measures the Airport intends to implement, with the objective of minimising the impact of its operations on local air quality.

2.2 London City Airport (LCA) comprises a single runway, a main terminal area, and a corporate aviation facility (the "Jet Centre"), together with supporting infrastructure, including a fuel farm, fire testing facilities and car parking. It has excellent public transport links, with 73% of passengers travelling by public transport in 2019[1], the highest use of public transport by any airport in the UK.

2.3 The pollutants of principal concern in the London Borough of Newham (LBN) are nitrogen dioxide (NO_2) and fine particulate matter (PM_{10} and $PM_{2.5}$). A summary of the sources of these pollutants and the principal environmental effects are described in Box 2.

Box 2: Pollutants of Concern in National Air Quality Objectives

Nitrogen dioxide: All combustion processes give rise to emissions of nitrogen oxides (NOx). Nitrogen dioxide (NO_2) and nitric oxide (NO) are collectively referred to as NOx.

The most important source of NOx is road transport, but emissions also arise from aircraft operations and other combustion sources such as boiler plant.

Particulate Matter: Particulate Matter (PM) is generally categorised according to the particle size; thus PM_{10} refers to particles with a diameter of less than 10 micrometres (µm), and $PM_{2.5}$ to particles with a diameter of less than 2.5 micrometres (µm).

Particulate Matter arises from a wide variety of sources, including both primary particles (which are directly emitted into the atmosphere) and secondary particles (which are formed in the atmosphere via chemical reactions). Road transport and aircraft operations generate emissions of primary PM through fuel combustion and non-exhaust emissions such as brake and tyre wear. There are many other sources of primary PM, including power generation, construction and quarrying; natural sources such as sea salt and Saharan dust also make a contribution.

2.4 London City Airport is committed to reducing air quality impacts on local air quality in accordance with Condition 58 of the CADP1 planning permission, reducing both concentrations and public exposure. Airport operations, including aircraft movements and airside operations, contribute to local air quality conditions to a relatively small degree, with other sources at both the local (e.g. road transport on the wider road network, industry etc.) and regional (e.g. transboundary) scales playing a major role.

2.5 London City Airport will continue to manage its operations over the three-year period between 2020 and 2023, so as to reduce air quality impacts. An annual statement on progress and performance, will be included within the Annual Performance Report (APR).

2.6 Whilst producing this document, consideration has also been given to the updated Air Quality Action Plan that was published by LBN in November 2019, and the Climate Emergency Action Plan published by LBN in July 2020. The measures and findings of that assessment

[1] London City Airport 2019 Annual Performance Report

have been considered to ensure that the proposed measures in this Strategy both enhance and complement the actions of LBN within the wider borough boundary.

2.7 The Air Quality Management Area (AQMA), in line with the Well Newham - 50 steps to a Healthier Borough and Towards a Better Newham Covid-19 Recovery Strategy, has been designated by LBN for exceedances of the annual mean objective for nitrogen dioxide and the daily mean objective for PM_{10}, was amended in 2019 to encompass the whole borough, and by definition, London City Airport lies within this AQMA. GLA has also identified a number of Air Quality Focus Areas in London, defined as areas that have both high levels of nitrogen dioxide and significant human

2.8 exposure. The Airport does not lie within any of these Focus Areas.

The LBN Air Quality Action Plan presents modelled pollutant concentrations from the London Atmospheric Emissions Inventory 2016 and notes that:

- Nitrogen dioxide concentrations exceed the air quality objective in the locality of all major roads in the borough;
- PM_{10} concentrations exceed the objective around some major roads, with the most significant source of PM_{10} being road transport and other sources associated with central London; and
- Concentrations of $PM_{2.5}$ exceed the WHO guideline of 10 µg/m^3 across the borough. Levels in the vicinity of major roads are higher, particularly in Stratford, Canning Town and at Prince Regent Lane.

2.9 The key 10 priorities identified in the Action Plan are:

- Enforcing the Non-Road Mobile Machinery (NRMM) Low Emission Zone;
- Promoting and enforcing smoke control zones;
- Promoting and delivering energy efficiency retrofitting projects in workplaces and homes;
- Supporting alert services such as airTEXT and promoting the Mayor's air pollution forecasts;
- Reducing pollution in and around schools, and extending school audits;
- Installing Ultra Low Emission Vehicle infrastructure;
- Improving walking and cycling infrastructure;
- Regular car free days/temporary road closures in high footfall areas;
- Reducing emissions from Council fleets; and
- Ensuring Master planning and development areas are aligned with *Air Quality Positive* and *Healthy Streets* approaches.

2.10 Insofar as Airport operations are related to these key priorities:

- London City Airport has committed as part of the CADP infrastructure to safeguard for 50 fast electrical charging points and 9 rapid charge points. These will be shared between

cars and taxis (during daytime peak hours) and airport vehicles (in evening off-peak hours);

- Doubled the provision of staff cycling to 48 across two key staff locations and provided additional stands take public cycle provision to 22. This provides a total of 70 cycle spaces across the airport.

- Provided funding through the CADP1 Section 106 for improvements to cyclist and pedestrian routes. The Airport is working with LBN to create a connection between Hartmann Road and Connaught Road to connect the Airport to the local cycle network;

- Provided funding through the CADP1 Section 106 for additional DLR station staff to ensure DLR remains the best choice for getting to and from the airport.

- The Airport Surface Access Strategy has identified facilitating the Healthy Streets approach as a key priority; and

- Any future planning application will conform with the Air Quality Positive approach, taking account of any future guidance issued by the GLA.

2.11 The LBN Climate Emergency Action Plan (Section 10 – Transport) commits to continuing to review compliance with all planning conditions and obligations for operation and construction works at London City Airport.

2.12 Wider policy and legislative context considered when creating this Air Quality Management Strategy is in Appendix 1.

3 AIR QUALITY MANAGEMENT STRATEGY 2020 - 2023

Contribution of Airport Operations to Local Pollution Levels

3.1. The Airport operates an Air Quality Monitoring Strategy, which currently comprises three automatic stations[2] and a network of 16 nitrogen dioxide diffusion tubes. The locations of these sites are shown in Figure 1. There have been no recorded exceedances of the nitrogen dioxide or PM_{10} objectives at the automatic sites since monitoring commenced at the Airport in September 2006. There were a number of recorded exceedances of the annual mean nitrogen dioxide objective at some of the diffusion tubes sites in 2011 and 2012; however none of these were at locations relevant to public exposure.

3.2. A site measuring $PM_{2.5}$ was installed at KGV House at the beginning of 2019. The annual mean concentration recorded in 2019 was 10.6 µg/m^3, and well below the Air Quality Objective (25 µg/m^3), but marginally above the WHO Guideline of 10 µg/m^3.

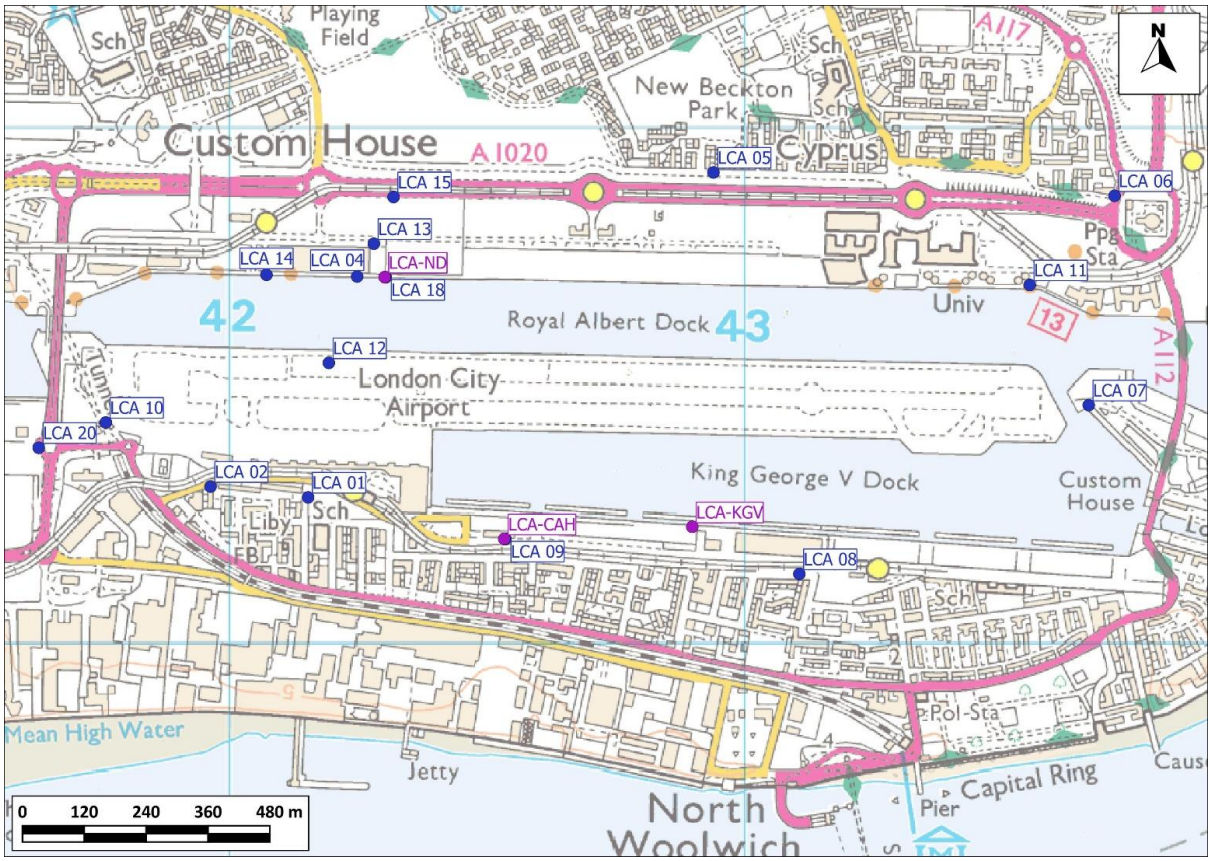


Figure 1: Monitoring site locations. LCA-CAH (NOx and PM_{10}); LCA-ND (NOx); LCA-KGV (PM_{10} and $PM_{2.5}$). Sites LCA01 - LCA20 are nitrogen dioxide diffusion tube locations

3.3. A detailed analysis of trends (2007 to 2019) in measured annual mean nitrogen dioxide concentrations has been carried out for monitoring sites in east London and this was

[2] The LCA-CAH will need to be decommissioned at some stage in the future, but the requirements for NOx and PM10 monitoring will be maintained. This is described in detail in the Air Quality Monitoring Strategy.

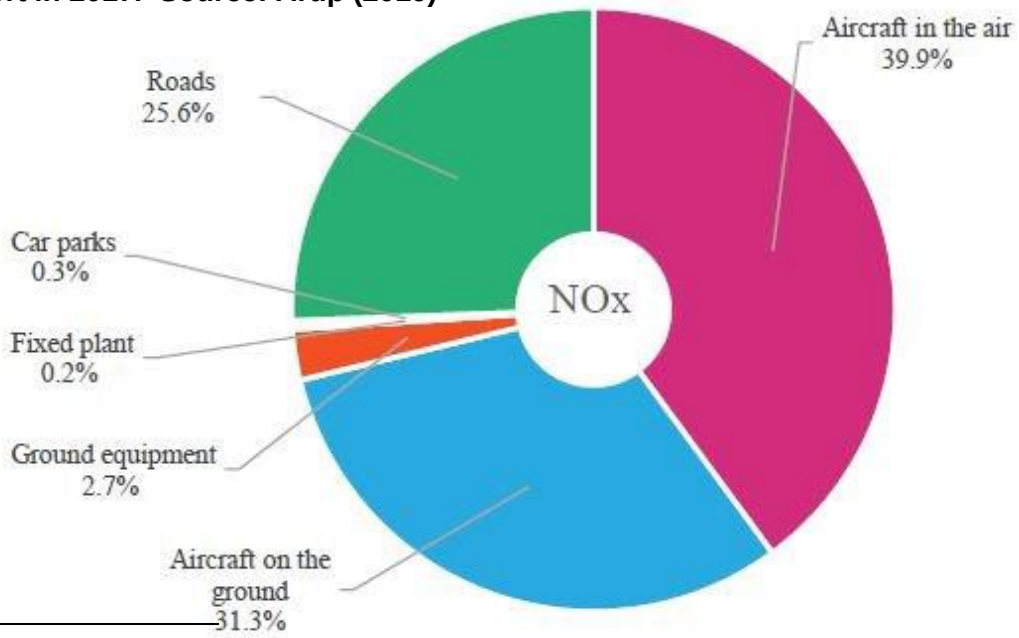
published as part of the Airports 2019 APR[3]. This has shown a statistically significant downward trend at both the LCA-CAH (-0.63 µg/m^3 per annum) and LCA-ND (-1.15 µg/m^3 per annum) sites, and at other sites in east London (including Newham Cam Road, Newham Wren Close, Tower Hamlets Blackwall, and all three sites in Greenwich). It is not possible to apply a Theil-Sen analysis to the past three years data (2017-19) covering the period of the previous Action Plan.

3.4. The Updated Environmental Statement (UES), which was published in September 2015 to accompany the City Airport Development Programme (CADP1) proposal, includes a detailed emissions inventory and dispersion modelling study. This document is available by request from environment@londoncityairport.com. The results of this study provide useful information regarding the contribution that Airport operations make to local air pollution levels. In terms of pollutant concentrations, the modelling study completed for the UES showed that Airport sources contribute a maximum of about 15% to nitrogen oxides concentrations at locations to the south of the Airport, and less than about 2% at most other locations. The contribution to PM_{10} concentrations is extremely small and less than about 0.3%.

3.5. Emissions from aircraft above about 100 metres altitude make very little contribution to ground-level pollutant concentrations in the vicinity of the Airport (Air Quality Expert Group (AQEG), 2004); in addition, the CAP1616 Airspace Change guidance published by the Civil Aviation Authority (CAA, 2018) notes that "*due to the effects of mixing and dispersion, emissions from aircraft above 1,000 feet (~300m) are unlikely to have a significant impact on local air quality*", and it is therefore appropriate to focus on emissions from sources at ground level.

3.6. An estimate of the contributing factors to NOx, PM_{10} and $PM_{2.5}$ emissions arising from various Airport sources at London City Airport in 2017 is shown in Figures 2, 3 and 4. Emissions from aircraft in the air include aircraft arriving and departing up to 3,000ft. Emissions from road sources is based on 2017 traffic data from roads identified in Figure 5.

Figure 2: Estimated Source Contributions to NOx emissions at London City Airport in 2017. Source: Arup (2019)



[3] Air Quality Consultants (2020) London City Airport Air Quality Measurement Programme: 2019 Annual Report

Figure 3: Estimated Source Contributions to PM_{10} emissions at London City Airport in 2017: Source: Arup (2019)

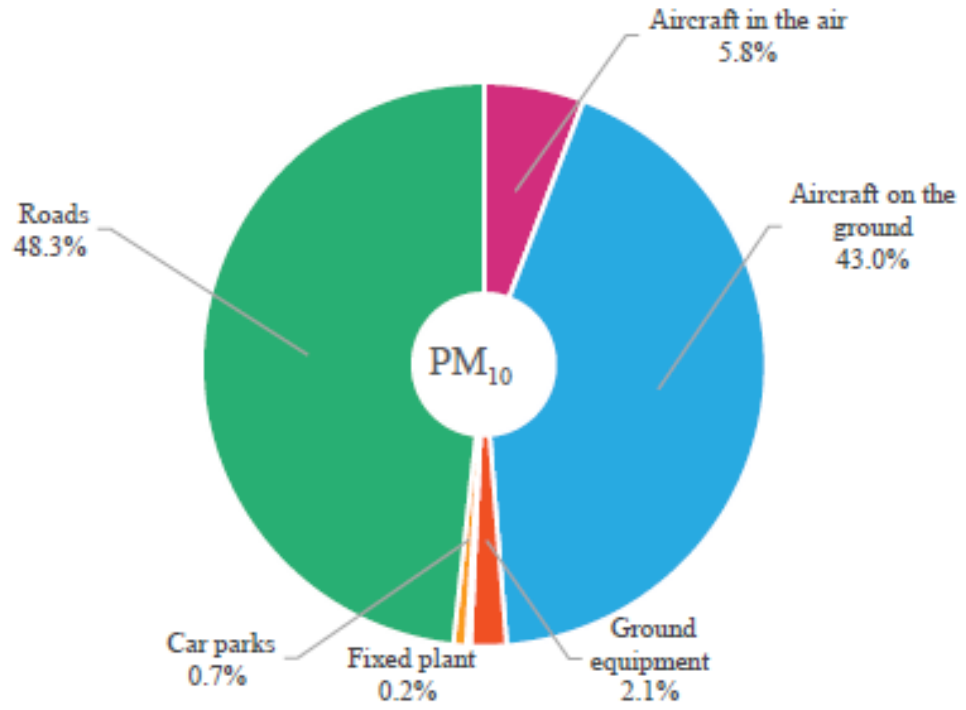


Figure 4: Estimated Source Contributions to $PM_{2.5}$ emissions at London City Airport in 2017: Source: Arup (2019)

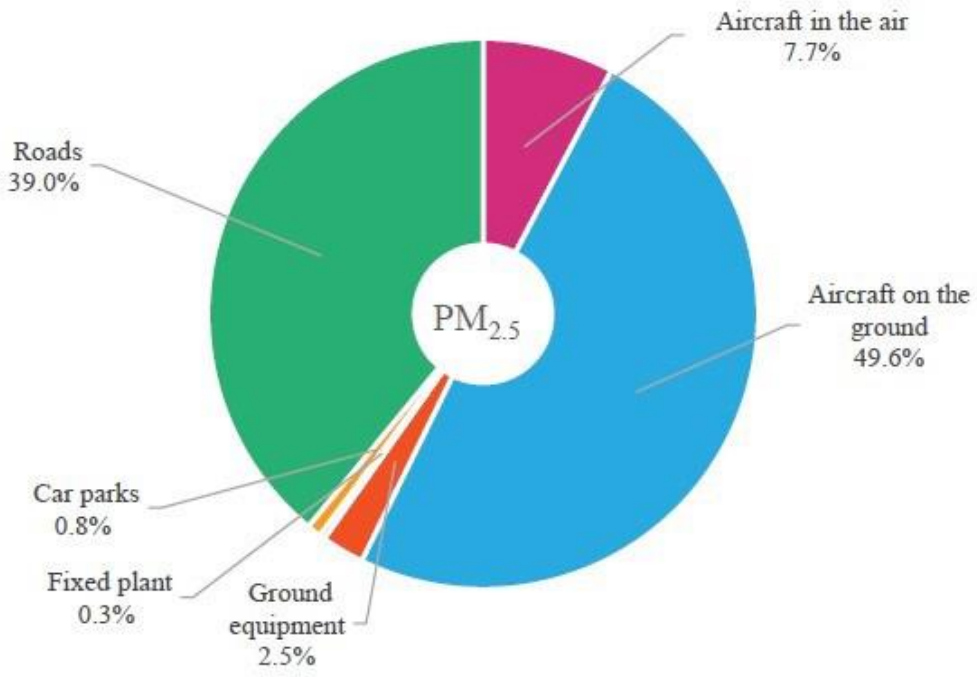


Figure 5: Modelled road network.

3.7. These modelled source contributions are further broken down and expressed as emissions (tonnes/annum) and as a percentage of the total ground-based emissions (for the reasons stated in paragraph 3.5) and are shown in Table 1.

Table 1: Summary of Annual Emissions (Ground-Based Sources) – 2017 (Source: Arup, 2019)

Source	NOx emissions te/yr (% of total)	PM10 emissions te/yr (% of total)	PM2.5 emissions te/yr (% of total)
Aircraft on Ground			
Landing	0.5 (0.8%)	0.01 (0.23%)	0.01 (0.31%)
Taxi in	4.4 (6.8%)	0.10 (2.29%)	0.10 (3.13%)
Hold	1.4 (2.2%)	0.03 (0.69%)	0.03 (0.94%)
Taxi out	9.8 (15.1%)	0.22 (5.03%)	0.22 (6.90%)
Take-off	12.5 (19.2%)	0.07 (1.60%)	0.07 (2.19%)
Brake wear	N/A	0.42 (9.61%)	0.17 (5.33%)
Tyre wear	N/A	0.09 (2.06%)	0.06 (1.88%)
APUs	4.5 (6.9%)	1.05 (24.03%)	1.05 (32.92%)
Engine testing	0.8 (1.2%)	<0.01 (0.23%)	<0.01 (0.31%)
Ground Equipment			
Ground Support Equipment	2.7 (4.2%)	0.07 (1.60%)	0.07 (2.19%)
MGPUs	0.2 (0.3%)	0.02 (0.46%)	0.01 (0.31%)
Fixed Plant			
Fire Training Ground	0.2 (0.3%)	0.01 (0.23%)	0.01 (0.31%)
Energy Centre	<0.1 (0.2%)	N/A	N/A
Car Parks	0.3 (0.5%)	0.03 (0.69%)	0.03 (0.94%)
Roads	27.6 (42.5%)	2.24 (51.26%)	1.35 (42.32%)

TOTAL	**65.0**	**4.37**	**3.19**

3.8. In relation to airport sources, for NOx, emissions from taxiing (24%), take-off (19%) and Auxiliary Power Units (APUs) (7%) use dominate. For both PM_{10} and $PM_{2.5}$, emissions from APUs (>24%), taxiing (8%) and brake wear (9%) dominate. Emissions related to surface access dominate overall contributing 43% of emissions for all pollutants.

3.9. LCA does not have direct control over all sources of emissions. The sources that the Airport does have direct control over include LCA-owned vehicles and ground support equipment, MGPUs, and fixed plant such as that at the fire training ground and energy centre. The Airport also has indirect control of some aircraft emissions whilst they are at the airport, by establishing operating criteria such as the maximum time that APUs can be running, and the conditions under which engine testing can be carried out. LCA also has some indirect control over third party vehicle emissions, by establishing emissions standards that must be met by third parties to operate at the airport.

3.10. There are however a number of emissions sources that LCA does not have direct control over. This includes emissions from passenger and staff travel to and from the airport, and aircraft emissions once they have left the stands. Stakeholder engagement and collaboration is therefore key to influencing a reduction in these emissions wherever possible. For example, whilst LCA cannot determine what aircraft type an airline operates at LCA, the Airport has invested significantly in developing aircraft stands that can accommodate the next generation of aircraft which are cleaner and more fuel-efficient. Similarly, the airport takes measures to encourage passengers and staff to use sustainable modes of transport to access the Airport.

Focus of the Air Quality Management Strategy

3.11. The focus of this Air Quality Management Strategy (AQMS) is on minimising emissions of nitrogen oxides (NOx)[4] from Airport operations, as this is the pollutant of greatest concern in the local area. Consideration is also given to the benefits of reducing exposure to particulate matter (especially $PM_{2.5}$). LBN has also raised concerns regarding emissions of Ultra-Fine Particles (UFPs) and this issue has been given additional consideration in this Strategy.

3.12. Measures to reduce emissions from fuel combustion sources (e.g. aircraft engines and road vehicles) will generally reduce emissions of both NOx and particulate matter, but in drawing together this Strategy, careful consideration has been given to ensure that this is the case for all measures considered.

3.13. London City Airport has established a protocol relating to the commissioning of Deposits Studies in the event that any complaints are received in relation to black smuts or oily deposits. As of 2016, complaints associated with these issues suggest that they are not a major problem but if the studies or the pattern of future complaints indicate otherwise, the Air Quality Management Strategy will be revised as appropriate.

3.14. This AQMS identifies measures that will be put into place to minimise both NOx and Particulate Matter (PM) emissions from Airport-related sources including:

[4] Emissions from combustion processes are primarily in the form of nitrogen oxides (NOx). Nitrogen oxides are transformed to nitrogen dioxide via chemical processes in the atmosphere.

i. Aircraft operations;
ii. Ground Support Equipment (including airside vehicles);
iii. Staff and passenger travel

3.15. The AQMS also identifies measures that will be used to inform and promote practices to improve air quality.

3.16. Where appropriate, this AQMS makes reference to other plans and strategies that are in place at London City Airport. In addition, previous progress has been considered when determining the measures within this latest AQMS.

3.17. To support the identified measures a review of air quality plans at a number of other airports have been undertaken, to ensure that all potential options are considered. A summary of this review is set out in Appendix 2.

Air Quality Management Strategy - Measures

Continuity of Previous Measures

3.18. To ensure continuity between the 2017-2019 Air Quality Management Strategy and this updated Strategy, it is important to ensure that any outstanding or ongoing measures are completed and progressed. Appendix 3 provides a list of current measures and progress to date, and the status of each Measure.

3.19. It is important to note that progress has been, and will continue to be determined with regard to the success with which the measure has been implemented, and it is not possible to determine the impact of individual measures, or a package of measures, with respect to changes in pollutant concentrations. This has been recognised in a recent report by the Air Quality Expert Group (AQEG)[5] which notes that "The assessment of interventions can be challenging for several reasons. These challenges include the common situation where interventions rarely occur in isolation from other changes that affect air quality, and the difficulty in detecting and quantifying changes if the interventions are small. Indeed, not every intervention is detectable in terms of quantifying changes in pollutant concentrations or health outcomes, even using sophisticated analysis techniques".

Ground Power

3.20. Both APUs[6], and diesel MGPUs[7] are used to provide power to the aircraft at times when the main engines are not running. This is necessary to provide power to the aircraft control systems, to provide conditioned air within the cabin for passenger comfort, and to enable start-up for some of the newer aircraft on scheduled routes. In 2017, APUs and MGPUs accounted for over 7% of NOx emissions and 25% of PM_{10} emissions (associated with ground-based sources). Potential measures to control APU and diesel MGPU use include

[5] AQEG (2020) Assessing the Effectiveness of Interventions on Air Quality
[6] Auxiliary Power Units are devices located on the aircraft to provide power to start the main engines, and to run the heating, cooling and ventilation systems prior to engine start-up.
[7] Mobile Ground Power Units are small vehicles capable of supplying electrical power to aircraft parked on the ground.

using Fixed Electrical Ground Power (FEGP), limiting the use and/or running times of APUs, and using battery-powered ground power units (B-MGPUs).

3.21. During the period of the 2017-2019 AQMS, London City Airport decommissioned the oldest (Stage II) diesel MGPUs. Of the diesel MGPUs that are currently operational, all meet the Stage IIIA emissions standard[8]. London City Airport has committed to phasing these out by June 2021. Until this time, the use of FEGP on stands where this is installed will continue to be enforced in order to minimise the use of diesel MGPUs.

3.22. Technological advances mean that the function of the FEGP can now be fulfilled by B-MGPUs whilst continuing to be emission free at the point of use from an air quality perspective and generating no perceptible noise beyond the airport boundary. Battery powered MGPUs also offer significant operational benefits as they can be moved between stands. These units will replace diesel MGPUs from June 2021, and will be used on stands where FEGP hasn't been installed.

MEASURE 1: Maximising availability of FEGP. London City Airport will continue to routinely record the availability of FEGP on all stands where it is has been installed, and the time taken to effect repairs until June 2021 when all diesel MGPUs will be replaced with B-MGPUs. It will also continue to record the use of FEGP within the online portal and document any contraventions of Airfield Operating Instruction AOI 07 until June 2021.

3.23. Emissions from APUs represented 7% NOX and 24% PM_{10} ground-based emissions in 2017. London City Airport has Airfield Operating Instructions (AOIs) which restricts the running of APUs except when there is a problem with the FEGP, or if required for cabin comfort during extreme temperatures. London City Airport will continue to operate and enforce these instructions. The AOI which contain directions on APU use is AOI 07 Aircraft Noise & Maintenance[10]. In order to discharge Condition 47 of the CADP 1 Conditions, an APU Strategy has been prepared.

MEASURE 2: Minimising APU Use. London City Airport will continue to monitor the use of APU in accordance with AOI 07, and will continue to record APU use via the Airport's "Qlickview" online reporting tool, and document any contraventions of the Airfield Operating Instructions, updated as necessary to comply with any requirements within the APU Strategy. Completed by June in each year.

MEASURE 3: Phasing Out Diesel MGPUs. Reliance on diesel MGPUs will be phased out completely by 30 June 2021 in accordance with the requirements of Condition 46 of the CADP1 Conditions. Battery-powered units (B-MGPUs) and FEGP will remain in use.

Minimising Emissions From Aircraft Taxiing Operations

[8] European emissions standards for non-road mobile machinery (which include MGPUs) are structured into progressively more stringent tiers, from Stage I to Stage V. The Stage II standards were introduced in 2002. All remaining diesel MGPUs at LCA in use after March 2017 will comply to Stage IIIA (with NOx emissions approximately 40% lower than Stage II)

[10] AOI 07 requires that APUs should be shut down as soon as practicable following the arrival of an aircraft and must not be restarted until 10 minutes prior to Estimated Off Blocks Time (EOBT) except where the outside air temperature (as promulgated by Air Traffic Control) is below +5°C or above 20°C. It also requires that FEGP should be used wherever possible. APU running times are recorded electronically by the Airfield Operations & Safety Unit (AOSU) and will be provided to the local authority on a quarterly basis..

3.24. Emissions from aircraft taxiing to and from stand, and when aircraft are held on the taxiway, represent a significant proportion of the ground-level NOx and PM_{10} emissions from aircraft. In 2017, these activities accounted for 15.6 tonnes (24%) NOx and 0.35 tonnes (7%) PM_{10}.

3.25. Due to the size and layout of the Airport, the distance aircraft have to taxi between the runway and the parking area is less than most UK international airports and therefore the extent of these emissions is relatively low due to the Airport's restricted physical footprint.

3.26. The Standard Terms and Conditions of Use of London City Airport require that Operators should:

1. Not seek approval from Air Traffic Control for aircraft engine start-up until strictly necessary;
2. Shut down all engines as soon as possible following arrival; and
3. Where a delay occurs subsequent to engine start-up to shut down engines whenever possible.

3.27. London City Airport will continue to operate and enforce these instructions. London City Airport operates an Electronic Flight Progress System (EFPS) as part of the Air Traffic Control System. The EFPS monitors the progress of each aircraft from engine start-up, to start-of-roll, and then from touch down to engine shut-down on stand. This system allows precise details of ground aircraft movements to be analysed.

3.28. A Ground Engine Running Strategy has been approved by LBN to discharge Condition 48 of the CADP1 Conditions. This sets out measures to reduce engine running on stand, and to minimise engine usage whilst taxiing, and commits to quarterly reporting to LBN.

Box 4: Ground Engine Running Strategy

Ground Engine Running relates to the use of aircraft engines from the time of engine start-up prior to departure, during taxiing and during holding, to the time of departure. Similarly, it relates to the time following an aircraft arrival from the time when it has reduced to taxiing speed on the runway, or when the aircraft turns off the runway, whichever occurs first, to the time when an aircraft switches off its engines on a stand. This Strategy is aimed at ensuring aircraft engines are operated with the minimum power necessary and for as short a time as possible to minimise noise, but will have benefits in reducing pollutant emissions, especially nitrogen oxides (NOx).

Management procedures for aircraft while on, approaching, or leaving a stand are set out in Airside Operating Instruction AOI 06 Apron management and will be retained for the new stands. In addition, the potential use of nose-in parking for all stands is currently under consideration, and which would provide scope to reduce engine running time. The Airport also operates an Electronic Flight Progress System (EPFS) that records times of aircraft ground operations; this system will be retained for the reconfigured and new stands.

Information from these systems will be interrogated on a quarterly basis and a report issued to LBN. Where engine run times on stand exceed agreed targets, the relevant airline will be contacted to explore ways of reducing engine running in future.

The system will also be used to interrogate hold times, and taxi times after departure and on arrival. This information will be collated and reported on a quarterly basis to LBN. The Strategy will include a review of these data, in order to establish targets to improve/minimise overall ground running times.

MEASURE 4: Ground Engine Running Strategy. London City Airport will review the outcomes of the Ground Engine Running Strategy (GERS) within the quarterly reports and will prepare a report for submission to LBN on the air quality implications where ground running exceeds agreed targets. Completed within two months of GERS quarterly reports.

3.29. Emissions can potentially be reduced from taxiing by a practice known as "Engine-out Taxi (EOT)" in which one or more of the aircraft engines are switched off. However, whilst single engine taxiing is used for up to 20% of the time, there are safety concerns regarding this operation, and it is not feasible to introduce this measure as a standard requirement. The use of reduced thrust has also been discussed with the airlines but is not currently feasible due to the short taxiing times. This will be reconsidered when the new taxiways associated with the CADP infrastructure have been completed.

MEASURE 5: Reduced Thrust During Taxiing. London City Airport will work with the major airlines to explore the potential to introduce reduced thrust during taxiing. A feasibility study will be completed within one year of the new CADP taxiways becoming operational.

3.30. A feasibility study to investigate the potential for introducing Electric Taxiing Systems at the Airport was completed in November 2018, but no suitable technology was identified. However, this is an evolving area, and this measure will be revisited.

MEASURE 6: Electric Taxiing Systems London City Airport will review emerging technologies related to Electric Taxiing Systems and will provide an updated report on feasibility. Completed by December 2021.

Ground Running, Testing and Maintenance

3.31. Issues related to ground running, testing and maintenance are most commonly linked with noise effects as opposed to air quality (as the frequency of ground testing is low), but this has been included for completeness. Ground running accounted for 1.2% of NOx emissions (ground-based sources) in 2017. A Ground Running, Testing and Maintenance Strategy has been prepared to discharge Condition 49 of the CADP1 Permission.

MEASURE 7: Ground Engine Running. London City Airport will continue to review the outcomes of the Ground Engine Running Testing and Maintenance Strategy and will advise on the air quality implications, specifically with regard to proposals for relocation of the engine ground run positions. Completed with two months of the publication of the revised GRT&M Strategy.

Airside Vehicles and Plant

3.32. Airside vehicles are used to provide a range of routine services, including baggage handling, aircraft refuelling, catering, cleaning and engineering support. There are also other vehicles and plant used on an occasional basis, such as fire tenders, snow ploughs, de-icing equipment and rescue boats.

3.33. All baggage tugs and belt loaders are electric. Measures to reduce NOx and PM emissions from airside vehicles and plant include the introduction of newer, low-emission or zero-emission units, ensuring that all vehicles and plant are correctly maintained and operated, and preventing unnecessary running of engines. The Ultra-Low Emissions Zone (ULEZ)

introduced by the Mayor of London requires the use of Euro 6 diesel cars and vans which have, on average, 65% lower NOx emissions than Euro 5.

Introduction of cleaner vehicles and plant

3.34. London City Airport directly owns a small fleet of vehicles. Of these, some are specialist vehicles such as fire tenders and vehicles reserved for winter use (e.g. tractors, snow ploughs and de-icing equipment). There are also airside vehicles owned by a number of third-party operators. All non-specialist vehicles are compliant with the emissions requirements of the London Low Emission Zone, with the exception of one fire tender which is only used in exceptional circumstances.

3.35. From 25 October 2021, it is expected that the Ultra-Low Emission Zone will be extended to the North and South Circular Roads and will encompass London City Airport. In April 2020, there were 152 airside vehicle permits registered to third-party operators[11]; of these, 104 vehicles (68%) are ULEZ-compliant (see Appendix 4). A feasibility study to upgrade the remainder of the airside fleet (owned by third-party operators) to comply with the ULEZ emissions standards will be carried out by London City Airport once ULEZ is extended in 2021.

3.36. Airport Operating Instruction AOI 12 controls the operation of airside vehicles and includes measures which aim to reduce the environmental impacts of airside vehicle operations. The key principles in AOI 12 ensure:

- Compliance with the requirements of the London Low Emissions Zone for all vehicles which use the public highway;
- Compliance with the latest emissions standards for all new Airside Vehicle Permits;
- Prevention of unnecessary engine idling of vehicles;
- Provision of driver employee awareness to reduce vehicle emissions; and
- Maintenance of vehicles in a road legal standard.

3.37. With specific regard to vehicle emissions, AOI 12 notes that

"*London City Airport falls with Transport for London's (TfL) London Low Emission Zone (LLEZ), and all vehicles which are operating airside and which enter a public highway must comply with the low emissions standards. In addition, all new vehicles issued with an Airside Vehicle Permit must comply with the latest EU emissions standards for road vehicles, defined as the date by which the Euro Standard comes into force for the registration and sale of new vehicles*" (Para 3.8.1); and

"*Control of vehicles to ensure they meet these requirements is primarily achieved through the AVP application process where vehicles are required to provide approved certificates of inspection which cover emissions standards. This is supported by random vehicle emissions testing airside*" (Para 3.8.2).

MEASURE 8: ULEZ Compliance – Airport Owned Vehicles. Once ULEZ is extended (expected to be October 2021), London City Airport will carry out a feasibility study as to whether LCA-owned airside vehicles can be made ULEZ compliant. If this is feasible, a

[11] This excludes the Cobus buses (which do not have UK licence plates) and certain types of specialist equipment such as cherry pickers.

programme for vehicle upgrades and/or replacement will be submitted to LBN. London City Airport will also review AOI 12 to reflect the expansion of the ULEZ.

MEASURE 9: ULEZ Compliance – Third Party Operators. London City Airport will work with third-party operators of airside vehicles and undertake a feasibility study for achieving ULEZ compliance. To be completed by October 2021.

MEASURE 10: Airside Vehicle Permits – Promote Earlier Introduction of Cleaner Vehicles. The system can be used to promote the earlier introduction of Euro 6 (or hybrid/electric) vehicles in advance of ULEZ compliance. London City Airport will continue to enforce a requirement in AOI 12 that all new vehicles issued with a Airside Vehicle Permit (i.e. not renewal applications for existing AVPs) comply with the latest vehicle emissions standards for road vehicles (Euro Standards) defined as the date by which the Euro Standard comes into force for registration and the sale of new vehicles.

MEASURE 11: Vehicle Emissions Testing. Failed abatement systems can lead to substantially higher emissions from individual vehicles. London City Airport will continue to undertake routine annual, and periodic, random emissions testing for Airport owned and third-party airside vehicles[12]. The results of the testing will be reported to LBN on an annual basis, by June of each year.

MEASURE 12: Introduction of Hybrid or Electric Vehicles. Both hybrid and electric vehicles would reduce emissions (above and beyond ULEZ standards) but is dependent on availability. London City Airport will revise the procurement process for the purchase of new vehicles owned by the Airport, with a focus on hybrid or electric alternatives. The outcome of this process will be reported on an annual basis.

Emissions from taxis (Black Cabs)

3.38. A black cab emissions study was submitted to LBN in July 2017 and approved in October 2018. In line with the outcome of this study, London City Airport will continue to monitor black cab idling. Vehicle Idling Action is a behaviour change campaign supported by LBN.

MEASURE 13: Anti-Idling, Black Cabs. London City Airport will continue to monitor black cab idling and will report any issues to the Airport Transport Forum.

Publicity and Promotion

3.39. To ensure that measures identified within this Air Quality Management Strategy are fully implemented, it is important to communicate the importance of air quality issues to staff, passengers and cab drivers. London City Airport will introduce further measures to promote the understanding of air quality matters.

MEASURE 14: Review and Update Website. London City Airport will review and update the website to provide clear, concise information to the local and wider community on the performance of this Air Quality Management Plan. This will allow for more regular updates, details of the type of monitoring undertaken, strategy and prominent links to applicable documents and the

[12] Vehicle emissions testing will be carried out on a minimum of 15 vehicles in each calendar year. Where a vehicle fails a test, a Vehicle Defect Notice will be issued. The responsible company will have 14 days to rectify the vehicle (with suitable documentation) or the Airside Vehicle Permit will be suspended. This accompanies the policy that all vehicles which have a permit to operate airside must provide a valid and in date MOT certificate.

opportunity for individuals and organisations to get in contact with the airport via an online interactive form. The outcome will be reported by June in each year.

MEASURE 15: RAMP Sampling London City Airport will undertake on a two-year basis a RAMP[13] employee air quality monitoring assessment with direct individual recording apparatus and publish findings on the LCA website. The next studies will be carried out by April 2021 (subject to the extent and profile of Airport operations following the Covid-19 pandemic) and April 2023.

MEASURE 16: Staff Communications. London City Airport will publish an article relating to air quality and airport operations at least once per year in the airport newsletter "Inside E16" or in the staff eBulletin. Progress will be reported by June in each year.

Ultra-Fine Particles

3.40. Ultra-fine Particles (UFPs) are defined as particulate matter with a diameter of less than 100 nanometres (nm). Exposure to UFPs is of concern because of the potential deep penetration of particles into the respiratory system (Cassee et al, 2019); there is also a potential route for direct neurological exposure via the olfactory bulb (Hopkins et al, 2018).

3.41. There are currently no air quality standards, guidelines or targets for UFPs against which compliance can be assessed. Information on particle number concentrations alone is not sufficient to derive dose-response relationships as the particles have many different physical and chemical characteristics that are likely to have different impacts on human health. It is not anticipated that standards or guidelines for UFPs in relation to the protection of human health will be developed in the near future.

3.42. A report published by the Airports Council International (ACI)[14] includes a section on mitigation options to minimise emissions of UFPs from airport operations. A summary of these measures, and the actions currently implemented by London City Airport are included in Appendix 5.

3.43. ICAO has published a mandated method for determining non-volatile PM (nvPM) emissions from aircraft engines in controlled / characterised environments (the CAEP10 nvPM mass concentrations certification standard)[15]; it is more difficult to perform "on-wing" studies as the quantities of exhaust gases from jet engines, the speed and temperature of emissions, and complex mixing processes all make gathering emission data at source extremely difficult. The new standard applies to all in-production engine types (rated thrust .26.7kN) on or after 1 January 2020 and represents a first step in the development of a mass and number nvPM standard for aircraft engines, and the basis for compiling emissions inventories for particle number emissions in the future. However, the data reported by the engine manufacturers is confidential. In addition, there is evidence that lubrication oil from aircraft engines may be important in the volatile fraction of UFPs, but there is currently no robust manner in which to quantify these emissions.

3.44. It is expected that a new version of the ICAO Aircraft Emissions Database may become available in 2020, and which will contain certification data for nvPM, but only for a limited

[13] Airport apron area
[14] Airports Council International (ACI) Europe (2018) Ultrafine Particles at Airports.
[15] Doc 9501, Environmental technical Manual, Volume II, Procedures for the Emissions Certification of Aircraft Engines ISBN 978-92-9258-371-2

number of engines. At this stage there is no robust manner in which an emissions inventory could be compiled for UFPs, but this will be kept under review.

MEASURE 17: UFP Emissions Inventory. London City Airport will review the emerging evidence on UFPs related to aircraft emission inventories and will provide an update on an annual basis.

3.45. There have been a number of studies to measures UFP concentrations in the vicinity of airports, but due to differences in sampling duration, methodology, and QA/QC procedures, direct comparison between the studies is not straightforward. A recent study at Heathrow Airport[16] has shown that average particle number concentrations in the vicinity of the airport are lower than at a kerbside, traffic location, but higher than an urban background location in London. However, the size distribution of UFPs at the airport was shown to be very different and dominated by particles with a mode of 20 nm; in contrast, UFPs in London have a larger mode of 30 nm.

3.46. The role of sulphur in aviation fuel appears to be critical to UFP formation, but has not yet been proven. Aviation fuel typically contains 600-900 ppm sulphur by volume, as compared to less than 10 ppm in road diesel. Development of low sulphur fuels could potentially reduce UFP emissions from aircraft engines, but there are potential engineering and regulatory restrictions, and an associated carbon penalty.

MEASURE 18: UFP Emissions and Sulphur Content of Aviation Fuel. London City Airport will review the emerging evidence on the link between the sulphur content of aviation fuel and UFP emissions, and will work with industry partners to assess the benefits and feasibility of reducing the sulphur content of the fuel.

London City Airport Surface Access Strategy

3.47. Studies undertaken by the LBN have identified road traffic as the primary source of poor air quality in the borough. Road traffic accounted for 27% of NOx emissions (from Airport-related ground-based sources) in 2017. Measures to reduce Airport-related traffic on the local road network therefore form an important link to this Air Quality Management Strategy.

3.48. It should, however, be recognised that 73% of passengers currently (2019) travel to the Airport by DLR, bus and black taxi. This is due to the excellent links to an integrated public transport system, specifically the Docklands Light Railway.

3.49. London City Airport's Surface Access Strategy (ASAS) defines the long-term approach the Airport will take to encouraging air passengers, airport staff and other airport users to travel sustainably. The ASAS includes the following 2025 targets:

- Over 75% of air passengers travelling by public transport, with 70% by DLR;
- Less than 40% of airport staff to travel by single occupancy private car.

3.50. The ASAS has identified six priorities that will be used to underpin these targets across all travel modes:

- Closing the information gap;

[16] Stacey et al (2020) Evaluation of Ultrafine Particle Concentrations and Size Distributions at London Heathrow Airport, *Atmos Environ* 222.

- Offering the right travel services;
- Equality of access;
- Facilitating Healthy Streets;
- Offering low carbon alternatives;
- A collaborative approach.

3.51. From the ASAS objectives a suite of specific documents have been produced (and approved by LBN) to set out how the airport will implement the strategy. The documents are the Travel Plan, Cycle Parking, Delivery and Servicing Plan, Bus Facilities Plan, Taxi Management Plan and Traffic Management Plan and LCA Surface Access Strategy 2017-2025. These documents detail how the Airport will develop its sustainable transport options. Such sustainable transport options will deliver improvements to local air quality by minimising reliance on private car use for both passengers and staff and consolidating delivery vehicle trips.

Sustainability and Biodiversity Strategy and Carbon Management Plan

3.52. The London City Airport Sustainability and Biodiversity Strategy was approved by the London Borough of Newham in 2017, and was subsequently reviewed in 2020. It considers the impact of operations at the Airport on matters such as energy, water and greenhouse gas emissions, and includes the Airport Sustainability Action Plan.

3.53. While primarily targeted at reducing emissions of carbon dioxide from Airport sources, the implementation of the Sustainability and Biodiversity Strategy is also expected to lead to a reduction of local emissions of NOx and PM through measures that reduce fuel and energy use, and will assist in the delivery of this Air Quality Management Strategy.

Box 6: Carbon Management Plan

The Carbon Management Plan has been produced to provide a clear approach as to how energy consumption and carbon emissions will be minimised at London City Airport. The Carbon Management Plan is based on the requirements of the Third Stage of the Airport Carbon Accreditation Scheme (commonly referred to as Stage 3: reduction).

The Airport has developed a key performance indicator which is measured against carbon emissions ($kgCO_2$) per passenger, which is an industry recognised metric. London City Airport's performance target is to reduce by 2020 the annual carbon ($kgCO_2$) emission per passenger by 20%, as compared to the 2013 baseline. London City Airport also achieved carbon neutrality in December 2019 through the Airport Carbon Accreditation Scheme (Level 3+), demonstrating that emissions that currently cannot be eliminated have been offset.

The scope of the carbon footprint currently includes the services and utilities that the Airport has direct control over, including electricity and mains gas supplied to onsite buildings, red diesel used for onsite vehicles and equipment, and fuel used on business trips. It also includes emissions that the Airport can influence, such as emissions with the aircraft Landing and Take-Off cycle, and passenger travel to the Airport.

Energy Assessment

3.54. Once CADP is complete, a combined cooling, heating and power system will meet an emissions level of <40 mgNOx/Nm^3, as compared to the emissions standard in the GLA SPG of 95 mgNOx/Nm^3 (i.e. a reduction of 58%). This will deliver a reduction in NOx emissions of approximately 1,420 kgNOx/annum[17].

[17] Based on operation for 18 hours per day, and at less than 75% load for 12 hours per day (as assumed in the UES)

APPENDIX 1 – NATIONAL, REGIONAL, LOCAL POLICY AND LEGISLATIVE CONTEXT

European Legislation

The United Kingdom formally left the European Union (EU) on 31 January 2020; until the end of 2020 there will be a transition period while the UK and EU negotiate additional arrangements. During this period EU rules and regulations will continue to apply to the UK. All European legislation referred to in this Appendix is written into UK law and will remain in place beyond 2020, unless amended, although there is uncertainty at this point in time as to who will enforce the requirements of some of this legislation.

Directive 2008/50/EC[18] Ambient Air Quality and Cleaner Air for Europe, came into force on 11 June 2008, with Member States required to incorporate the provisions into national legislation before 11 June 2010. The principal aim of the Directive is to protect human health and the environment by avoiding, reducing or preventing harmful concentrations of air pollutants, by the establishment of limit and target values; by the assessment of air quality in a uniform manner; by making air quality information available to the public; and by setting out plans and programmes to maintain or improve ambient air quality conditions.

National Regulations

Air Quality Strategy (2007)
The 2007 Air Quality Strategy [19] provides the policy framework for air quality management and assessment in the UK. It provides air quality standards and objectives for key air pollutants, which are designed to protect human health and the environment. It also sets out how the different sectors, industry, transport and local government, can contribute to achieving the air quality objectives. Local authorities are seen to play a particularly important role. The Strategy describes the Local Air Quality Management (LAQM) regime that has been established, whereby every authority has to carry out regular Reviews and Assessments of air quality in its area to identify whether the objectives have been, or will be, achieved at relevant locations, by the applicable date. If this is not the case, the authority must declare an Air Quality Management Area (AQMA) and prepare an action plan that identifies appropriate measures that will be introduced in pursuit of the objectives.
The objectives defined in the Strategy are linked to the air quality Limit Values set at a European level in the Ambient Air Quality Directive.

Airports National Policy Statement (2018)
The Airports NPS provides the primary basis for decision making on development consent applications for a Northwest Runway at Heathrow Airport, and will be an important and relevant consideration in respect of applications for new runway capacity and other airport infrastructure in London and the South east of England.

It notes that “the Government has confirmed that it is supportive of airports beyond Heathrow making best use of their existing runways” and that “airports wishing to make more intensive use of existing runways will still need to submit an application for planning permission or development consent order to the relevant authority”.

The Airports NPS does not affect Government policy on wider aviation issues, as set out in the 2013 Aviation Policy Framework and the expected Aviation Strategy.

[18] European Union (2008). Ambient Air Quality and Cleaner Air for Europe (2008/50/EC).
[19] Defra (2007). The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, July 2007.

Aviation Policy Framework (2013)
The Aviation Policy Framework[20] sets out the Government's high level strategy and overall objectives for aviation, and replaces the 2003 Air Transport White Paper[21]. With regards to air quality, the policy is to seek improved international standards to reduce emissions from aircraft and vehicles, and to work with airports and local authorities to improve air quality, including encouraging transport operators to introduce less polluting vehicles. The Framework places a particular importance on areas where the EU Limit Values and air quality objectives are exceeded, but recognises that nitrogen oxides (NOx) concentrations from aviation-related activities reduce rapidly beyond the immediate area of the runway, and places emphasis on reducing emissions associated with surface access. In particular, the preparation of Airport Surface Access Strategies (ASASs) is strongly encouraged, together with the development of targets to reduce the air quality impacts of surface access.

Air Quality Criteria

The pollutants of principal concern in the London Borough of Newham are nitrogen dioxide (NO_2) and fine particulate matter (PM_{10} and $PM_{2.5}$).

The Government has established a set of air quality standards and objectives to protect human health. The 'standards' are set as concentrations below which effects are unlikely even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely upon the scientific and medical evidence of the effects of an individual pollutant. The 'objectives' set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of economic efficiency, practicability, technical feasibility and timescale. The objectives for use by local authorities are prescribed within the Air Quality Regulations 2000 (Stationery Office, 2000) and the Air Quality (England) (Amendment) Regulations 2002 (Stationery Office, 2002). The relevant objectives are provided in Table A1.1.

The objectives for nitrogen dioxide and PM_{10} were to have been achieved by 2005 and 2004 respectively and continue to apply in all future years thereafter.

Table A1.1: Air Quality Objectives for Nitrogen Dioxide and PM_{10}

Pollutant	Time Period	Objective
Nitrogen Dioxide	1-hour mean	200 μg/m^3 not to be exceeded more than 18 times a year
	Annual mean	40 μg/m^3
Fine Particles (PM_{10})	24-hour mean	50 μg/m^3 not to be exceeded more than 35 times a year
	Annual mean	40 μg/m^3

More recently, new health criteria have been introduced for $PM_{2.5}$ and these are shown summarised in Table A1.2. The 2007 Air Quality Strategy (Defra, 2007) sets out both an exposure-reduction approach and a "backstop" annual mean objective for $PM_{2.5}$. The former is an objective focused on reducing average exposures across the most heavily populated

[20] The Stationery Office (2013). Aviation Policy Framework
[21] DfT (2003) The Future of Air Transport

areas of the country and is not directly applicable to individual schemes. It is supported by the "backstop objective" or concentration cap to ensure a minimum environmental standard. These $PM_{2.5}$ objectives have not been included in Regulations.

Table A1.2: Relevant Air Quality Criteria for $PM_{2.5}$

	Time Period	Objective/Obligation	To be achieved by
UK objectives	Annual mean	25 µg/m^3	2020
	3 year running annual mean	15% reduction in concentrations measured at urban background sites	Between 2010 and 2020

Regional Policy and Guidance

The London Plan

The London Plan 2015[22] was published in March 2015 and consolidates the London Plan 2011 with the Revised Early Minor Alterations to the London Plan and the Further Alterations to the London Plan. It sets out the spatial development strategy for London over the next 20-25 years, and brings together all relevant strategies, including those relating to air quality.

Policy 7.14, *'Improving Air Quality'*, addresses the spatial implications of the Mayor's Air Quality Strategy and how development and land use can help achieve its objectives. It recognises that Boroughs should have policies in place to reduce pollutant concentrations, having regard to the Mayor's Air Quality Strategy. It encourages greater use of sustainable transport modes through implementation of travel plans and promotes the use of measures on-site to reduce emissions from developments.

The 'Intend to Publish' version of the new London Plan was published in December 2019, incorporating consolidated changes to previous versions suggested by the Mayor of London, as well as addressing the Inspectors' recommendations following the 2019 Examination in Public. The new London Plan is expected to be adopted in 2020. However, the 'Intend to Publish' London Plan is a material consideration in planning decisions and is afforded considerable weight. Policy SI1 on 'Improving Air Quality' states that:

"Development plans, through relevant strategic, site specific and area-based policies should seek opportunities to identify and deliver further improvements to air quality and should not reduce air quality benefits that result from the Mayor's or boroughs' activities to improve air quality".

It goes on to detail that development proposals should not:

- *"lead to further deterioration of existing poor air quality*
- *create any new areas that exceed air quality limits, or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits*
- *create unacceptable risk of high levels of exposure to poor air quality".*

It also states that:

[22] GLA (2015) The London Plan: The Spatial Development Strategy for London Consolidated with Alterations Since 2011.

"Masterplans and development briefs for large-scale development proposals subject to an Environmental Impact Assessment should consider how local air quality can be improved across the area of the proposal as part of an air quality positive approach. To achieve this a statement should be submitted demonstrating a) how proposals have considered ways to maximise benefits to local air quality, and b) what measures or design features will be put in place to reduce exposure to pollution, and how they will achieve this."

London Environment Strategy

The London Environment Strategy was published in May 2018. The strategy considers air quality in Chapter 4; the Mayor's main objective is to create a "zero emission London by 2050". Policy 4.2.1 aims to "reduce emissions from London's road transport network by phasing out fossil fueled vehicles, prioritising action on diesel, and enabling Londoners to switch to more sustainable forms of transport". An implementation plan for the Strategy has also been published which sets out what the Mayor will do between 2018 and 2023 to help achieve the ambitions in the Strategy. The Strategy also sets out the Mayor's ambition to achieve the WHO Guidelines for $PM_{2.5}$ by 2030.

With specific regard to airports, the Strategy states (Proposal 4.2.2b):

- *demonstrating airport expansion will not cause new exceedances or increase exposure to pollution where improvements have been secured: and*
- *airports increasing passenger numbers without expanding infrastructure should continue to review their actions to reduce impacts on or offsite".*

Regulating Emissions from Airport Sources

Pollutant emissions from aircraft operations at London City Airport are regulated by both the European Aviation Safety Agency[23] and the Civil Aviation Authority who provide certification of aircraft including the compliance with emissions performance. Agreed standards for aircraft engine emissions are published by the International Civil Aviation Organisation (ICAO). Through its Committee on Aviation Environmental Protection (CAEP), ICAO has set progressively tighter certification standards for air pollutant emissions from new and future civil aircraft, which are commonly referred to as the "CAEP standards". The latest standard in CAEP8.

Local Air Quality Management

The London Borough of Newham has investigated air quality within its area as part of its responsibilities under the LAQM regime and has identified road traffic as the primary source of poor air quality in the borough. In 2002, the Council concluded that it would not meet the statutory objectives for two pollutants[24] - nitrogen dioxide (annual mean) and PM_{10} (24-hour mean), and designated an Air Quality Management Area (AQMA) extending alongside the major roads in the Borough including North Woolwich Road, Connaught Crossing, Silvertown Way, Royal Albert Way and Royal Docks Road.

The Air Quality Management Area (AQMA) was amended in 2019 to encompass the whole borough, and by definition, London City Airport lies within this AQMA. The LBN Air Quality Action Plan presents modelled pollutant concentrations from the London Atmospheric Emissions Inventory 2016 and notes that:

[23] The UK will no longer participate in the EASA systems after the end of the transition period on 31 December 2020. It is anticipated that UK-EU aviation agreements will be in place after this time.

[24] The objectives for $PM_{2.5}$ have not been included in Regulations, and the London Borough of Newham is not required to carry out reviews and assessments for this pollutant.

- *Nitrogen dioxide concentrations exceed the air quality objective in the locality of all major roads in the borough;*
- *PM_{10} concentrations exceed the objective around some major roads, with the most significant source of PM_{10} being road transport and other sources associated with central London; and*
- *Concentrations of $PM_{2.5}$ exceed the WHO guideline of 10 µg/m^3 across the borough. Levels in the vicinity of major roads are higher, particularly in Stratford, Canning Town and at Prince Regent Lane.*

The 10 key priorities identified in the Action Plan are:

- *Enforcing the Non-Road Mobile Machinery (NRMM) Low Emission Zone;*
- *Promoting and enforcing smoke control zones;*
- *Promoting and delivering energy efficiency retrofitting projects in workplaces and homes;*
- *Supporting alert services such as airTEXT and promoting the Mayor's air pollution forecasts;*
- *Reducing pollution in and around schools, and extending school audits;*
- *Installing Ultra Low Emission Vehicle infrastructure;*
- *Improving walking and cycling infrastructure;*
- *Regular car free days/temporary road closures in high footfall areas;*
- *Reducing emissions from Council fleets; and*
- *Ensuring Master planning and development areas are aligned with Air Quality Positive and Healthy Streets and Newham Climate Emergency Action Plan approaches.*

APPENDIX 2: REVIEW OF ACTION PLAN MEASURES AT OTHER UK AIRPORTS

A review of air quality measures at other UK airports has been undertaken. A summary of these measures, and the actions currently taken, or proposed, by London City Airport indicated.

Airport Action Plans	**London City Airport AQMS**
Gatwick Airport	
Newer Aircraft: 26% of aircraft are CAEP8 and 68% are CAEP 6	The CADP1 project is primarily intended to provide the infrastructure to accommodate new generation aircraft such as the Airbus A220-100 and the Embraer E190-E2. This is expected to phase out the older generation aircraft such as the Avro RJ and Embraer E1.
FEGP on all stands	All main stands are equipped with FEGP, and installation on remaining stands will be completed as part of the CADP timescales.
200 airfield charging points for GSE	As part of the CADP development new electrical infrastructure is to be completed by December 2021 and this will allow additional capacity for electrical charging points. CADP has been designed to safeguard for 52 fast charging units and 9 rapid charge units. These will be shared between cars and taxis (daytime peak hours) and airport vehicles (evening off peak hours).
Airport supporting projects on Government's Future Fuels and Freight competition to accelerate commercial production of sustainable aviation fuel.	London City Airport has held discussions with suppliers and is considering how it might encourage and incentivise innovations
Manchester Airport	
Sustainable Vehicle Policy related to Airport-owned vehicles; aim to have vehicles no more than 6 years old, or retrofitting exhaust abatement equipment where appropriate.	All Airport-owned vehicles are ULEZ compliant (with the exception of two fire tenders); a plan to bring these into compliance has been agreed with LBN.
Work with third-party operators of airside vehicles and equipment to encourage the operation of cleaner fleets. Regular vehicle inspections including emissions testing; banning vehicles that do not meet MOT emissions standards. Enforcement of no-idling policy.	A strategy to bring the entire airside fleet into compliance with the ULEZ has been developed and submitted to LBN. It is the intent that all airside vehicles will be electric (or zero emission) or use renewable fuels by 2030. Routine and periodic, random emissions testing of airside vehicles is carried out, and the results reported to LBN. AOI12 prevents unnecessary engine idling.
Promotion of sustainable transport by staff and passengers via Economy and Surface Access Plan.	Surface Access Strategy (2017-2025) sets targets for 75% of passengers travelling by public transport, with 70% by DLR, and fewer than 40% of staff travelling by single occupancy car.
Birmingham Airport	
Working with airlines and air traffic control to encourage reduced engine taxiing and limiting holding of aircraft where possible.	An assessment of single engine taxiing has been undertaken and may occur for 20% of the time but is limited by safety concerns. Opportunities for reduced engine thrust will be considered once the new CADP taxiway is operational.
Reduce use of APU and MGPU by providing FEGP on stands.	All main stands are equipped with FEGP, and installation on remaining stands will be completed as part of the CADP timescales. Reliance on MGPUs will be phased out by December 2020.
Increase public transport access to the Airport.	CADP1 is delivering financial contributions

	towards new DLR rolling stock and additional Travel Ambassadors to advise passengers. In the longer terms, the Airport is committed to working with stakeholders to deliver the new Crossrail Station on the Elizabeth Line south of the Airport.
Increase use of electric vehicles on the Airport site.	A feasibility study for the procurement of low emission (hybrid or electric) vehicles has been submitted to LBN and implementation being considered through the procurement process. It is the intent that all airside vehicles will be electric (or zero emission) or use renewable fuels by 2030.
Heathrow Airport	
Regular review of landing charges in order to encourage the use of cleaner aircraft	The potential to introduce an emissions-based landing charge has been previously investigated. However, due to the short runway and steeper approach angle, the types of aircraft that can operate from the Airport is limited, and an emissions-charging scheme is not considered viable.
Minimising use of APUs by maximising use of both FEGP and Pre-Conditioned Air (PCA)	All main stands are equipped with FEGP, and installation on remaining stands will be completed as part of the CADP timescales. Use of PCA was explored during CADP design, but there is no room on the apron to fit PCA from the air bridge, and many aircraft in use at LCY cannot use PCA.
Encouraging airlines to sign up to a Departures and Ground Operations Code of Practice	The Standard Terms and Conditions of Use require that all Operators do not seek approval from Air Traffic Control for engine start-up until necessary; shut down all engines as soon as possible on arrival; and, where delays occur, to shut down engines wherever possible.
Working with NATS to reduce emissions during taxiing, hold and use of reduced engine taxiing.	An assessment of single engine taxiing has been undertaken and may occur for 20% of the time but is limited by safety concerns. Opportunities for reduced engine thrust will be considered once the new CADP taxiway is operational.
All airside vehicle operators to comply with Operational Safety Instruction (OSI)	Airport Operating Instruction AOI 12 controls the operation of airside vehicles and includes measures to reduce the environmental impacts of their operation.
Reducing emissions from airside fleet through use of hybrids, electric, biofuel and hydrogen alternatives.	A feasibility study for the procurement of low emission (hybrid or electric) vehicles has been submitted to LBN and implementation being considered through the procurement process.
Exhaust emission checks on airside vehicles to VOSA standards	Routine and periodic, random emissions testing of airside vehicles is carried out (to VOSA standards), and the results reported to LBN.
Encouraging eco driving training for users of airside vehicles.	AOI 12 includes the provision of driver employee awareness to reduce vehicle emissions.
Reviewing of OSI with regard to introducing minimum emissions standards.	AOI 12 requires that all new vehicles issued with an Airside Vehicle Permit must comply with the latest EU emissions standards for road vehicles in force at the time.
Seeking to provide adequate infrastructure to encourage use of low and zero emission vehicles airside.	As part of the CADP development new electrical infrastructure is to be completed by December 2021 and this will allow additional capacity for

	electrical charging points. CADP has been designed to safeguard for 52 fast charging units and 9 rapid charge units. These will be shared between cars and taxis (daytime peak hours) and airport vehicles (evening off peak hours).
Working with Clean Vehicle Programme and Sustainability Partnership members to reduce emissions from airport-related landside fleets.	Provision of 300 parking spaces with electric charging points, as well as provision for electric charging or zero emission vehicles on all other spaces by 2035.
Incorporating Sustainable Transport Plan air quality objectives to support transport provision relevant to Heathrow.	The Airport Surface Access Strategy commits to a target of 75% of passenger travel by sustainable transport by 2025, and less than 40% staff travel by single occupancy cars. In the longer term the Airport is committed to working with stakeholders to deliver a new Crossrail station.
Supporting the Hytec Project for 15 hydrogen taxis in London	The Hytec Project was closed in 2015.

APPENDIX 3 – PROGRESS ON 2017-2019 AQMS AND STATUS

Measure	Progress	Status
Measure 1: London City Airport will continue to routinely record the availability of FEGP on all stands where it is has been installed, and the time taken to effect repairs. It will also continue to record the use of FEGP within the online portal and document any contraventions of Airfield Operating Instruction AOI 07. The Standard Terms and Conditions will be amended to require mandatory use of FEGP on any Stand where it is available, as and when FEGP availability is increased.	Use of FEGP where available is mandatory, and no contraventions to this were recorded in 2019. Eight faults were recorded during the year relating failure of the FEGP supply, all of which were rectified within 24 hours. A further 79 faults were reported with the Powervamp units.	Ongoing
Measure 2: London City Airport will monitor the use of APU in accordance with the relevant Airfield Operating Instruction AOI 07 and will continue to record APU use via the Airport's "Qlickview" online reporting tool. Any contraventions of the Airfield Operating Instructions, and any future requirements within the forthcoming APU Strategy, will be documented.	In place. 1031 aircraft requested use of APUs during 2019. 10 aircraft were recorded as being in breach of the operating instruction, and this was raised with the airlines accordingly.	Ongoing
Measure 3: With the continued procurement of Fixed Electrical Ground Power (FEGP) reliance on MGPUs will be phased out completely by December 2020 in accordance with the requirements of Condition 46 of the CADP1 Conditions. Prior to this date, the early decommissioning of the older MGPUs will minimise emissions; all remaining MGPUs with Stage II emissions will be decommissioned by March 2017.	All MGPUs with stage II emissions have been decommissioned. The installation of FEGP on the remaining stands will be completed as part of CADP within the agreed timescales. Battery-powered (eMGPUs) have been agreed for the Jet Centre.	Ongoing
Measure 4: London City Airport will review the outcomes of the Ground Engine Running Strategy within the quarterly reports and will prepare a report for submission to LBN on the air quality implications where ground running times exceed agreed targets.	There was no exceedance of limits. This will be continually monitored.	Ongoing
Measure 5: London City Airport will work with the major airlines to explore the potential to introduce "Engine Out Taxi" (EOT) procedures i.e. single engine taxiing. A feasibility study will be submitted to LBN for approval. Pending the outcome of the feasibility study, a Code of Practice to encourage EOT will be introduced at a later date.	Single Engine Taxi assessment has been completed and may occur 20% of the time however there are safety concerns surrounding the operation of this however hence why it cannot be a fundamental change. Reduced thrust has also been discussed with the airlines but not considered to be possible at LCY due to the short taxiing times. This will be revisited once the new taxiways for CADP have been constructed.	Single Engine Taxi – Closed. Reduced engine thrust carried forwards
Measure 6: London City Airport will undertake a feasibility study to understand the potential of using Electric Taxiing Systems at LCA, without affecting time performance. A feasibility study will be submitted to LBN for approval, and will include, if practicable, timescales for implementation.	Completed November 2018. No suitable technology is currently available. This measure will be retained for consideration again in 2021.	Ongoing
Measure 7: London City Airport will review the outcomes of the Ground Engine Running, Testing and Maintenance (GERT&M) Strategy and will advise on the air quality implications, specifically with regard to proposals for relocation of the engine ground run positions during CADP1 construction.	A report will be completed within 2 months of the strategy review being submitted.	Ongoing
Measure 8: London City Airport will continue to work with operators at the Airport (in accordance with AOI 12) to increase the percentage of London Low Emissions Zone (LLEZ) compliant vehicles year on year, with the target of achieving 100% compliance with the LLEZ by December 2017. If the ULEZ is expanded to encompass London City Airport, LCA will review AOI 12 with the intent of achieving ULEZ compliance for all airside vehicles as soon as December 2020.	All vehicles are compliant with LLEZ, with the exception of 1 fire appliance which is only used in exceptional circumstances. A strategy for upgrading the fleet to comply with the ULEZ requirements has been developed and shared with LBN.	Ongoing

Measure 9: London City Airport will continue to enforce the requirement in AOI 12 that all new vehicles issued with a Airside Vehicle Permit (i.e. not renewal applications for existing AVPs, comply with the latest vehicle emissions standards for road vehicles (Euro Standards) defined as the date by which the Euro Standard comes into force for registration and the sale of new vehicles	In effect and internally audited annually.	Ongoing
Measure 10: London City Airport will continue to undertake routine annual, and periodic, random emissions testing for Airport owned and third party airside vehicles. The results of the testing will be reported to LBN on an annual basis.	15 vehicles have been tested since the last APR was published. No issues were raised as a result of the test.	Ongoing
Measure 11: London City Airport will undertake a feasibility study for the procurement of low emission vehicles (hybrid or electric) to replace the existing fleet, together with a timescale for subsequent implementation. The feasibility report will be submitted to LBN for approval.	Submitted December 2018 following agreement with LBN to postpone submission. The consideration of hybrid or electric alternatives is now being considered through the procurement process.	Ongoing
Measure 12: London City Airport will investigate and implement provisions to reduce idling black cabs. This will involve liaison through the Airport's Transport Forum with the relevant service providers to understand the causes for such instances and implementation, if necessary, of methods to reduce such impacts occurring.	A black cab emissions study was submitted to LBN in July 2017 and approved October 2018.	Ongoing
Measure 13: London City Airport will continue to review and update the website to provide clear, concise information to the local and wider community on the performance of the Air Quality Management Strategy.	The website has been reviewed regularly and updated throughout 2018. Continuous PM2.5 data are now displayed.	Ongoing
Measure 14: London City Airport will continue to undertake, on a two year basis, a RAMP employee air quality monitoring assessment with direct, individual recording apparatus.	Completed in 2019 and shared with LBN. Levels of pollutants identified were well below workplace exposure levels.	Ongoing
Measure 15: London City Airport will publish an article relating to air quality and airport operations at least once per year in the airport staff newsletter "Airport Life".	Article was published in the summer 2019 edition (now called Inside E16) as part of a sustainability double-page.	Ongoing

APPENDIX 4: Vehicles with Airside Permits (Third Party Operators) and ULEZ Compliance (April 2020)

Vehicle Reg.	Make	Model	ULEZ Compliant
OE69LCL	VW	Transporter	YES
M9ACE	Mercedes	Sprinter	NO
S25ACE	Mercedes	Sprinter	NO
78FLY	Mercedes	Vito	YES
Q735 LBW	MAN	TGS18	NO
Q733LBW	MAN	TCS18.360	NO
Q731LBW	MAN	TGS 18.360	NO
Q734LBW	MAN	TGS18 360	NO
Q732LBW	MAN	TGS 18.360	NO
KP54HYN	Volvo	FM9	NO
Q856SDV	Man	Man	NO
Q857SDV	MAN	MAN	NO
Q858SDV	MAN	MAN	NO
KW03 RTX	Volvo	FM9	NO
AF65 DZZ	Ford	Transit	NO
WF61 XMJ	Ford	Transit	NO
EF16LXG	VAUXHALL	VIVARO	NO
KS53KRU	Ford	Connect	NO
DY16PYF	VAUXHALL	VIVARO	NO
WF64XVW	Ford	Transit	NO
CE65XLS	Nissan	eNV200	YES
KS68KNH	Mercedes	Atego	YES
GX57KFZ	Citroen	Relay	YES
LM06KTE	Renault	Kangoo	NO
LN07PFZ	Renault	Traffic	NO
BV66YAU	Ford	Ranger	YES
DY66VBE	Vauxhall	Vivaro	YES
OV15CVF	Volkswagen	Luton	NO
EK66HBP	Volkswagen	Caddy	YES
EJ60MPZ	Renault	Master	NO
LR16DWO	Mercedes	Vianno	YES
LN16EWW	Mercedes	Vianno	YES
LN16 FEX	Mercedes	Vianno	YES
LN16FEU	Mercedes	V-Class	YES
CV67YLZ	Ford	Transit	YES
DA68 YBO	Mercedes	Dustcart	YES
DG18 KNL	Mercedes	Dustcart	YES
DG68 BBF	Mercedes	Dustcart	YES
DG68 AYW	Mercedes	Dustcart	YES
KU68 NGX	Volvo	Dustcart	YES
DG68 BFM	Mercedes	Econic	YES
DA68YBO	Mercedes	Econic	YES

DA68 YAV	Mercedes	Econic	YES
LB54BWE	Volkswagen	Caddy	NO
RJ60ZHN	Volkswagen	Caddy	NO
NX09 ULA	Vauxhall	Vivaro	NO
DL16DVA	Vauxhall	Vivaro	NO
YT18 TVN	Ford	Connect	YES
BX10LJA	Vauxhall	Zafira	NO
BX13DMZ	FORD	TRANSIT	NO
BX17 DVF	Mitsubuishi	Shogun	YES
BX10 LDK	Mitsubuishi	Shogun	NO
BX17DUY	BMW	218i	YES
BX17 DUV	BMW	218i	YES
BX13 DPV	Volkswagen	Sharan	NO
BX17DMY	Mercedes	Sprinter	YES
BX11HLN	Mitsubushi	Shogun	NO
M667NNA	Leyland	DAF	YES
M55FFL	Leyland	DAF	YES
J11 AFL	Leyland	DAF	YES
J90AFL	Leyland	DAF	YES
J100 AFL	Leyland	DAF	YES
M69NNA	Leyland	DAF	YES
J12AFL	Leyland	DAF	YES
J13AFL	Leyland	DAF	YES
KU69AXK	Mercedes	Atego	YES
KU69AXD	Mercedes	Mallahan	YES
KU69AXM	Mercedes	Callaghan	YES
KU69AXF	Mercedes	Callaghan	YES
KU69AXG	Mercedes	Callaghan	YES
KU69AXN	Mercedes	Callaghan	YES
PN67OPE	DAF	CF75	YES
RO67YPK	DAF	LF230	YES
RK65WSL	DAF	LF55	YES
RV17UWH	DAF	LF55	YES
FJ19NDU	Mercedes	Arocs	YES
RK69GCV	DAF	LF230	YES
RK69GCU	DAF	LF230	YES
RO67YPJ	DAF	LF230	YES
RO67YPL	DAF	LF230	YES
RK69 GCX	DAF	LF230	YES
EK14YWN	Ford	Transit Connect	NO
GC14OPE	Ford	Transit	NO
EN08LJO	Ford	Transit	NO
GL64OVC	Ford	Transit	NO
LV07YNF	Citroen	Berlingo	NO

GF11 ONP	Ford	Transit	NO
EX58YWN	Ford	Transit	NO
GJ11EBK	Ford	Transit	NO
NU66GGK	Peugeot	Partner	YES
BA66NZG	Nissan	NV200	YES
DA69YVY	VW	Transporter	YES
WT66BLV	Citroen	Berlingo	YES
LJ66UYD	Ford	Transit	YES
GD64 DVG	Ford	Transit	NO
CE16UNP	PEUGEOT	BOXER	NO
LR18 MXC	LIEBHER	LTM1450-8.1	YES
EJ67OVT	FORD	TRANSIT	YES
PY63MTK	SCANIA	R450	NO
EY17PXN	Citroen	Dispatch	YES
EY17 PXO	Citroen	Dispatch	YES
EU65 XCL	SCANIA	R730	YES
EY64 CLF	SCANIA	R730	YES
PN16 PCU	SCANIA	G450	YES
HX66XWO	IVECO	Daily	YES
OU18YTE	JOHN DEERE	6110M	NO
PO65UUF	Scania	R450	YES
BV17VZU	Amarok	VW	YES
GJ14DVM	Amarok	VW	NO
GD66XFS	Amarok	VW	YES
HX66XWR	IVECO	Daily	YES
GY67XLA	VOLKSWAGON	Crafter	YES
EY68VTJ	Scania	L280	YES
LV16KPZ	Terex	AC 100/4L	YES
SN13AVD	SCANIA	G4800	NO
LO17JZW	LIEBHER	LTM1040-3.1	YES
GU67XVC	FORD	Connect	YES
GU67XVP	FORD	Transit tipper	YES
GU67XVL	FORD	Transit Tipper	YES
HJ18SZT	Ford	Transit	YES
WN18TLV	Ford	Transit	YES
VK16THN	Ford	Transit	NO
BC17YYW	Ford	Transit	YES
EY68XWG	Ford	Connect	YES
CP19VOH	Ford	Transit	YES
GV18OFC	Ford	Transit	YES
HX15WKG	Iveco	Daily	NO
MK17GMU	Ford	Transit	YES
FE68LZT	JCB	DUMPER	YES
FE68LZV	Wacker Neuson	DW90	YES

WA68EHB	Hitachi	ZX17OW	YES
VX67BYR	Doosan	DX140W-S	YES
WX65ZDJ	JCB	535-95	YES
91915	Hitachi	ZX135US-6	YES
NK12EXU	Hitachi	ZX210W	NO
CU15LSD	Hitachi	ZX170w-5	YES
BK68XBB	Wacker Neusor	DW90	YES
MX68GHH	Doosan	Excavator	YES
CP19VOM	Ford	Transit	YES
GK65EGF	Iveco	70C18D	YES
FD66BOV	Ford	Transit	YES
EF67KMU	Mercedes Benz	Citan	YES
KX67WXT	Volvo	C8XL8FV	YES
ku69zbz	Volvo	N/A	YES
KU68NCC	Volvo	Box Van	YES
KU68NCA	Volvo	Box Van	YES
KX18MYO	Volvo	FL	YES
EY18HAX	Scania	P450	YES
EU63EZH	Scania	P400	NO
EU65XFT	Scania	P410	YES
KT18TBV	Volvo	TIPPER	YES
KS18JHU	Volvo	TIPPER	YES
KT15AAN	Volvo	TIPPER	YES

APPENDIX 5: Particle Emission Mitigation Options at Airports. Source: ACI (2018) Ultrafine Particles at Airports

Group	Emission Source	Mitigation Option	London City Airport Action
Aircraft	**Aircraft taxiing**	Reduce congestion, ease flow of traffic through support software	London City Airport operates an Electronic Flight Process System (EFPS) which monitors the progress of each aircraft from engine start-up, to start-up roll, and then from touch down to engine shut-down on stand.
		Change of fuel properties (lower sulphur and aromatics)	London City Airport has been in discussion with suppliers and will undertake a study to investigate the feasibility of introducing lower sulphur aviation fuels [Measure 18]
		Support for aircraft taxiing with less than all engines operating	A single engine taxi assessment has been carried out, and this may occur for up to 20% of the time. However, there are safety concerns regarding the operation of this procedure which means it cannot be incorporated as a formal requirement. The potential to introduce reduced thrust settings on taxiing will be investigated once the new taxiways for CADP have become operational [Measure 5]
		Modify push back operations to avoid engine start up procedures in sensitive areas	The Standard Terms and Conditions of Use require that operators should not seek approval for engine start-up until strictly necessary, and where push-back delays occur subsequent to start-up, to shut down engines wherever possible.
	Auxiliary Power Units (APUs)	Provide stationary electricity and Pre-conditioned air	FEGP is to be provided on all main stands. PCA is not a feasible option due to space on the apron, and inability of many aircraft types to connect to PCA.
		Impose APU operating procedures	Airport Operating Instruction AOI07 provides APU procedures. Contraventions monitored via "Qlickview" reporting tool
Ground Handling	**Ground Support Equipment and airside vehicles**	Electrify GSE fleet or provide electric charging stations	All baggage trucks and belt loaders are electric. All MGPUs are to be decommissioned by December 2020. A feasibility study has been prepared for the procurement of hybrid or electric vehicles.
		Modernise fleet (Stage II to Stage IV)	All MGPUs with Stage II emissions have been decommissioned. Reliance on diesel MGPUs will be phased out completely by December 2020.
		Install diesel particle filters on diesel GSE	Reliance on diesel MGPUs will be phased out completely by December 2020.
		Change to fuel with lower emissions	Reliance on diesel MGPUs will be phased out completely by December 2020.
Airport Infrastructure	**Diesel generators**	Limitation on operating times	There are no diesel generators on site
		Change to fuel with lower emissions	There are no diesel generators on site
		Alternative systems	There are no diesel generators on site
	Heating plant	Change to fuel with lower emissions	All boiler plant are gas fired and conform to ultra-low NOx requirements. CHP plant are equipped with SCR.
		Reduce usage through installation of alternative heating systems and development of renewables	The Energy Strategy for CADP includes the provision of photovoltaic panels.
Landside traffic	**Vehicles**	Incentives to use public transport and car-pooling. Provision of electric charging points	A target of 75% of passenger journeys by sustainable transport by 2025 has been set. 300 electric charging points are to be provided, with provision for electric charging or

			xero emission vehicles on all other spaces by 2035.
		Prioritising low emission vehicles (taxis, shuttles)	Initiatives to deliver low emission or zero emission capable taxis are primarily driven TfL policies, including changes to taxi and PHV licencing requirements
		No-idling polices at kerbside	A black cab emissions study, including provisions to reduce idling, was approved by LBN in October 2018.

APPENDIX 6 - REFERENCES

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APPENDIX 7 - ABBREVIATIONS

APU	Auxiliary Power Unit
AQMA	Air Quality Management Area
CAA	Civil Aviation Authority
CAEP	Committee on Aviation Environmental Protection
EU	European Union
FEGP	Fixed Electrical Ground Power
GLA	Greater London Authority
GSE	Ground Support Equipment
ICAO	International Civil Aviation Organisation
LBN	London Borough of Newham
LCA	London City Airport
LCACC	London City Airport Consultative Committee
LTO	Landing and take-off cycle
µg/m^3	Micrograms per cubic metre of air
µm	Micrometre (or micron) – one-millionth of a metre
MGPU	Mobile Ground Power Units
NO	Nitric Oxide
NO_2	Nitrogen dioxide
Nm	Nanometre – one-billionth of a metre
NOx	Nitrogen oxides (NO + NO_2)
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10 µm
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of less than 2.5 µm
UFP	Ultra Fine Particles. Particulate matter with a mobility diameter less than 100 nanometres (0.1 µm)