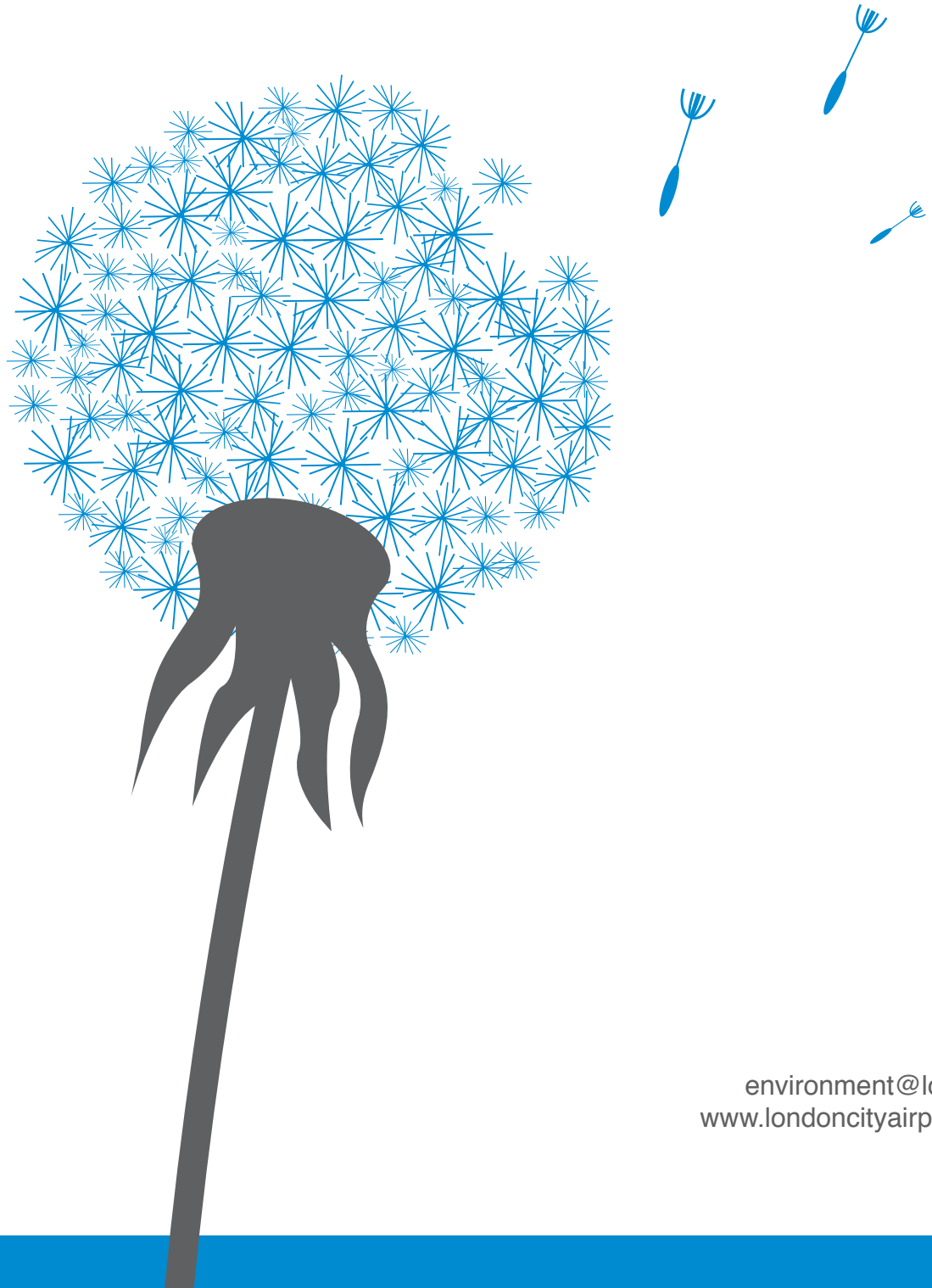
LondonCityAirport

London City Airport
Air Quality Action Plan

2012 – 2015



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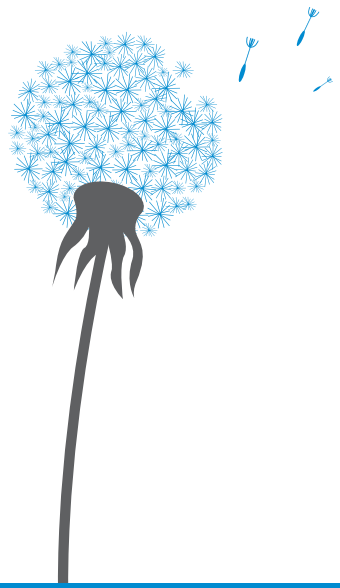
June 2012

Air Quality Action Plan

Measure		Indicative Timescale
Measure 1:	Establish and implement a new system to routinely record the availability of FEGP on Stands 1-10 and log the time taken to effect repairs.	August 2012 (on-going)
Measure 2:	Refurbish FEGP facilities on Stands 1-10	December 2012 (completion)
Measure 3:	Install FEGP to Stands 21-24 during any future stage of apron improvements, and in any event by 2013	December 2013 (completion)
Measure 4:	Replace or decommission all MGPU units that do not comply with a minimum of Stage II emissions standards.	December 2013 (completion)
Measure 5:	Conduct an assessment of APU use over a period of 8 hours at selected stands on two separate days during the summer months.	August 2012 (on-going)
Measure 6:	The Airport Operations and Safety Unit (AOSU) to maintain a documented record of any observations where mandatory use of FEGP or OSIN 09/04 is contravened.	August 2012 (on-going)
Measure 7:	Inclusion of APU use as a topic on the agenda of the Pilots Forum and the Flight Ops Governance Meetings. Reference to minimising APU use will also be included in an article for the UK Air Pilot publication.	August 2012 (on-going)
Measure 8:	Produce analysis of trends in aircraft ground operational times, and, where significant increases are identified, investigate procedures to reduce times.	On-going
Measure 9:	Requirement for all third-party airside vehicle operators to prepare and submit a fleet management strategy.	December 2012 (completion)
Measure 10:	London City Airport will work with operators at the airport to increase the percentage of LLEZ compliant vehicles year on year, with the target of achieving 100% compliance with the LLEZ by 2015[1].	On-going

[1]Exceptions from this requirement will only be made if an exemption is provided for a specific vehicle by TfL or agreed with the London Borough of Newham.

Measure	Indicative Timescale
Measure 11: London City Airport will require that all new vehicles issued with an Airside Vehicle Permit (i.e. not renewal applications for existing Airside Vehicle Permits) comply with the latest EU emissions standards for road vehicles (Euro Standard), defined as the date by which the Euro Standard comes in to force for the registration and sale of new types of vehicles	August 2012 (on-going)
Measure 12: London City Airport will undertake routine, annual and periodic random emissions testing for all airside vehicles.	On-going
Measure 13: Amend the Airside Driving Policy to make specific reference to vehicle emissions testing and the actions that must be taken in the event of failure.	August 2012
Measure 14: Publish a notice in "Taxi" which is published by the London Taxi Drivers Association. This will set out the concerns associated with unnecessary idling, and will seek to encourage taxi drivers to turn off engines wherever practicable.	August 2012
Measure 15: During any future infrastructure developments to the airport forecourt, take into consideration the potential for redesign of the taxi rank to minimise idling.	On-going
Measure 16: Continue to lobby the Mayor of London and TfL to provide a direct DLR service between Canary Wharf and London City Airport stations.	On-going
Measure 17: Publish an article relating to air quality and Airport operations at least once per year in the airport staff newsletter "The Chronicle".	On-going
Measure 18: Amend the London City Airport website to promote the measures it is taking to minimise air quality impacts, and include links to the Air Quality Monitoring Programme Annual Report and the Air Quality Action Plan.	August 2012
Measure 19: Amend the London City Airport website to provide advice to passengers to use public transport.	August 2012



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Appendices

1 Introduction

1.1. London City Airport is the UK's leading business airport with currently 12 airlines serving over 35 destinations across the UK, Europe and the United States of America. Located within the heart of the London Docklands, and within the boundary of the London Borough of Newham, the Airport lies approximately three miles from Canary Wharf, and six miles from the City of London.

1.2. London City Airport comprises a single runway, a main terminal area, and a corporate aviation facility (the "Jet Centre"), together with support infrastructure including a fuel farm, fire testing facilities and car parking. It is well served by public transport, with around 3% of passengers arriving and parking by private car[1].

1.3. The pollutants of principal concern in the London Borough of Newham are nitrogen dioxide (NO_2) and fine particulate matter (PM_{10} and $PM_{2.5}$). A summary of the sources of these pollutants and the principal environmental effects are described in **Box 1.**

Box 1: Pollutants of Concern in London Borough of Newham

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 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.

1.4. The airport is committed to minimising any negative environmental impacts for people living and working in the area, including impacts on local air quality. 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. Studies carried out by London City Airport have demonstrated that these airport sources contribute a maximum of about 10% 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%.

1.5. This Air Quality Action Plan sets out how London City Airport intends to manage its operations over the three year period between 2012 and 2015, so as to mitigate any air quality impacts. It commits to an annual statement on progress and performance, to be included within the Annual Performance Report, and a review of the Action Plan every three years.

1.6. This Air Quality Action Plan describes:

1.6.1. Why local air quality is of relevance to London City Airport;

1.6.2. What contribution the airport makes to local air quality conditions; and

1.6.3. What measures the airport intends to implement, with the objective of minimising the impact of its operations on local air quality.

1.7. In drafting this document, consideration has also been given to the draft Air Quality Action Plan produced by the London Borough of Newham in 2005, to ensure that the proposed measures both enhance and complement the actions of the Council within the wider borough boundary.

1.8 The policy and legislative context to this Air Quality Action Plan is described in Appendix 1.

[1]London City Airport Customer Satisfaction Research 2011

2 Air Quality Action Plan 2012 – 2015

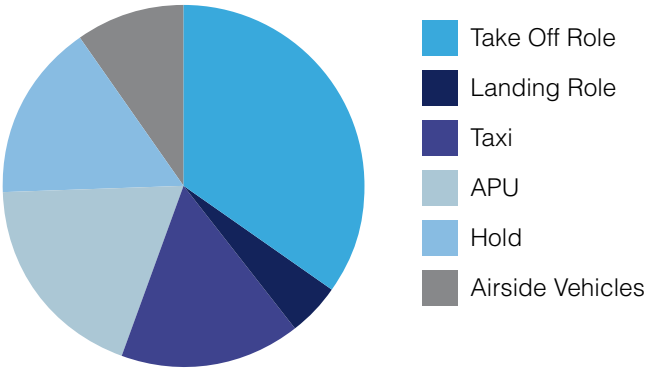
Contribution of Airport Operations to Local Pollution Levels

2.1. As part of the 2007 application for planning approval to expand operations to 120,000 flight movements per annum, a detailed emissions inventory and dispersion modelling study was carried out by independent consultants acting for London City Airport, and was reported in the Environmental Statement. The results of this study, which were accepted by the London Borough of Newham, 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 Environmental Statement showed that airport sources contribute a maximum of about 10% 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%.

2.2. Emissions from aircraft above about 50 metres altitude make very little contribution to ground-level pollutant concentrations (AQEG, 2004), and it is therefore appropriate to focus on emissions from sources at ground level. An estimate of the contributing factors to NOx emissions arising from various ground-level airport sources at London City Airport in 2006[2] is shown in **Figure 1.**

2.3. The majority of ground-based NOx emissions occur during the Landing and Take-off (LTO) Cycle (which includes take-off and landing rolls, taxiing and aircraft hold), with the take-off roll dominating (42%). Emissions from Auxiliary Power Units (APUs), which are sometimes used to provide power to the aircraft when the main engines are not switched on and which do not form part of the LTO Cycle, are also important, contributing almost 20% to total airport emissions.

Figure 1: Estimated Source Contributions to Ground-Level NOx Emissions at London City Airport in 2006 (Note: Airside Vehicles Contribution includes MGPUs)



[2]The number of aircraft movements in 2011 was very similar to the number in 2006. The 2006 Emissions Inventory is expected to accurately represent current conditions for the purpose of this Action Plan.

Focus of the Air Quality Action Plan

2.4. The focus of the Air Quality Action Plan is on minimising emissions of nitrogen oxides (NOx) from airport operations. Results from the airport's Air Quality Measurement Programme have demonstrated that concentrations of PM_{10} have been well below the UK Government objectives at the City Aviation House site since monitoring commenced in 2006. While $PM_{2.5}$ concentrations are not explicitly measured in the AQMP, empirical evidence from other monitoring stations shows that the $PM_{2.5}$ limit values or objectives are highly unlikely to be exceeded where the PM_{10} standards are met.

2.5. The Action Plan relies on measures being taken pursuant to the Section 106 Planning Agreement completed in 2009, in order to address matters such as odours, black smuts and oily deposits. Under the Agreement, the airport is committed to undertaking a study to measure concentrations of Volatile Organic Compounds and odours in and around the airport, and the results of this study have been reported separately[3]. In addition, London City Airport has established a new protocol relating to the commissioning of Deposits Studies in the event that any complaints are received in relation to black smuts or oily deposits. At this stage, the register of complaints associated with these issues suggests that they are not a major problem but if the studies or the pattern of future complaints indicate otherwise, the Action Plan will be revised as appropriate.

2.6. The Action Plan identifies measures that will be put into place to minimise NOx emissions from airport-related sources including:

2.6.1. Aircraft operations

2.6.2. Ground-based aircraft support equipment (e.g. Mobile Ground Power Units)

2.6.3. Airside vehicles

2.6.4. Black cabs (taxis)

2.7. The above subjects are presented below as separate studies.

2.8. The Action Plan also identifies measures that will be used to inform and promote practices to improve air quality.

2.9. The Action Plan further commits to the continued operation and maintenance of the Air Quality Measurement Programme which forms an important component in monitoring the extent to which pollutant concentrations are adversely affected by airport operations.

2.10. Where appropriate, this Action Plan makes reference to other plans and strategies that are in place, or are currently being developed by the airport, principally the London City Airport Travel Plan and the Sustainability Strategy and Action Plan.

2.11. In preparing this Action Plan, careful consideration has been given to each of the Air Quality Action Plan Measures as defined within the 2009 Section 106 Agreement. A summary of the Measures defined within the Agreement, and the relevant proposals within this Action Plan, are set out in Appendix 2.

[3]http://www.lcacc.org/environment/airquality.html

Minimising use of APU and MGPU

2.12. Both APU[4]s and MGPU[5]s are used to provide power to the aircraft at times when the main engines are not running. Such power 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. Potential measures to control APU and MGPU use include improving the availability of, and extending the facilities for, Fixed Electrical Ground Power (FEGP)[6] and limiting the use and/or running times of both APUs and MGPUs.

2.13. **Fixed Electrical Ground Power:** FEGP is currently available on Stands 1-10, and is available for all aircraft types. Non-availability of FEGP due to equipment failure is minimised with target repair times of within 8 hours, and not exceeding 24 hours. London City Airport has committed to refurbishing the FEGP on Stands 1-10 in order to maintain reliability, and this will be completed by December 2012.

Measure 1:

A new system will be set up by London City Airport to routinely record the availability of FEGP on all stands where it is available, and to log the time taken to effect repairs. Where FEGP availability falls below 90% in the year, procedures will be revised and reviewed to improve repair times as necessary.

Measure 2:

London City Airport will refurbish FEGP facilities on Stands 1-10 and will complete this programme by December 2012.

2.14. It is intended that Stands 21-24 will be equipped with FEGP during any future stage of apron improvements, and in any event by the end of 2013. It is also confirmed that any new stands, constructed during any future stage of apron improvements, would all be equipped with FEGP.

Measure 3:

London City Airport will upgrade Stands 21-24 during any future apron improvements, and in any event by the end of 2013. Any new stands constructed during any future apron improvement will be equipped with FEGP.

2.15. **Use of APU and MGPU:** The current Standard Terms and Conditions for airlines at London City Airport require the mandatory use of FEGP on Stands 1-10, subject to the power supply being available and the equipment being serviceable.

2.16. London City Airport currently has an Operational and Safety Information Notice (OSIN 09/04) which restricts the running of APU's except when there is a problem with the FEGP, or if required for cabin comfort. The maximum running time is limited to no more than 10 minutes prior to departure unless express permission is granted by Air Traffic Control in extreme temperatures. London City Airport will continue to operate and enforce these instructions.

2.17. In developing this Action Plan, London City Airport has carried out an inventory of all MGPUs currently in use, and has calculated the NOx emissions benefits associated with two scenarios i.e. upgrading all MGPUs to a minimum of EU Stage II or Stage IIIA emissions standards (see Appendix 3). To comply with the Stage II emissions limits would require the purchase of four new MGPU's, at an approximate cost of £240,000. To comply with the Stage IIIA emissions would require the purchase of 10 new MGPU's at an approximate cost of £600,000. The benefit of meeting the Stage IIIA emissions (over and above the Stage II limits) is 774 kg NOx/annum, or about a 2% improvement on total airport-related ground level NOx emissions. Given that there have been no recorded exceedences of the objective or limit values for nitrogen dioxide, the investment costs of complying with the Stage IIIA limits are not justified.

2.18. As stated above, London City Airport has committed funds to the refurbishment of the FEGP currently provided at stands 1-10 to maintain the reliability and use of this facility. Once FEGP has been installed at Stands 21-24 (by the end of 2013 at the latest), the overall requirement for MGPUs will be substantially reduced.

[4]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.

[5]Mobile Ground Power Units are small vehicles capable of supplying electrical power to aircraft parked on the ground.

[6]FEGP provides mains power from the stand to aircraft parked on the ground.

Measure 4:

London City Airport will replace or decommission all MGPU units that do not comply with a minimum of EU Stage II emissions limits by December 2013. In the event that replacement units are purchased, they will comply with a minimum of Stage IIIA emissions limits.

Measure 5:

An assessment of APU use will be carried out over a period of 8 hours at selected stands on 2 separate days during the summer months. This study will log the use and operating times of APUs and will be used to inform future strategies to reduce APU use.

Measure 6:

The Airport Operations and Safety Unit (AOSU) will maintain a documented record of any observations where the mandatory use of FEGP or OSIN 09/04 is contravened.

Measure 7:

London City Airport will ensure that APU use is a topic regularly raised on the agenda of the Pilots' Forum and the Flight Ops Governance Meetings. Reference to minimising APU use will also be included in an article for the UK Air Pilot publication.

Minimising Aircraft Taxi and Hold Times

2.19. Emissions from aircraft taxiing to and from stand, and when they are kept at hold positions, represent a significant proportion of the ground-level NOx emissions from aircraft.

2.20. 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 any other UK international airport and therefore the extent of these emissions is relatively low due to the airport's restricted physical footprint.

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

2.21.1. Not seek approval from Air Traffic Control for aircraft engine start-up until strictly necessary;

2.21.2. Shut down all engines as soon as possible following arrival; and

2.21.3. Where a delay occurs subsequent to engine start up to shut down engines whenever possible.

2.22. London City Airport will continue to operate and enforce these instructions. In addition, in March 2010, London City Airport introduced a new Electronic Flight Progress System (EFPS) to 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. Statistics of average aircraft times from engine start-up to wheels-off (on departure) and from wheels-down to arrival on stand (on arrival) are set out in Appendix 4.

Measure 8:

London City Airport will continue to maintain analyses of aircraft ground operational times which will be reported on an annual basis. Where significant increases in ground operational times are identified, procedures to reduce operational times will be investigated and reported.

Airside Vehicles and Plant

2.23. 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 a less regular basis, such as fire tenders, snow ploughs, de-icing equipment and rescue boats.

2.24. All baggage tugs and belt loaders are electric. There are currently a total of 145 airside-approved non-electric vehicles or other equipment in use. Measures to reduce NOx 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.

2.25. **Introduction of cleaner vehicles and plant:** London City Airport directly owns a small fleet of vehicles as described in Appendix 5. Of these, the majority are specialist vehicles such as fire tenders and vehicles reserved for winter use (e.g. tractors, snow ploughs and de-icing equipment). Only a small proportion of the fleet could potentially be considered for replacement to low-emission or zero-emission vehicles, but there are over-riding operational and safety issues that preclude this at present. In particular, the vehicles must be 4-wheel drive (as they must be able to operate in all conditions), and they must be immediately available throughout the entire operating day (16 hours). There are currently no hybrid or electric vehicles that would meet these requirements.

2.26. There is opportunity to introduce cleaner vehicles into the fleets operated by London City Airport and third party operators. The following measures are proposed:

Measure 9:

London City Airport will require all third party operators of airside vehicles to prepare and submit a fleet management strategy by December 2012, setting out their intentions for vehicle replacements over the next three years.

Measure 10:

74% of vehicles operating airside at London City Airport in May 2012 achieved compliance with the London Low Emissions Zone (LLEZ). Although vehicles solely operating airside are officially exempt from the LLEZ, in order to achieve minimum emissions standards for existing airside vehicles, London City Airport will work with operators at the airport to increase the percentage of LLEZ compliant vehicles year on year, with the target of achieving 100% compliance with the LLEZ by 2015[7].

Measure 11:

To drive continuous improvement in airside vehicle emissions, London City Airport will require that all new vehicles issued with an Airside Vehicle Permit (i.e. not renewal applications for existing Airside Vehicle Permits) comply with the latest EU emissions standards for road vehicles (Euro Standard), defined as the date by which the Euro Standard comes in to forces for the registration and sale of new types of vehicles.

2.27. **Maintenance and Operation:** All vehicles operating airside are required to have a valid Airside Vehicle Permit. This requires vehicles to meet the standards required for the issue of the appropriate Department for Transport Test Certificate, including requirements related to vehicle emissions. All operators of airside vehicles must have an Airside Driving Permit, and abide by the airport's Vehicle Operating Rules. These require that vehicles must not be left unattended anywhere on the airside area with the engine running. London City Airport will continue to enforce this requirement.

Measure 12:

London City Airport will undertake routine, annual and periodic random emissions testing for all airside vehicles. The tests will be conducted using an Omnitec Diesel Smoke Tester, which is used by VOSA[8] for roadside spot checks of commercial vehicles. In all cases, vehicles will be refused a permit if the emissions fail the test.

Measure 13:

An amendment will be made to the Airside Driving Policy to make specific reference to vehicle emissions testing and the actions that must be taken in the event of failure.

[7]Exceptions from this requirement will only be made if an exemption is provided for a specific vehicle by TfL or agreed with the London Borough of Newham.

[8]Vehicle and Operator Services Agency

Emissions from Taxis (Black Cabs)

2.28. Taxis (black cabs) picking up passengers from the airport do so via a small taxi rank on the terminal forecourt. The rank is only able to accommodate about 10 taxis at any one time, and so, during busy periods, the line of queuing taxis extends eastwards along Hartmann Road; there can be 70 plus taxis in the queue along this stretch of road at busy periods.

2.29. Taxis entering the airport contribute to NOx emissions when idling in a queue. The importance of emissions from idling has been considered in the recent Public Consultation revision to the Mayor's Air Quality Strategy (GLA, 2010). This sets out a vision to establish a "No-idling" zone throughout London, specifically focusing on buses, coaches and taxis. The aim of the "No-idling" zone is to reduce emissions in hotspots (where the air quality objectives are exceeded) and to reduce public exposure to emissions (as taxi ranks are often within semi-enclosed areas). However, the Strategy also recognises that it is difficult to determine when a vehicle is "unnecessarily idling", and the design of most taxi ranks makes it difficult to prevent idling as taxis are usually required to move forwards every few minutes or so. Any continual "stop-starting" of engines would potentially incur a greater NOx penalty than idling at low load (when NOx emissions are lowest).

2.30. A survey of idling and queuing taxis at London City Airport was carried out on 8-9 April 2010. This was intended to determine whether taxi idling was a common occurrence at the airport, and whether any practical measures could be implemented to reduce it. The survey commenced early evening (17:30 – 18:00 hrs) and continued the next day from 08:30 to 13:30 hrs. For reasons stated above, a taxi was only considered to be "idling" if it had the engine running and did not move over a period longer than 2 minutes.

2.31. Idling was not found to be common practice. Within the taxi rank area there was a single occasion when eight taxis were idling; at all other times there were fewer than three taxis idling, and often none. On Hartmann Road, there was a single occasion when seven taxis were idling (out of 70 plus vehicles), and often no idling taxis were identified.

2.32. It is possible to use these data to approximate the NOx emissions that might arise from taxis idling in queues at London City Airport. There are few data relating to NOx emissions from idling vehicles, but Euro 3 and Euro 4 taxis might be expected to emit approximately 10 g NOx per hour (Boulter, 2010). Given a worst-case assumption of 3 taxis continually idling over half of the operational hours of the airport (45 hours per week), this would equate to approximately 70 kg NOx per year. This would represent approximately 0.2% of airport-related NOx emissions.

Measure 14:

London City Airport will publish a notice in the publication 'Taxi' (which is produced by the London Taxi Drivers Association) setting out concerns associated with unnecessary idling, and will seek to encourage taxi drivers to turn off engines wherever practicable.

Measure 15:

London City Airport will take into consideration in any future infrastructure improvements to the airport forecourt, the potential for redesign of the taxi rank, for example by including parallel ranks with supervised passenger loading.

2.33. London City Airport is keen to reduce the reliance on black cabs and Public Hire Vehicles (minicabs), particularly for passengers travelling from the Canary Wharf area. It is believed that this is, in part, driven by the lack of a direct DLR link between Canary Wharf and London City Airport.

Measure 16:

London City Airport will continue to lobby the Mayor of London and TfL to provide a direct DLR service between Canary Wharf and London City Airport stations.

Publicity and Promotion

2.34. To ensure that measures identified within the Action Plan are fully implemented, it is important to communicate the importance of air quality issues to both staff and passengers. London City Airport will introduce a number of new measures to promote the understanding of air quality matters.

Measure 17:

London City Airport will publish an article relating to air quality and airport operations at least once per year in the airport staff newsletter "The Chronicle".

Measure 18:

London City Airport will amend its website to promote the measures it is taking to minimise air quality impacts, and include links to the Air Quality Measurement Programme Annual Report and the Air Quality Action Plan.

2.35. The airport has excellent links to public transport, with typically less than 3% of passengers travelling to and parking at the airport by private car.

Measure 19:

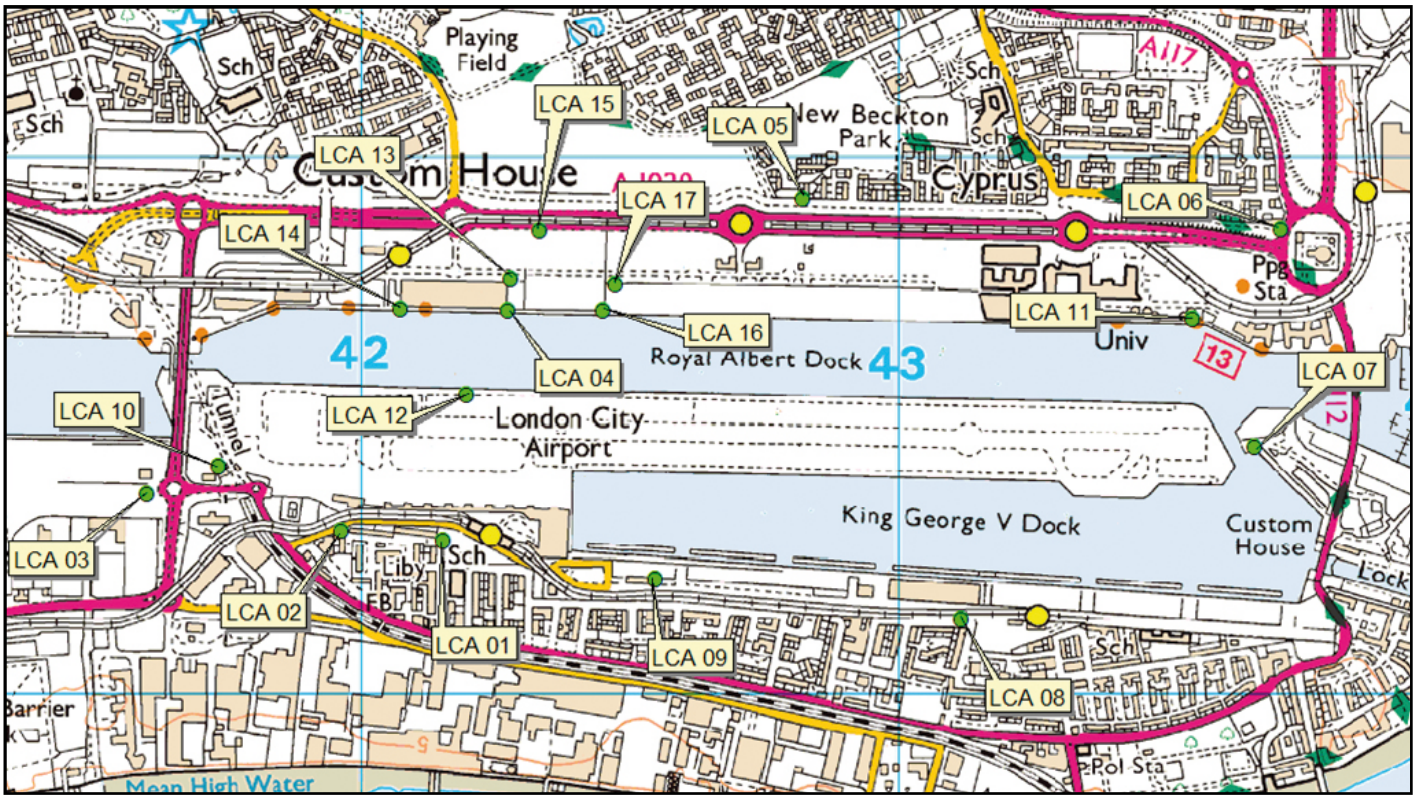
London City Airport will amend its website to provide advice to passengers to use public transport.

London City Airport – Air Quality Measurement Programme

2.36. London City Airport operates an extensive Air Quality Measurement Programme (AQMP) at sites both in and around the airport. The AQMP has been in operation since 2006, and has consistently shown that pollutant concentrations are below the air quality objectives and EU limit values at all locations relevant to public exposure.

2.37. The AQMP, as defined within the 2009 Section 106 Agreement, comprises an automatic air quality monitoring station situated on the roof of City Aviation House which measures concentrations of both nitrogen dioxide and PM_{10}, and a network of nitrogen dioxide diffusion tubes, situated in and around the airport site. In addition, London City Airport commissioned a second automatic air quality monitoring station, which measures nitrogen dioxide concentrations, at a site adjacent to the Newham Dockside building, in September 2008. **Figure 2** shows the location of the monitoring sites.

Figure 2: Location of Monitoring Sites in AQMP. Pink Boxes refer to Automatic Stations (LCA-CAH and LCA-ND). The Green Boxes refer to the Nitrogen Dioxide Diffusion Tube Sites[9]



[9]Site LCA17 was removed in early 2012 as a result of development on the site. LCA and the London Borough of Newham agreed in April 2012 that the loss of this site was not material due to the close proximity of other diffusion tube sites in this area.

2.38. The results of the continuous automatic measurements for 2009-2011 are summarised in **Table 1.** There were no recorded exceedences of the annual mean objective for nitrogen dioxide at the automatic sites, nor at any of the diffusion tube sites in 2009, 2010 or 2011; there were also no exceedences of the objectives for PM_{10}. The 2011 Annual Report for the AQMP which provides full details of the measured results can be downloaded from the London City Airport Consultative Committee (LCACC) website[10] and the airport's website[11].

Table 1: Summary of Measured Concentrations at Automatic Sites in 2009-2010

Site	Nitrogen Dioxide				PM_{10}			
	Annual Mean ($\mu g/m^3$)		No. Hours >200 $\mu g/m^3$		Annual Mean ($\mu g/m^3$)		No. days >50 $\mu g/m^3$	
	2009	2010	2009	2010	2009	2010	2009	2010
LCA-CAH	34	35	0	0	23	22	5	2
LCA-ND	36	39	0	0	-	-	-	-
Objectives	**40**		**18**		**40**		**35**	

Environmental Complaints and Enquiries

2.39. London City Airport operates an environmental complaint handling procedure by which anyone can contact the airport to register a complaint or make an enquiry about airport operations. Complaints or enquiries can be registered by telephone, post, email or via the airport website. Each complaint or enquiry is registered by the airport, and then investigated and resolved where practical. All environmental complaints and enquiries are reported to the London Borough of Newham and a summary provided to the quarterly meetings of the LCACC.

2.40. A summary of the environmental complaints related to air quality issues since April 2000 is shown in **Table 2.**

Table 2 – Summary of Air Quality Complaints (2000 – 2011)

Year	No. Complaints	Nature of Complaint
2000	2	Airport odours
2001	2	Airport odours
2002	1	Smoke
2003	0	
2004	0	
2005	2	Airport odours
2006	1	Airport odours
2007	1	Airport odours
2008	0	
2009	1	Airport odours
2010	0	
2011	0	
TOTAL	10	

London City Airport Travel Plan

2.41. Studies undertaken by the London Borough of Newham have identified road traffic as the primary source of poor air quality in the borough. This is evidenced by the shape of the Air Quality Management Area (see Figure A1.1 in Appendix 1), which effectively mirrors the major road network. Measures to reduce airport-related traffic on the local road network therefore form an important link to this Air Quality Action Plan.

2.42. It should, however, be recognised that 66% of passengers currently travel to the airport by public transport (including black cabs), and the proportion of passengers that travel to and from the airport by private car is very low, at about 3%. This is due to the excellent links to an integrated public transport system, and specifically the Docklands Light Railway.

2.43. The London City Airport Travel Plan[12] (approved by the London Borough of Newham in February 2011) has been developed to further encourage passengers and staff to use sustainable transport modes to access the airport where possible. This includes making the best use of public transport and minimising the number of trips to and from the airport by single occupancy vehicles.

2.44. Specific objectives and targets include:

2.44.1. Appointment of a Travel Plan Coordinator to oversee the implementation of the Travel Plan

2.44.2. Reducing the modal share for staff travelling to work in single-occupancy cars. This may include the promotion of walk and cycle schemes and car-share schemes.

2.44.3. Enhancement of services to/from the airport on the DLR network, and improvements to local bus services.

Sustainability Strategy and Action Plan

2.45. The London City Airport Sustainability Strategy was approved by the London Borough of Newham in June 2012. It is intended to consider the impact of operations at the airport on matters such as energy, water and greenhouse gas emissions, and includes the Airport Sustainability Action Plan. While primarily targeted at reducing emissions of carbon dioxide from airport sources, the implementation of the Action Plan may also lead to a reduction of local emissions of NOx through measures that reduce fuel and energy use.

[10]http://www.lcacc.org/environment/airquality.html#09aqreport

[11]http://londoncityairport.com/aboutandcorporate/page/airquality

[12]http://londoncityairport.com/aboutandcorporate/page/sustainabletransport

3 Air Quality Action Plan

3.1. A summary of the measures, together with associated indicative timescales is set out in **the action plan** below. The outcome of each measure will be set out in future Annual Performance Reports.

Table 3: Air Quality Action Plan 2012 – 2015

Measure		Indicative Timescale
Measure 1:	Establish and implement a new system to routinely record the availability of FEGP on Stands 1-10 and log the time taken to effect repairs.	August 2012 (on-going)
Measure 2:	Refurbish FEGP facilities on Stands 1-10	December 2012 (completion)
Measure 3:	Install FEGP to Stands 21-24 during any future stage of apron improvements, and in any event by 2013	December 2013 (completion)
Measure 4:	Replace or decommission all MGPU units that do not comply with a minimum of Stage II emissions standards.	December 2013 (completion)
Measure 5:	Conduct an assessment of APU use over a period of 8 hours at selected stands on two separate days during the summer months.	August 2012 (on-going)
Measure 6:	The Airport Operations and Safety Unit (AOSU) to maintain a documented record of any observations where mandatory use of FEGP or OSIN 09/04 is contravened.	August 2012 (on-going)
Measure 7:	Inclusion of APU use as a topic on the agenda of the Pilots Forum and the Flight Ops Governance Meetings. Reference to minimising APU use will also be included in an article for the UK Air Pilot publication.	August 2012 (on-going)
Measure 8:	Produce analysis of trends in aircraft ground operational times, and, where significant increases are identified, investigate procedures to reduce times.	On-going
Measure 9:	Requirement for all third-party airside vehicle operators to prepare and submit a fleet management strategy.	December 2012 (completion)
Measure 10:	London City Airport will work with operators at the airport to increase the percentage of LLEZ compliant vehicles year on year, with the target of achieving 100% compliance with the LLEZ by 2015[1].	On-going

[7]Exceptions from this requirement will only be made if an exemption is provided for a specific vehicle by TfL or agreed with the London Borough of Newham.

Measure	Indicative Timescale
Measure 11: London City Airport will require that all new vehicles issued with an Airside Vehicle Permit (i.e. not renewal applications for existing Airside Vehicle Permits) comply with the latest EU emissions standards for road vehicles (Euro Standard), defined as the date by which the Euro Standard comes in to force for the registration and sale of new types of vehicles	August 2012 (on-going)
Measure 12: London City Airport will undertake routine, annual and periodic random emissions testing for all airside vehicles.	On-going
Measure 13: Amend the Airside Driving Policy to make specific reference to vehicle emissions testing and the actions that must be taken in the event of failure.	August 2012
Measure 14: Publish a notice in "Taxi" which is published by the London Taxi Drivers Association. This will set out the concerns associated with unnecessary idling, and will seek to encourage taxi drivers to turn off engines wherever practicable.	August 2012
Measure 15: During any future infrastructure developments to the airport forecourt, take into consideration the potential for redesign of the taxi rank to minimise idling.	On-going
Measure 16: Continue to lobby the Mayor of London and TfL to provide a direct DLR service between Canary Wharf and London City Airport stations.	On-going
Measure 17: Publish an article relating to air quality and Airport operations at least once per year in the airport staff newsletter "The Chronicle".	On-going
Measure 18: Amend the London City Airport website to promote the measures it is taking to minimise air quality impacts, and include links to the Air Quality Monitoring Programme Annual Report and the Air Quality Action Plan.	August 2012
Measure 19: Amend the London City Airport website to provide advice to passengers to use public transport.	August 2012

3.2. It should be noted that the timescales set out above (where given) are indicative, and are reliant on the date of receipt of approval of this Action Plan from the London Borough of Newham. London City Airport is required to implement this Air Quality Action Plan within six months of receipt of such approval of the document by the London Borough of Newham, which was received on 22 June 2012.

3.3. Every three years from the date of implementation, London City Airport will submit for the approval of the London Borough of Newham a review of the Air Quality Action Plan and the Air Quality Measurement Programme as may be necessary to ensure that they address any significant air quality impacts due to the operation of the airport, and to represent best practice.

Appendices

APPENDIX 1 – NATIONAL, REGIONAL AND LOCAL POLICY LEGISLATIVE CONTEXT

UK Air Quality Strategy

The Air Quality Strategy (Defra, 2007) 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 local government 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 which identifies appropriate measures that will be introduced in pursuit of the objectives.

Air Quality Criteria

The pollutants of principal concern in the London Borough of Newham are nitrogen dioxide (NO2) and fine particulate matter (PM10 and PM2.5).

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 PM10 were to have been achieved by 2005 and 2004 respectively, and continue to apply in all future years thereafter.

The European Union has also set limit values for both nitrogen dioxide and PM10. Achievement of these values is a national obligation rather than a local one. The limit values for nitrogen dioxide are the same levels as the UK objectives, and are to be achieved by 2010 (Stationery Office, 2007). The limit values for PM10 are also the same level as the UK statutory objectives, and were to be achieved by 2005. The objectives are the same as, or more stringent than the limit values, thus it is appropriate to focus on achievement of the objectives.

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})[a]	24-hour mean[b]	50 µg/m^3 not to be exceeded more than 35 times a year
	Annual mean	40 µg/m^3

a: Measured by the gravimetric method. b: Equivalent to the 90th percentile of 24-hr means

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 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.

A new air quality directive (2008/50/EC) was adopted in May 2008, and includes a national exposure reduction target, a target value and a limit value for $PM_{2.5}$.

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
European obligations	Annual mean	Target value of 25 µg/m^3	2010
	Annual mean	Limit value of 25 µg/m^3	2015
	Annual mean	Stage 2 indicative Limit value of 20 µg/m^3	2020
	3 year Average Exposure Indicator (AEI)[a]	Exposure reduction target relative to the AEI depending on the 2010 value of the 3 year AEI (ranging from a 0% to a 20% reduction)	2020
	3 year Average Exposure Indicator (AEI)	Exposure concentration obligation of 20 µg/m^3	2015

a. The 3 year running annual mean or AEI is calculated from the PM2.5 concentration averaged across all urban background monitoring locations in the UK e.g. the AEI for 2010 is the mean concentration measured over 2008, 2009 and 2010.

The London Plan

The London Plan 2011 (GLA, 2011) sets out the spatial development strategy for London. It 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.

The Mayor's Air Quality Strategy

The revised Mayor's Air Quality Strategy (MAQS) was published in December 2010 (GLA, 2010). The overarching aim of the Strategy is to reduce pollution concentrations in London to achieve compliance with the EU limit values as soon as possible. The Strategy commits to the continuation of measures identified in the 2002 MAQS, and sets out a series of additional measures:

Policy 1 – Encouraging smarter choices and sustainable travel;

Measures to reduce emissions from idling vehicles focusing on buses, taxis, coaches, taxis, PHVs and delivery vehicles;

Using spatial planning powers to support a shift to public transport;

Supporting car free developments.

Policy 2 – Promoting technological change and cleaner vehicles:

Supporting the uptake of cleaner vehicles.

Policy 4 – Reducing emissions from public transport:

Introducing age limits for taxis and PHVs.

Policy 5 – Schemes that control emissions to air:

Implementing Phases 3 and 4 of the LEZ from January 2012

Introducing a NOx emissions standard (Euro IV) into the LEZ for Heavy Goods Vehicles (HGVs), buses and coaches, from 2015.

Policy 7 – Using the planning process to improve air quality:

Minimising increased exposure to poor air quality, particularly within AQMAs or where a development is likely to be used by a large number of people who are particularly vulnerable to air quality;

Ensuring air quality benefits are realised through planning conditions and section 106 agreements and the Community Infrastructure Levy.

Low Emission Zone (LEZ)

A key measure to improve air quality in Greater London is the Low Emission Zone (LEZ). This entails charges for vehicles entering Greater London not meeting certain emissions criteria, and affects older, diesel-engined lorries, buses, coaches, large vans, minibuses and other specialist vehicles derived from lorries and vans. London City Airport lies within the LEZ. The LEZ was introduced on 4th February 2008, and will be phased in through to January 2012. The timescale for implementation is 2008 for diesel heavy goods vehicles (HGVs), coaches and buses; and 2010 for the heaviest, most polluting large vans and minibuses (a standard of Euro III). From January 2012 a standard of Euro IV will be implemented for lorries over 12 tonnes, buses and coaches. Cars and lighter LGVs are excluded. The proposed third phase of the LEZ, which applies to vans and minibuses, came into effect from January 2012.

There have been a number of assessments of the LEZ as the scheme has developed. The latest assessment can be found at the TfL website (www.tfl.gov.uk) in the Environmental Appraisal of the Proposed London Low Emissions Zone. This states that the LEZ is expected to reduce the area within Greater London above the annual mean nitrogen dioxide objective by about 16%, and the area above the daily mean PM10 objective by about 27%, in 2012.

Regulating Emissions from Airport Sources

Pollutant emissions from aircraft operations at London City Airport are regulated by both the European Aviation Safety Agency 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 the Committee on Aviation Environmental Protection (CAEP). Emissions standards for many current aircraft in service were agreed at the CAEP/4 meeting in 1998; new engines, certified after 31 December 2007 have to meet the more stringent CAEP/6 standards.

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 - 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 AQMA boundary is shown in Figure A1.1. The Airport, and the roads to the south of it including Hartmann Road and Albert Road, lie outside the AQMA boundary.

Figure A1.1: Location of Air Quality Management Area in Newham

The London Borough of Newham prepared a draft Air Quality Action Plan in 2005 which sets out the measures that it intends to apply in order to improve local air quality conditions. This Action Plan includes a number of measures that are related to London City Airport. A summary of these measures (LBN, 2008), and the progress that has been achieved by the Airport, is provided in Table A1.3 below.

Table A1.3: Summary of Progress on Airport-Related Measures in LBN Action Plan

Measure	Progress
London City Airport to carry out a detailed study of the impact of the airport on local air quality conditions.	As part of the planning application for expansion of operations to 120,000 movements per annum, a detailed air quality assessment was undertaken by London City Airport to quantify the impact of Airport operations.
Green Transport Plan to be regularly updated	An updated Travel Plan was submitted by London City Airport to the London Borough of Newham in June 2010.
Newham Council to liaise with LCA for the Vehicle Inspectorate to carry out random emission checks of queuing taxis at the Airport.	London City Airport has indicated its willingness to support emissions testing. The Council is still in discussions with the Vehicle Inspectorate.
LCA to meet its commitments under the s106 agreements to carry out a programme of air quality monitoring.	London City Airport carries out an extensive Air Quality Monitoring Programme that goes above and beyond the previous and existing legal obligations.
Newham Council and LCA to continue to lobby for a Crossrail proposal that includes access to the Airport.	London City Airport continues to lobby for appropriate facilities to be provided at Custom House station to accommodate a shuttle bus service to the Airport.

[12]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.

APPENDIX 2 – AIR QUALITY ACTION PLAN MEASURES (AS DEFINED IN CLAUSE 1 OF THE 2009 S106 AGREEMENT (PAGE 4)

Category	S106 Measure	LCA Consideration and Proposal
Minimising use of APUs and GPUs	Extending the facilities for Fixed Electrical Ground Power.	FEGP is currently available on Stands 1-10, and currently achieves an availability level of 90%. These existing FEGP facilities are currently being refurbished, and this programme will be complete by July 2012. It is intended that Stands 21-24 will be equipped with FEGP during any future stage of apron development, and in any event by December 2013. A staged programme to retrofit or replace all MGPUs that do not meet a minimum Stage II emissions standard by December 2013 will be implemented.
	Limiting the use of Ground Power Units to times when Fixed Electrical Ground Power is not available or unfeasible.	The current Standard Terms and Conditions For Airlines at LCA require the mandatory use of FEGP on Stands 1-10, subject to the power supply being available and the equipment serviceable. A new system will be set up by London City Airport to record the availability of FEGP on Stands 1-10 and to log the time taken to effect repairs.
	Setting maximum and optimum usage times for Auxiliary Power Units based on operational requirements.	Operational and Safety Information Notice (OSIN 09/04) restricts the running of APUs except when there is a problem with the Fixed Electrical Ground Power, or if required for cabin comfort. In the case of the latter, the maximum running time is limited to no more than 10 minutes prior to departure. APU use is unavoidably required for many aircraft types, regardless of the availability of FEGP, and some of the newer, large aircraft used on scheduled services require the APU to start the engines. To ensure conformance with the OSIN, and to further minimise APU use as far as practicable, London City Airport will: 1) Ensure that APU use is a topic regularly raised on the agenda of the Pilots Forum and the Flight Ops Governance Meetings. Reference to minimising APU use will also be included in an article for the UK Air Pilot publication. 2) Carry out surveys to log the actual use and operating times of APUs which will be used to inform compliance with the OSIN and inform future strategies to reduce APU use. 3) Maintain a documented record of any observations where OSIN 09/04 is contravened.
	Reviewing charging structures for fixed and electrical power to discourage further the use of auxiliary power units.	LCA currently administers a charge for FEGP whether it is used or not; it is therefore not appropriate to review the FEGP charging structures.
Minimising Aircraft Hold and Taxi Times	Minimising idle and taxi times for aircraft prior to take-off.	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 any other UK international airport. The current Standard Terms and Conditions for Airlines requires that Operators should not start engines until strictly necessary; should shut down engines as soon as possible; and where delays occur after start up, to shut down engines wherever possible. This is, of course, consistent with the airline's own requirements to reduce fuel use. London City Airport introduced (in March 2010) a new Electronic Flight Progress System to 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. Statistics of average aircraft engine running in different modes will be reported on an annual basis, and where significant increases in operational times are identified, procedures to reduce operational times will be investigated and reported.

Category	S106 Measure	LCA Consideration and Proposal
Airside Vehicles	Setting maximum age of various categories of airside vehicles.	There is currently a total of 145 Airside-approved non-electric vehicles or other equipment in use. These include tankers, vans, trucks, buses, minibuses and cars, as well as specialist equipment such as de-icing rigs, snow ploughs, fire engines and rescue boats. London City Airport will: 1) Require all third party operators of airside vehicles to prepare and submit a fleet management strategy by June 2012, setting out their intentions for vehicle replacements over the next three years. 2) Require, via the Airside Driving Policy, minimum emissions standards (equivalent to compliance with the London Low Emissions Zone) and promote the introduction of cleaner vehicles into fleets.
	Encouraging use of low emission or electric powered airside vehicles through charging structures.	The baggage tugs and belt loaders are all currently electric. Lower emission vehicles will be encouraged via the measures set out above.
	Introducing and enforcing regulations to prevent airside vehicles being left unattended with engines running;	Current Vehicle Operating Rules require that vehicles must not be left unattended anywhere on the Airside area with the engine running. London City Airport will continue to enforce this requirement.
	Introducing periodic emissions-checking of airside vehicles;	All vehicles operating airside are required to have a valid Airside Vehicle Permit, which is valid for only 12 months. This requires vehicles to meet the standards required for the issue of the appropriate Department of Transport Test Certificate, including requirements related to vehicle emissions. London City Airport Motor Transport Department will undertake routine, annual emissions tests of all vehicles granted an Airside Vehicle Permit. The tests will be conducted using an Omnitec Diesel Smoke Tester, which is used by VOSA for roadside spot checks of commercial vehicles. In addition, all vehicles operating airside will be subject to periodic, random emissions testing. In all cases, vehicles will be refused a permit if the emissions fail the test. London City Airport will amend the Airside Driving Policy to make specific reference to vehicle emissions testing and the actions that must be taken in the event of failure. Emissions testing for NOx cannot be practically undertaken without the use of a chassis dynamometer, as the engine is not under load). Additional emissions checking beyond that proposed is considered unnecessary.
	Setting up a system to check that regular maintenance of airside vehicles is undertaken.	All vehicles operating airside are required to have a valid Airside Vehicle Permit. This requires all vehicles to be regularly maintained. The emissions testing regime described above provides both routine and periodic, random checks to ensure that vehicles are correctly maintained.
Energy Use	Developing an energy management system to monitor and minimise energy use for heat and power generation.	Issues related to energy management are being considered in the Sustainability Strategy, and are not duplicated here
	Investigating the potential for increased use of renewable energy sources on the Site.	Issues related to energy management are being considered in the Sustainability Strategy, and are not duplicated here.

Category	S106 Measure	LCA Consideration and Proposal
Black Cabs (Taxis)	Where research identifies that emissions from idling taxis are a significant problem, investigating and introducing measures to reduce numbers of idling taxis on stand.	A survey of idling taxis was carried out to support this Action Plan. It is estimated that idling black cabs contribute less than about 0.2% of Airport-related NOx emissions. The design of the taxi rank makes it difficult to completely prevent idling as taxis are required to move forwards every few minutes, and continual "stop-starting" of engines would potentially be more polluting. London City Airport will publish a notice in Taxi. This will set out the concerns associated with unnecessary idling, and will seek to encourage taxi drivers to turn off engines wherever practicable. The potential for redesign of the taxi rank, for example by including parallel ranks with supervised passenger loading, will be included in any future infrastructure development of the forecourt.
Travel Plan	Encouraging the use by staff of the most sustainable options for travel to and from the Site.	Issues related to staff travel are set out in the London City Airport Travel Plan, and are not duplicated here.
	Ensuring a linkage between air quality and the Staff Travel Plan as well as the Passenger Travel Plan.	Issues related to staff and passenger travel are set out in the London City Airport Travel Plan. Whilst the focus is on climate change benefits, all measures to discourage the use of private vehicles will be beneficial to local air quality conditions.
Publicity and Promotion	Promoting the understanding of air quality issues among staff and passengers of the Airport through use of publicity documents and campaigns.	London City Airport will introduce a number of measures to promote the understanding of air quality issues: o An article relating to air quality and Airport operations will be published at least once per year in the Airport newsletter "The Chronicle" o The London City Airport website will be amended to include links to the Air Quality Monitoring Programme Annual Report and the Air Quality Action Plan
	Providing advice on the Airport Website to encourage passengers to travel by public transport to and from the Site on days when poor air quality is measured or forecast.	The London City Airport website encourages passengers to travel to and from the Airport by means of public transport wherever possible, and particularly on days when air quality is poor. Passengers are encouraged to check (via a website link) whether current or forecast pollution levels are "HIGH" or "VERY HIGH" before they travel.

APPENDIX 3 – REVIEW OF MGPU EMISSIONS

Emissions from non-road mobile diesel engines are regulated under a series of EU directives. The regulations have been introduced in stages :

- Stage I was implemented in 1999
- Stage II was implemented in 2002
- Stage IIIA was implemented in 2006
- Stage IIIB was implemented in 2011

A summary of the emissions limits associated with each Stage is provided in Table A3.1 below.

Table A3.1: Summary of NOx and Hydrocarbon (HC) Emissions for Non-road Engines

EU Stage	Emissions (g/kWh		
	NOx	HC	NOx + HC
Stage I	9.2	1.3	-
Stage II	6.0	1.0	-
Stage IIIA	N/A	N/A	4.0
Stage IIIB	2.0	0.19	-

Note: Emissions limits for Stage IIIA are only provided as NOx + HC. Based on the other Stages, it is estimated that NOx emissions are approximately 90% of the combined NOx+HC emission.

A summary of the MGPUs currently operational at the Airport is provided in Table A3.2.

Table A3.2: Current MGPUs in use at London City Airport

Fleet No.	Year of Manufacture	Model	EU Stage
1	2001	Houchins C690	Stage I
2	2001	Houchins C690	Stage I
3	1992	Houchins C690	Pre-Directive
4	2002	Houchins C690	Stage II
5	2002	Houchins C690	Stage II
6	1995	Houchins C690	Pre-Directive
7	2005	Houchins C690	Stage II
8	2002	Houchins C690	Stage II
9	2005	Houchins C690	Stage II
10	2005	Houchins C690	Stage II
11	2006	Houchins C790	Stage IIIA
12	2006	Houchins C790	Stage IIIA
13	2006	Houchins C790	Stage IIIA
14	2008	Houchins C690	Stage IIIA
15	2008	Houchins C690	Stage IIIA
16	2008	Houchins C690	Stage IIIA

Based on the current fleet, an assessment of the NOx benefits associated with a number of upgrade and replacement strategies have been investigated. The following assumptions have been made:

- NOx emissions for Stage IIIA engines are 90% of the NOx + HC emission rate, i.e. equal to 3.6 g/kWhr
- Pre-Directive engines operate to Stage I emissions limits
- The average engine size is 150 kW
- Actual emissions are 10% below the emissions limits stated in the Directive[14]
- An average load factor of 25% is applied[2]

Upgrade of Existing MPGUs

Two potential scenarios were investigated:

- Upgrade of all MGPU's to a minimum of Stage II
- Upgrade of all MGPU's to a minimum of Stage IIIA

For both scenarios it was assumed that any new MGPU's would be compliant with Stage IIIB emissions limits.

The assessment was based on an analysis of aircraft movements over the period 14/02/11 to 20/02/11 inclusive, for all stands including the Jet Centre. Aircraft movements were factored up to a full year (70,408 movements). For those aircraft operating from Stands 1-10 where FEGP is currently available, it was assumed that MGPU use would only occur for 10% of the aircraft movements (equivalent to 90% FEGP availability). Only 5% of aircraft operating from the Jet Centre use MGPU, and aircraft movements were factored to take this into account. On the assumption that average MGPU use is 15 minutes per aircraft movement (and 7.5 minutes for aircraft operating from the Jet Centre), this results in a total of 10,192 MGPU-hours per annum. Assuming that these hours are evenly distributed across the 16 MGPU's that are available, the benefits in terms of NOx emissions can be calculated for each scenario. The results are summarised below:

- Existing MGPU's: 2029 kg NOx/annum
- Upgrade to minimum of Stage II emissions limits: 1238 kg NOx/annum
- Upgrade to minimum of Stage IIIA emissions limits: 464 kg NOx/annum

[13]The date of implementation is dependent on the engine power output. For MGPUs operational at the Airport, the 130<P<560 kW emissions limits and implementation dates apply.

[14]Ground Power Unit Exhaust Emissions at Zurich Airport, Unique (Flughafen Zurich AG). 2006. www.unique,ch.

APPENDIX 4 – SUMMARY OF AIRCRAFT GROUND OPERATIONAL TIMES

An analysis of aircraft ground operational times has been carried out over the period December 2010 to December 2011 inclusive. The information has been derived from the Electronic Flight Progress System (EFPS) to record:

Departure: Time from engine start-up on stand to start-of-roll

Arrival: Time from wheels-down to arrival on stand (and engine close-down)

The data are shown summarised in Figures A4.1 (departures) and A4.2 (arrivals) in the form of box-and-whisker plots. These show the inter-quartile range (in the box), the mean and median value, and the 5th to 95th percentile range (in the whiskers)

Figure A4.1: Distributions of Departure Times by Month (December 2010-December 2011).

Number of Days Included in Each Month Analysis Shown Below Whisker. Mean (Red Bar), Median (Black Bar).

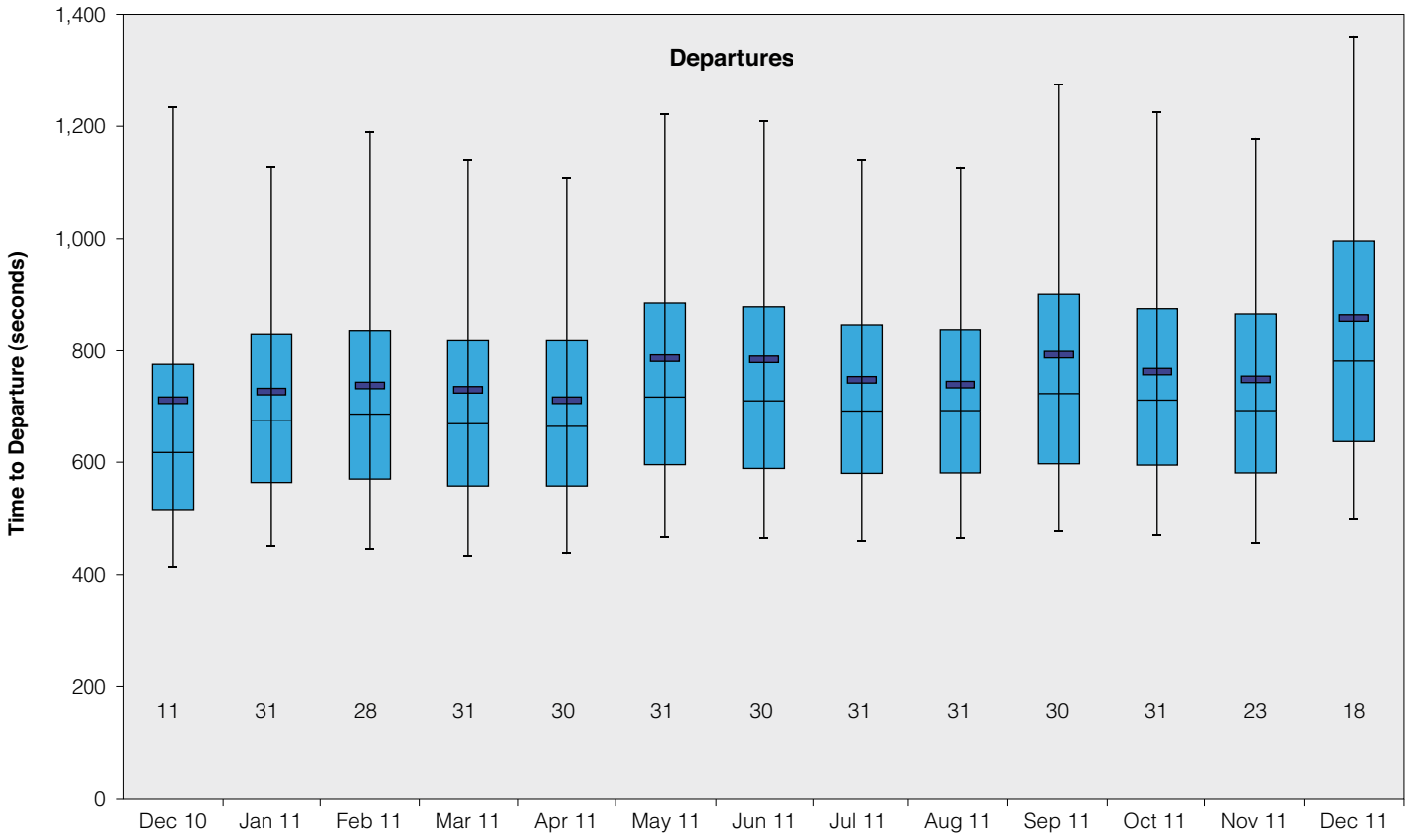
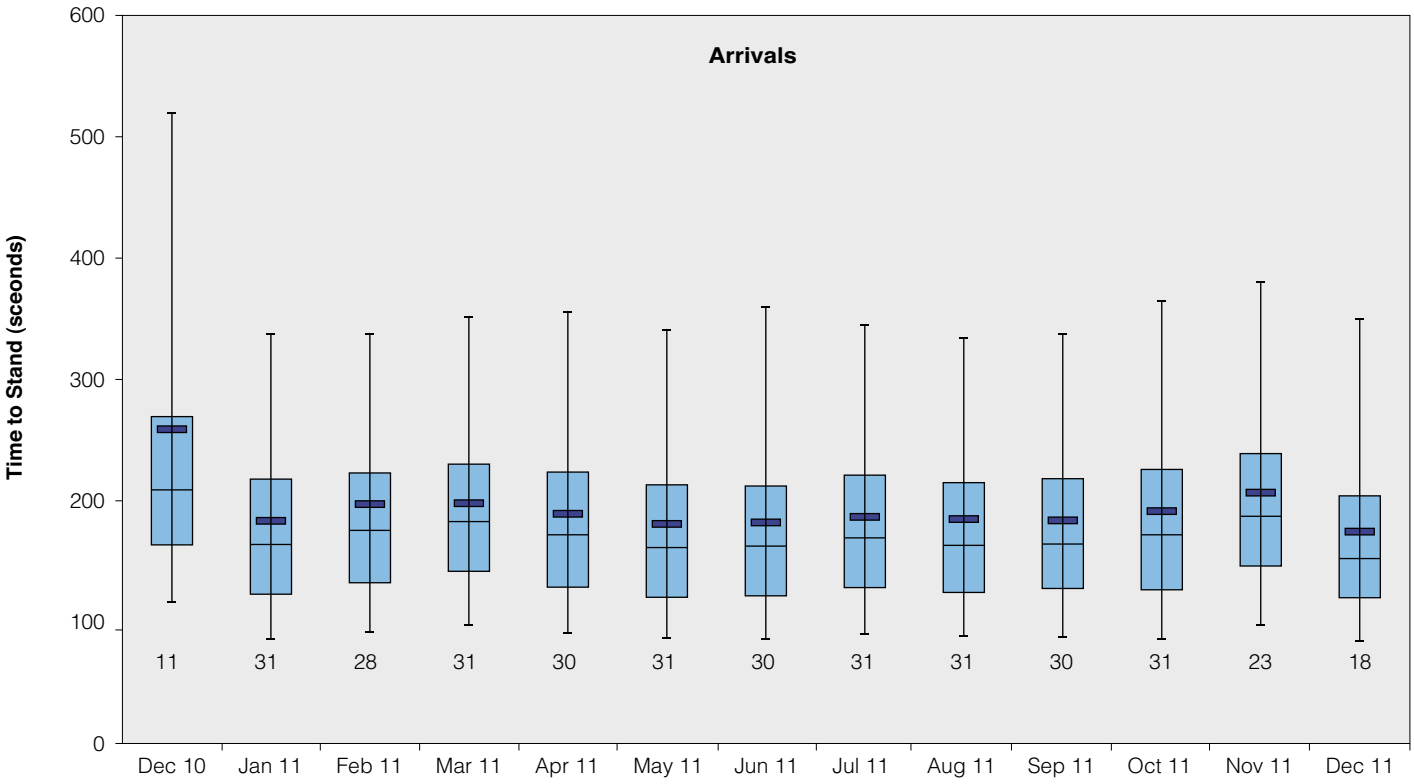


Figure A4.2: Distributions of Arrival Times by Month (December 2010-December 2011).

Number of Days Included in Each Month Analysis Shown Below Whisker. Mean (Red Bar), Median (Black Bar).



APPENDIX 5 – SUMMARY OF LCY - OWNED VEHICLES

Table A5.1: Summary of vehicles directly owned by LCY

Vehicle Reg	Make	Model	Comment
M809 FEW	Ranger	Defender	
PX59 RSU	Toyota	Hilux	
PY56 KYU	Toyota	Hilux	
LL59 YHO	Mercedes	Viano	
LL59 YHP	Mercedes	Viano	
PY06 APX	Chrysler	Voyager	
GF07 MLL	Renault	Kangoo	
M60 ECF	Toyota	Hilux	
EJ55 ETU	Toyota	Hilux	
PY07 HWF	Toyota	Hilux	
KS07 XFO	Toyota	Hilux	
EU10 AGO	NA	NA	Fire tender
EU06 WDR	NA	NA	Fire tender
S752 JLM	NA	NA	Fire tender
EU04 BRX	NA	NA	Fire tender
GX59 AYW	John Deere	Tractor	Winter Equipment
GX59 AYX	John Deere	Tractor	Winter Equipment
D512 PJN	Ford	Tractor	Winter Equipment
LK59 DYM	Kubota	RTV900	All terrain utility
LK10 KNB	Kubota	RTV900	All terrain utility
LK10 KNC	Kubota	RTV900	All terrain utility
LK59 DYM	Kubota	RTV900	All terrain utility
OU59 EZX	John Deere	Tractor	Winter Equipment
OU10 CDF	John Deere	Tractor	Winter Equipment
OU10 CDN	John Deere	Tractor	Winter Equipment
OU10 CDO	John Deere	Tractor	Winter Equipment
OU10 CEA	John Deere	Tractor	Winter Equipment
LK60 BWE	JCB	Fastrac	Winter Equipment
KE56 FDY	JCB	Fastrac	Winter Equipment
KE56 DYM	JCB	Fastrac	Winter Equipment
KX07 BGF	Manitou	Forklift	Winter Equipment
KX57 DUJ	Manitou	Forklift	Winter Equipment
KX08 ERY	Manitou	Forklift	Winter Equipment

APPENDIX 6 - REFERENCES

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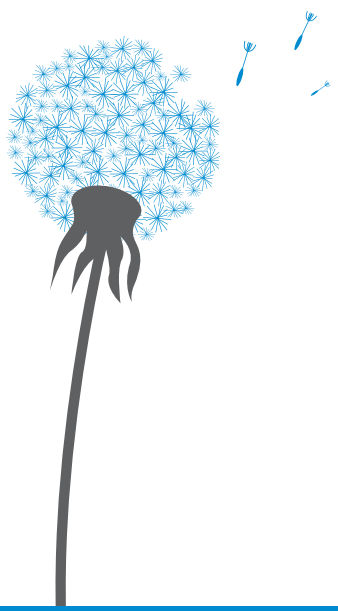
APPENDIX 7 - ABBREVIATIONS

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
ICAO	International Civil Aviation Organisation
LBN	London Borough of Newham
LCA	London City Airport
LCACC	London City Airport Consultative Committee
LTO	Landing and takeoff 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
NOx	Nitrogen oxides (NO + NO2)
PM_{10}	Particulate matter with an aerodynamic diameter of less then 10 µm
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of less then 2.5 µm



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