Comparison of maximum noise levels of New Generation and Old Generation aircraft in use at London City Airport - a Citizen Research Study.

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Summary

London City Airport (LCA) plans to expand its operating hours into Saturday afternoons and evenings. These periods are currently banned under its Planning Permissions in order to protect Londoners from City Airport's airplane noise at weekends. The airport persists in freely describing the 'new generation' planes it proposes to use more extensively as 'quieter and cleaner'. We set out to discover by measurement and analysis if they really are noticeably quieter in flight over our area.

We took 265 different maximum noise readings of London City-bound planes at several points under its concentrated arrivals flight path over SE London. This included both new and old generation planes. Our readings indicate that the new generation planes are not consistently quieter than old generation planes under this flight path, and that London City's claim is misleading and inaccurate.

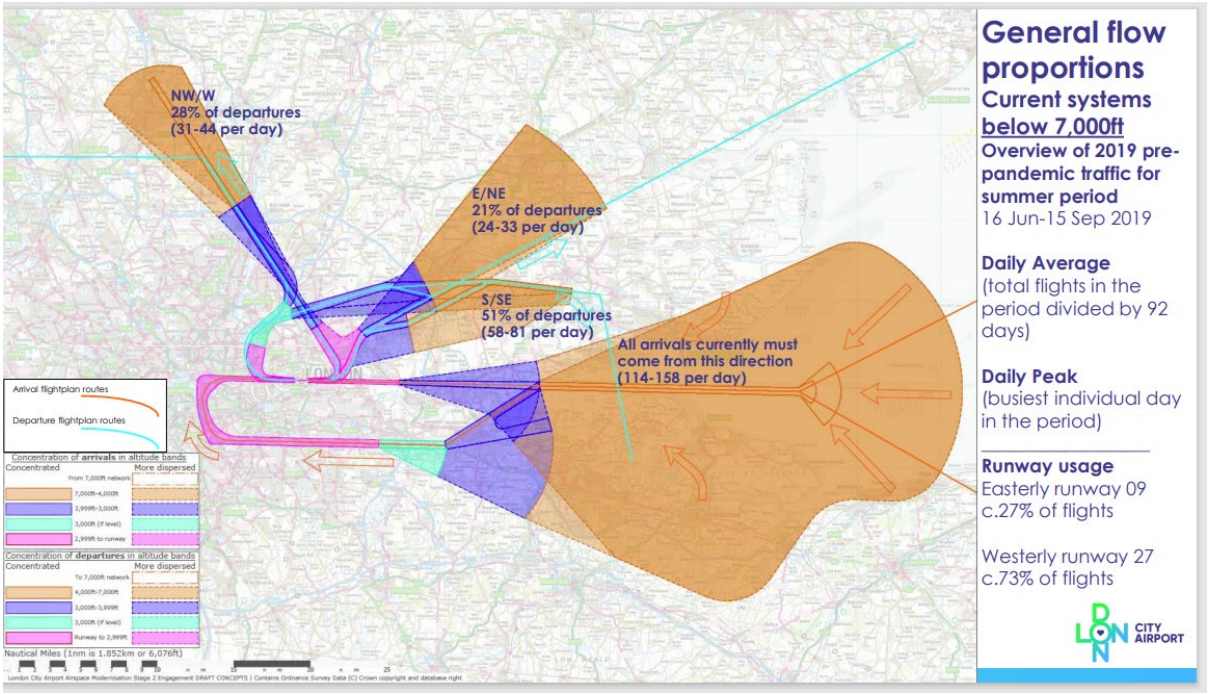
The implication of our findings is that certainly for SE London and perhaps for any London community overflown by London City aircraft at 1800-2500ft (550- 760m) above Mean Sea Level, increasing the number of overflights will increase the noise disturbance in direct proportion; it makes no noticeable difference whether the type of plane used is new or old generation.

A great deal of London City Airport's justification for its expansion plan relies on its claim that new generation planes will be quieter for the overflown, as old generation planes are replaced by new generation ones over time. This study provides evidence that LCA claims in this area are unreliable. As a result we believe that the airport must provide significant new measured and evidence-based noise data before policymakers give any consideration to expansion of flight volumes or changes of operating hours. This new evidence should cover areas across London under each of their flight paths. LCA currently focuses nearly all of its noise analysis on a narrowly defined 'noise contour' area close to the runway and relies largely on aircraft manufacturers for its data rather than real world measurement.

In the light of this study, even with additional data no consideration should be given to the change of London City Airport's operating hours or permitted plane movements. First, they should deliver tangible noise relief to overflown Londoners by implementing new flight paths that stay higher for longer and provide alternating relief routes. This, they say, is due by 2027/28.

Flight Path

The LCA flight paths are set out by the airport below. In easterly wind conditions the airport uses a low (at or around 2000ft) concentrated single arrivals route over SE London then turning north towards the airport, shown by the pink east-west line.



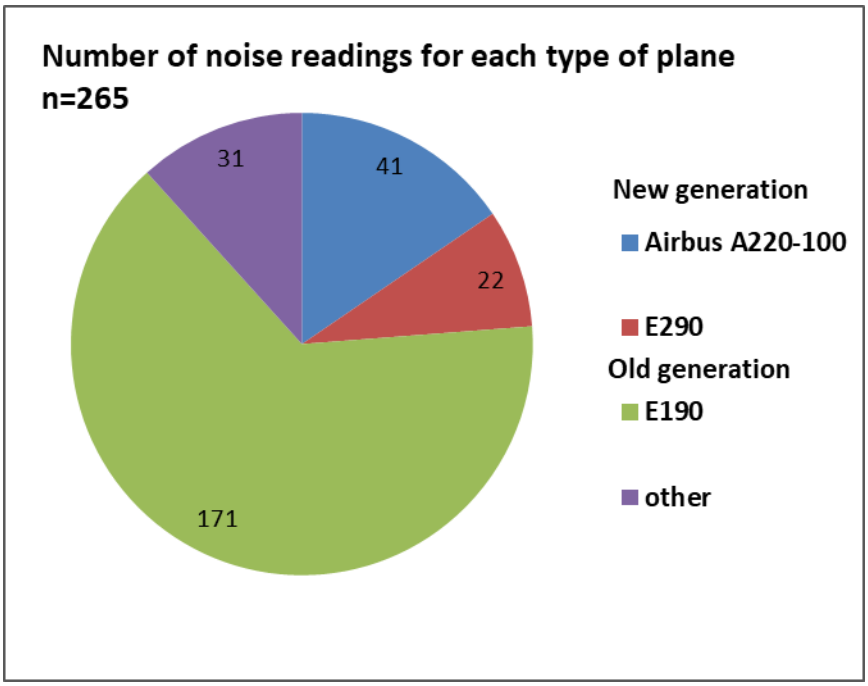
The observed aircraft for this study vary in altitude above Mean Sea Level (MSL) from around 2400ft/740m in Mottingham in the east to 2000ft/610m at Horniman museum in the west. However London City aircraft have been recorded on the airport's tracking system as low as 1600ft/488m above MSL along this flight path.

With a hilly terrain in SE London, the height of observed planes above ground level varied from around 690m in Mottingham to only 540m at Horniman Gardens.

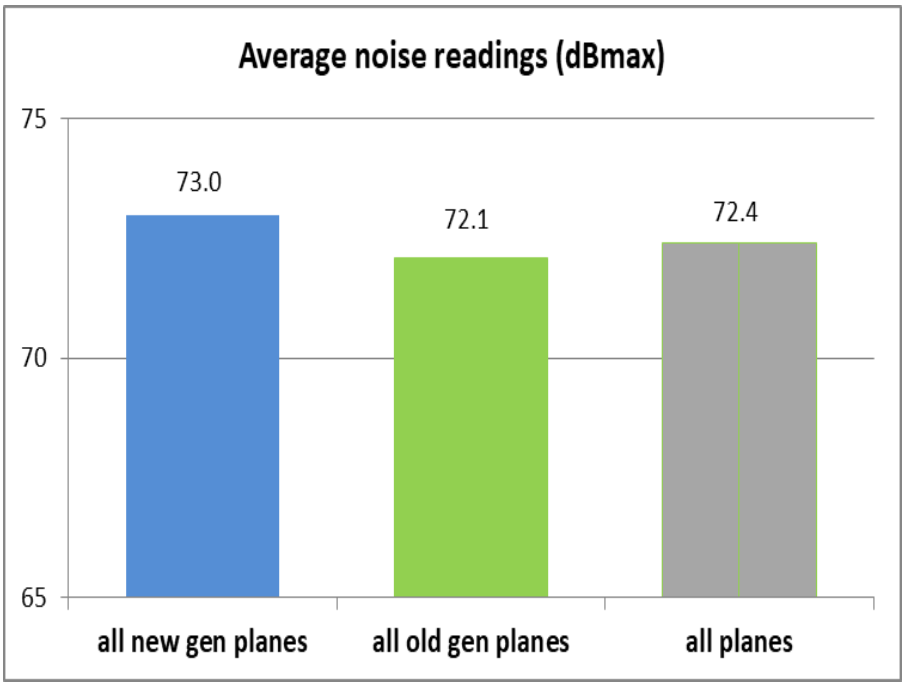
On westerly wind days aircraft approach and land directly from the east, low over the Thames Estuary and Thamesmead.

Results

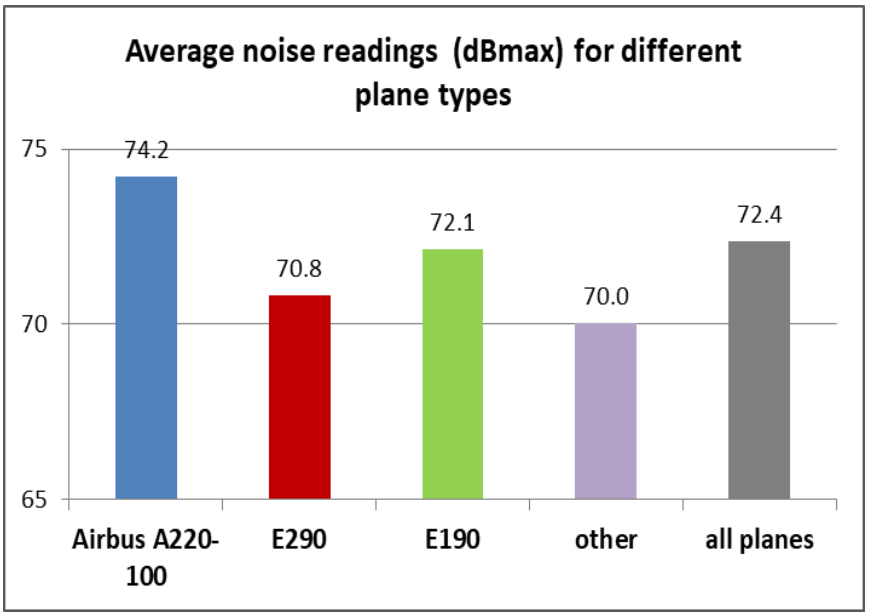
1.We took 265 noise readings for the different aircraft types as set out below.



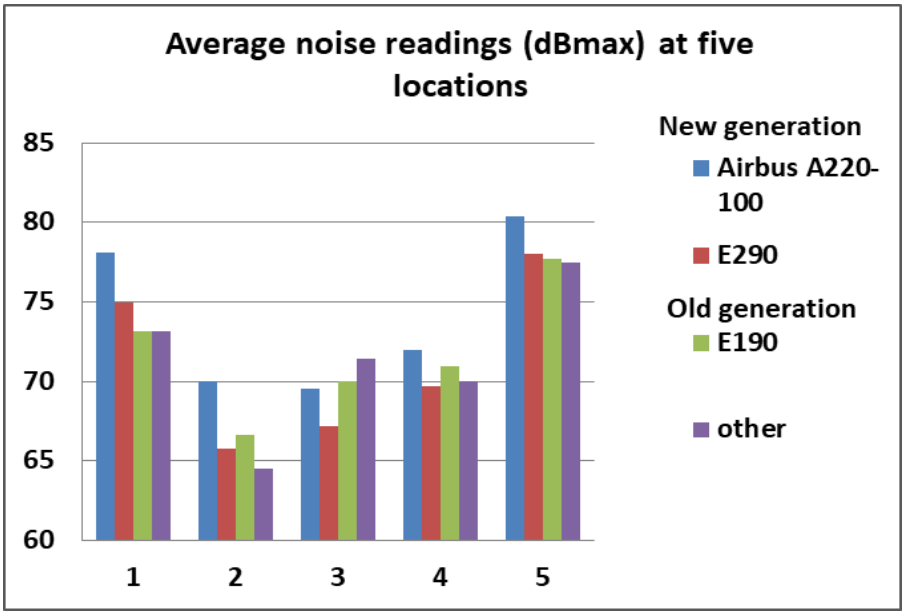
2. Across all locations and observations, there was only a very small average difference between new generation and old generation planes. These differences would not be noticeable to the human ear.



3. The noisiest plane, on average, was the new generation Airbus A220-100 – claimed by London City Airport to be a 'quieter' plane**.** The new generation Embraer E290 also known as the E190-E2 was on average 1.3 dBmax quieter than its predecessor, the Embraer E190. However this difference would not be noticeable to the human ear.



4. The noisiest location was at location 5 in the table below, the Horniman Museum and Gardens, one of SE London's most treasured public park spaces, on a hill directly under the low flight path but still 22km flying distance from the airport. Readings here from all plane types were very high, most readings around 77-80 dBmax. Perhaps this is the noisiest place under London City's flight path, excluding in the immediate vicinity of the airport runway.



Analysis and Conclusions

At consultation events LCA has consistently claimed that under the SE London arrivals flight path we should expect new generation aircraft to be 2-3 decibels quieter than old generation aircraft. We did not find this to be the case. If new generation aircraft are at all quieter then it is by a very small margin, perhaps as little as 1 dBmax. A change of 3 decibels is 'just noticeable to the human ear' according to the Civil Aviation Authority (see **Appendix 1**). So any new generation plane overflying densely populated SE London will make the same noise impact on the ground as an older generation plane. There is no benefit to these overflown areas from the airport's promise that only new generation planes will fly in any extended operating hours.

If the airport is permitted to change its operating hours to include Saturday afternoons and evenings, the overflown of SE London will be condemned to a new weekend intrusion and an ever increasing frequency of noise and disturbance incidents. The airport plans to expand from the current level (autumn 2022) of around 50,000 movements per year (source, LCA) to 110,000. Doubling plane numbers means doubling the frequency and level of disturbance, whether London City Airport's airlines fly new or old generation aircraft.

It is very questionable whether the new generation Airbus A220-100 can be viewed as 'quieter' at all. All observers noted an intermittent but loud 'whale noise' from this aircraft, and this will be reflected in its average dBmax levels. Looking for why this might be, it is easy to discover pilot groups and citizen groups, in Switzerland for example, who ever since its introduction have noted the strange and loud noises from this plane as observed from the ground.

The airport is currently planning introduction of an even bigger Embraer plane, the E195-E2 to fly this arrivals route. Given the alarming noise measurements shown here and the apparently exaggerated claims the airport has made about noise from new generation aircraft, we should be very concerned about this new threat. The airport should provide policymakers and all overflown communities with significant new measured data and impact assessments to justify their claims about quieter planes.

London City Airport makes frequent claims in its consultation documents that new generation planes are cleaner and quieter. It says that they will be "*sharing the benefit of quieter aircraft with the local community*." Additionally, that "*the benefit of quieter aircraft will be felt by local residents throughout the week*". This study indicates that these claims are misleading if read at face value. It shows that there is no noise benefit to be shared under the two arrivals flight paths over densely populated parts of London.

In their consultation documents is a carefully worded explanation. What they actually mean is that new generation aircraft give a "*reduced departure noise footprint*"- that is in a small departure area at either end of the runway. This study demonstrates that even if they do have a smaller departure noise footprint, new generation aircraft are not noticeably quieter than old in other stages of flight, such as under the two narrow arrivals flight paths low over densely populated parts of Greenwich, Lewisham, Southwark, Lambeth and Bexley.

We should also note the cumulative noise impacts of the crossing of LCA flight paths with Heathrow; most of the above communities under London City Airport's arrivals or departure flight paths are also overflown by Heathrow, sometimes simultaneously at different heights.

Our citizen research study concludes that there is no noticeable reduction in noise for the overflown communities of SE London from new generation planes. London City Airport should therefore withhold any expansive plans or change in operating hours until the situation for the overflown is improved by the introduction of new flight paths. New flight path priorities should include the introduction of Continuous Descent Approaches (see **Appendix 1**) and alternative flight paths so that overflown communities receive genuine noise reduction, planned quiet times and noise respite.

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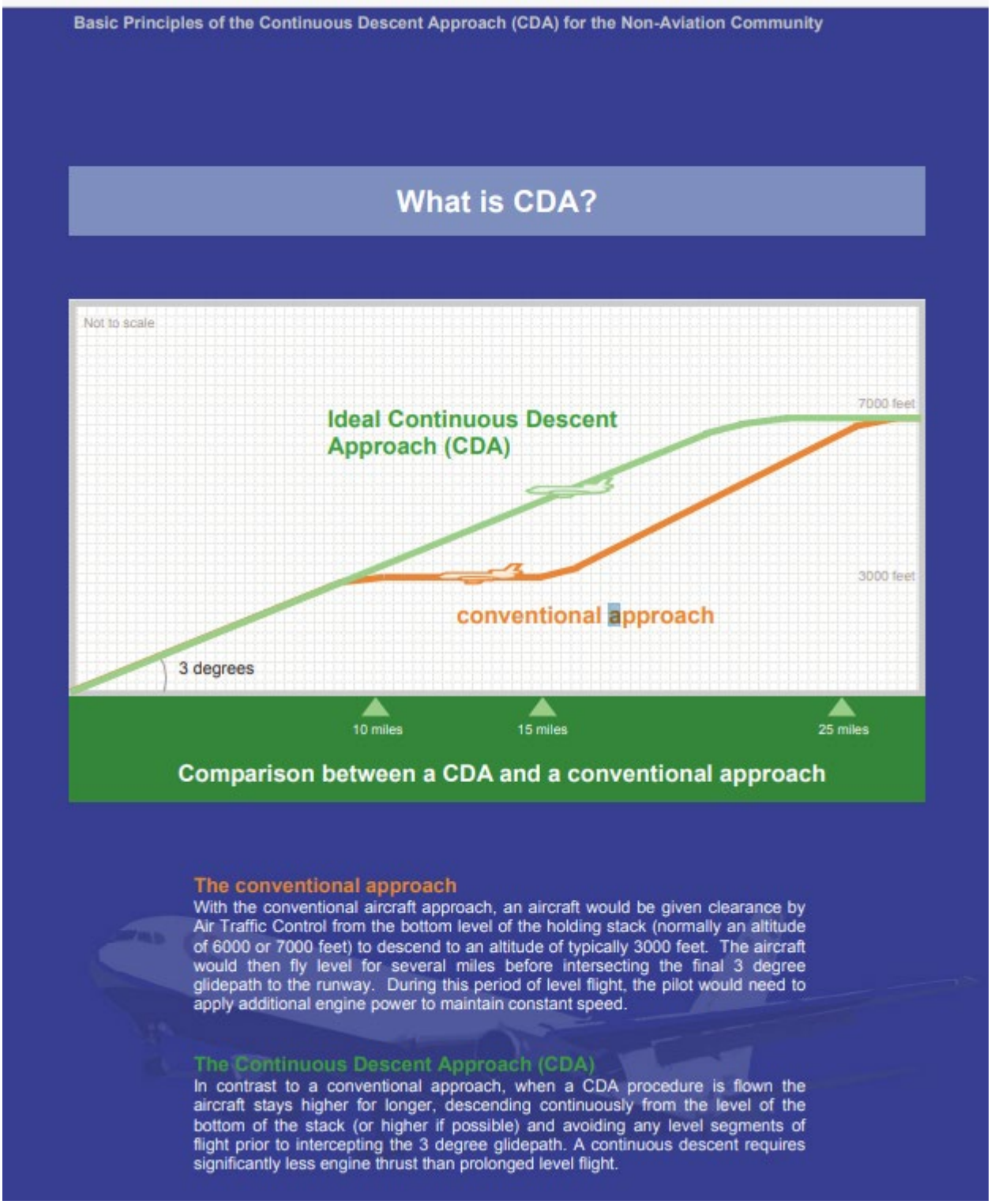
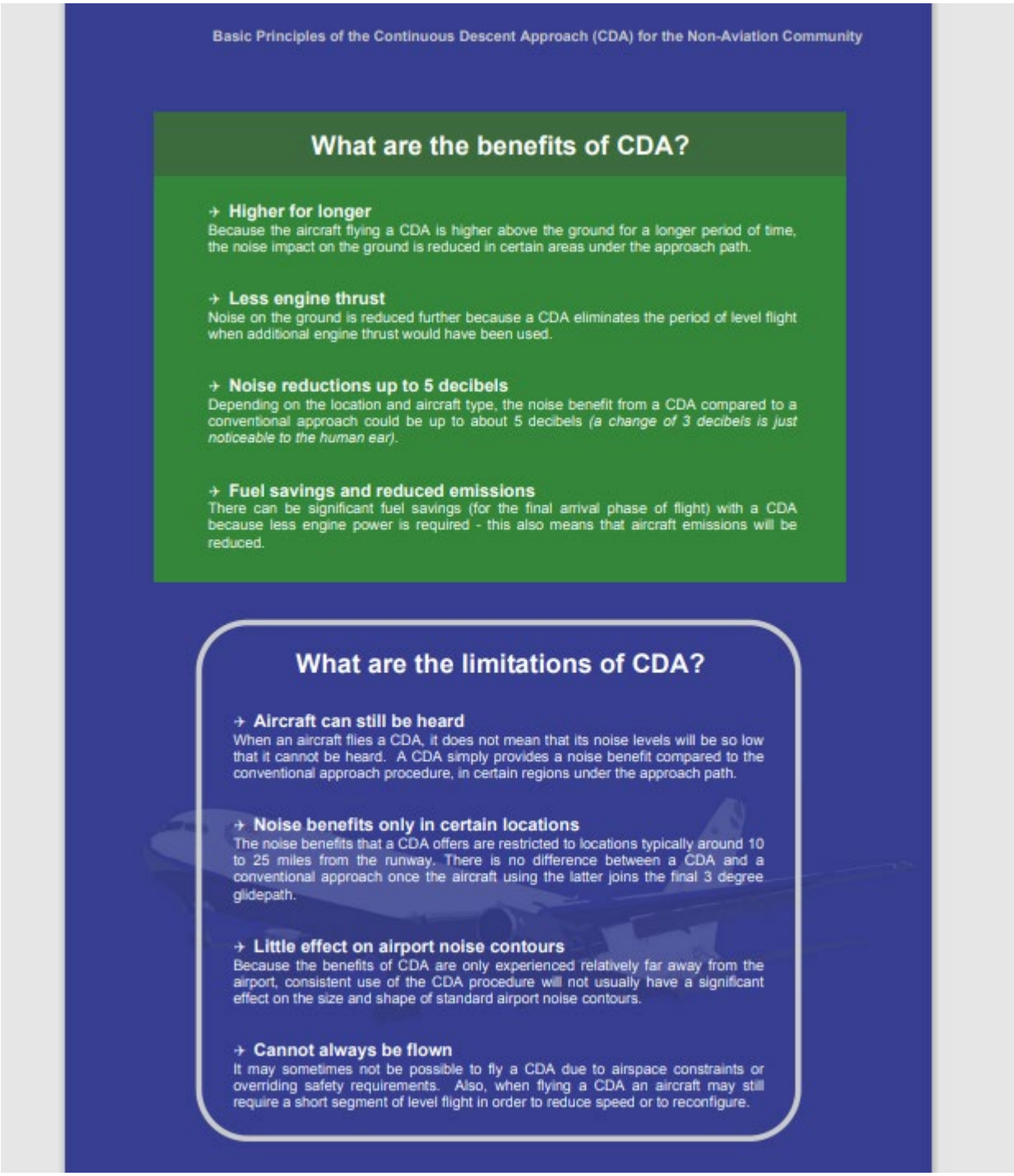
for HACAN East
August 2022, with additional material Feb 2023

Appendix 1. Continuous Descent Approaches, aka Continuous Descent Operations (CDO)

London City arrivals in east winds use a Conventional Approach to reach Sidcup, about 20 miles from landing, at around 2300 feet. Flying level or in small steps over all of SE London requires additional thrust, creating more noise, as illustrated by the Civil Aviation Authority below.



A change of 3 decibels is ‘just noticeable to the human ear’ according to the CAA. Yet new generation planes are not measured at even 3 decibels quieter over Lewisham. But flight paths using a Continuous Descent Approach could give up to 5 decibels of noise benefit.



Appendix 2. Methodology

A new generation aircraft is defined by London City Airport as an Embraer 290 or an Airbus A220-100. There are a very small number of these aircraft using the airport regularly, flying from Geneva and Zurich. An equivalent old generation aircraft used at the airport very frequently is the Embraer 190.

We asked volunteers at five separate locations along or just off the flight path to take sets of decibel max (dBmax) readings including new generation and old generation planes. The locations were along a five mile section of the flight path, including Mottingham (SE9) 29km from landing to Catford (SE6) 26km from landing and the gardens of the Horniman Museum (SE23) in the west, 22km from landing. Monitoring sites were mostly directly under the path, with one offset to the side by a kilometre.

To make the measurements we used a noise measurement app, Explane, devised and calibrated for this purpose in the Netherlands. Over July and August 2022, we compiled 265 individual measurements. Batches of readings were taken by each observer over short periods with similar wind and weather conditions. A variety of readings were taken including at different times of day and across variable wind and weather conditions. Plane types were checked against LCA's tracking system, and the recorded dBmax for different plane types recorded for each day and location when measurements were made.

Once we had sufficient observations of each plane type, we took average dBmax levels for each to assess each aircraft type against the others.

Appendix 3. Noise measurements by London City Airport

The airport carries out almost no measurement of aircraft noise away from its immediate runway area. We have seen just two South London studies, one between Dulwich and Forest Hill in Dec 2018, and one in Mottingham SE9 3LU in December 2019.

Neither study identified measurement of any 'new generation aircraft'. They did however identify many of the current generation Embraer E190 overflights.

The results from Bickerdyke Allen, and published by the airport for the Dulwich study are below. Aircraft are at only 2000ft above MSL, 21.3km/13.2 miles from landing.

During the measurement period there were 110 arrivals at LCA using runway 09. Of these, 104 (95%) were correlated with a noise event. This is considered to be sufficient to give broadly representative noise levels for the most common aircraft operations. The correlated aircraft noise events are summarised in Table 1.

Aircraft	No. Correlated	Average L_{ASmax} (dB)
De Havilland Dash 8-400	15	64
Embraer E170	16	68
Embraer E190	59	69
Others	14	66
Total	104	68

Table 1: Summary of Noise Results – LCA Aircraft

The results published by the airport for the Mottingham study, at a site next door to our Citizen Research study measurement point are shown below. Aircraft here were at 2000-2500 ft and still 29.2km/18.1 miles from landing.

Aircraft Type	No. Correlated	Average† L_{ASmax} (dB)
Airbus A220	39	68
Avro RJ85	33	66
De Havilland Dash 8 Q400	118	66
Embraer E170	76	67
Embraer E190	482	68
Other††	92	66
Total	840	67

† Arithmetic average.
†† Aircraft types with less than 25 correlated movements have been categorised as 'Other'.

Table 1: Summary of correlated noise measurements, LCA aircraft Runway 09 arrivals.

These aircraft are by no stretch of the imagination quiet. We should note that a 68-69 decibel aircraft event represents a significant disturbance of the peace to the homes and gardens of those overflown. London City may fly as many as 22 aircraft over these homes in a one hour period. In both these studies, the authors noted that the overflown sites were also overflown by Heathrow planes during their measurement period.

The 'new generation' E195-E2.

London City wants to fly the large Embraer E195-E2 low over London along these same narrow, low flight paths. It is 5m longer and with 5m bigger wingspan than its

predecessor E190 models. It is also noisier, as shown by this table in the Airport's Planning Application documents of Feb 2023.

5.1 below compares new generation aircraft noise levels to the Embraer E190 which is the most common type of aircraft currently flying at the airport. Based on noise certification data it shows how the more modern versions can be 3.2 dB quieter on arrival and 5.4 dB on departure.

Table 5.1 New Generation Noise Levels Compared to current Embraer E190

Aircraft Type	Change in Noise Level (SEL) compared to Embraer E190, dB (A)	
	Arrival	Departure
Airbus A220-100	-2.8	-5.1
Airbus A220-300	-2.0	-4.0
Embraer E190-E2	-3.2	-5.4
Embraer E195-E2	-2.9	-4.6

Arrivals over London communities represent 50% of LCY movements. The table above, taken from the Airport's planning application, shows that on Arrivals, even the Airport only claims up to 3dB difference close to the Airport for these larger 'new generation' aircraft. According to the Civil Aviation Authority this small difference would not be noticeable to the human ear. Effectively, when the Airport doubles the number of any aircraft type it also doubles the noise intrusion of its arriving aircraft over Londoners, often many miles from the airport.

Appendix 4. Response from London City Airport

We presented our findings to the Airport's Consultative Committee in autumn 2022, and followed this up by a meeting with the airport and their noise consultants, Bickerdyke Allen in October 2022.

1.We asked for the evidence that the airport relied upon in rejecting the findings of the Citizen Research Study presented at the Consultative Committee?

The airport/consultants advised that the airport has no measured noise data that can be used to compare new and old gen aircraft in our area. It has three ad hoc studies, in Mottingham, East Dulwich and Lambeth, but there are insufficient new generation aircraft included to draw any conclusions.

They advised that the airport relies upon noise data supplied by the manufacturer, in the case of Embraer in carefully controlled desert conditions in Brazil. This data is useful for takeoff and landing noise, but does not provide anything that can be relied upon when we are looking at aircraft in level flight over SE London. It is also used to provide ICAO Certification at noise restricted airports, to ensure aircraft comply with local noise limits close to the airport, and is nearly all about takeoffs.

The data that the airport does have is supplied by the 3 monitors at either end of the runway, which show that at 1000 ft, arriving aircraft consistently show a 2-3 dBmax reduction for the new gen E190-E2 over the old E190. We noted that according to

the Civil Aviation Authority this difference would not be noticeable to the human ear. We also agreed that this data could not indicate that over SE London any larger difference could be claimed. So we seemed to agree that **at very best** a 2-3 dB difference might be experienced at 2000ft above Mean Sea Level over SE London – which is what our Study had found.

Conclusion – We agree that new generation aircraft over SE London are not noticeably quieter on current concentrated arrivals path low over SE London than old generation aircraft.