London City Airport
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London City Airport LAMP RNAV replications Airspace Development
Framework Briefing: Record of Agreement
3rd March 2014, CAA House,

Action	Position	Name	Acknowledged	Date
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Issue 1	8 Apr 2014	First issue released to SARG, also incorporating notes from FWB2 meeting on 7th Apr 2014

Contents

1. Introduction

1.1 This note is a record of the framework briefing for the London City Airport (LCY) London Airspace Management Programme (LAMP) RNAV replication Airspace Change Proposal (ACP). LCY is the sponsor of this ACP, however it is being developed in partnership with NATS. It was agreed that the CAA Safety and Airspace Regulation Group (SARG) would assess the proposed airspace change process for the RNAV replication of conventional procedures as outlined within this document. Acceptance of this note by SARG represents, in principle, an agreement that the process undertaken thus far, and the proposed process herein, meets the requirements of the CAP725 airspace change process.

1.2 A follow-up meeting was held on 7th April 2014. This was specifically to present early design options to the CAA procedure design regulators, to ensure that RNAV replication was achievable. Notes of this meeting are included as Annex B.

1.3 Should any of the elements of this document change significantly as the plans/processes develop, NATS will provide the rationale for change to SARG and seek further agreement in principle for the revisions.

2. Background

2.1 The London City RNAV project plans to replicate portions of the promulgated SIDs and arrivals routes as shown in the accompanying presentation (included as Annex B). The project is planned to be implemented as part of the LAMP package of ACP's.

2.2 The benefits of the London City RNAV replication project are summarised below:

i) The introduction of RNAV1 replications of the extant SIDs at London City is in line with the CAA Future Airspace Strategy, which recommends the transition to performance based navigation (PBN) technologies.

ii) RNAV1 enables aircraft to control their position with far greater accuracy than conventional forms of navigation.

iii) The aircraft's position is known with greater certainty, and when operating under "own navigation" ATC have greater certainty that aircraft are conforming to the defined RNAV routes within close tolerances.

iv) Due to the increased accuracy of RNAV1, it's use results in improved track-keeping, with traffic being more concentrated close to the route centreline. This is in accordance with the Department for Transport's recommendations for minimizing the impact of over-flying aircraft on populations.

2.3 The change is supported by the airlines for the following reasons. Procedures designed to PBN specifications allow airlines to use their FMS equipment to its full capability to assure predictable flights paths. More predictable flight planning & improved standardisation of flight profiles is possible in accordance with standard operational procedures. There is reduced need for tactical intervention from ATC. In congested airspace, this aids efficiency, expedition and safety.

2.4 *Safety Benefit*:

- The overall ATS provided will remain "at least as safe as" prior to the implementation of this airspace development. The Project will aim to deliver safety benefits where possible.

2.5 *Capacity*:

- Capacity is not a driver for this project and no capacity gains are claimed.

2.6 *Environment*:

- There are no environmental benefits claimed, or significant impacts anticipated. [note – the CAA acceptance of no environmental analysis was predicated on the assurance of no environmental impact by the sponsor.]
- The full Environmental Requirements checklist is attached as Annex A.

3. SARG/DFT and Environmental Design Aims

3.1 An outline of the generic design aims as relating to the SARG/DfT requirements that NATS considers for all ACPs was provided, including those relating specifically to environmental aspects. These are listed below. Those which can be applied to the London City Airport LAMP RNAV replication ACP are highlighted in **bold**.

3.2 *SARG/DfT design aims*:

a) To design routes based on RNAV1.

b) To ensure that designs are compatible with Government policy (Air Transport White Paper/Review).

c) Runway development: where applicable accommodate future growth due to proposed runway expansion projects

3.3 *Environmental design aims*:

Where practical, within operational and safety constraints, and in this case within the constraints of replicating the conventional procedures:

a) **enable CDAs** (note: the arrivals being replicated will contribute to facilitating CDAs as part of the LAMP network).
b) minimise track mileage
c) allow more efficient flight profiles (i.e. clear climbs/descents on separated tracks)
d) minimise population over-flown
e) minimise exposure of new populations to noise and visual impacts
f) minimise low level over-flight of AONBs, National Parks and other tranquil areas

3.4 These aims are aspirational in so much that it may not be possible to achieve all aims within one design. The final design will hence reflect a balance between competing requirements (e.g. avoiding population may only be possible with additional track

mileage). London City and NATS will seek to demonstrate this balanced approach to achieving all the design aims within the consultation documents and ACP.

4. RNAV procedure replication

4.1 This project is being progressed under the guidelines as described in the CAA Policy Policy Statement for PBN SID Replications. This defines replication as:

"The design of an RNAV or RNP procedure that follows the path over the ground of the nominal track of the existing conventional procedure as closely as possible".
Note: it is the path over the ground of the designed conventional procedure and not the nominal centreline of the current traffic concentration.

4.2 In accordance with the above guidance it is the intention of this project to design RNAV procedures which replicate the existing conventional nominal centrelines as closely as possible. The procedure design will also endeavour to keep aircraft trajectories as close as possible to the centre of the current day swathes of trajectories. The objective being that, to casual observers on the ground, it will not be apparent that a change has taken place. The process for achieving this was discussed with the case officer following the framework briefing and it was agreed that the following steps would be followed.

1. NATS PDG produce design options for new nominal centre lines (possibly several options per SID) matching as closely as possible to existing nominal centrelines.
2. Seek CAA endorsement that options conform to the requirements for replication.
3. Desktop analysis of design options (using desktop flyability tool) to identify if there are any flyability issues with design assumptions.
4. Determine which is the preferred option based on design and performance criteria.

We would expect options to be ruled out at each of the above stages, so that the optimal design solution can achieved. It should be noted that the desktop tool is being used to provide evidence for option selection, not for operational flyability validation – that will be done using certified flight simulators once the detailed design of the final procedures has been finalised.

4.3 There are no Noise Preferential Routes (NPR's) defined at London City Airport.

4.4 It is intended for the extant conventional SIDs to remain in place for the foreseeable future, thereby providing an alternative for those aircraft which are not currently RNAV1 equipped. The RNAV1 capability of the aircraft fleet operating from LCY will determine how long the conventional SIDs will remain in place

5. Stakeholder Engagement

Stakeholder Identification for Formal Consultation

5.1 The consultation exercise is planned to be of twelve weeks duration, and will include the following stakeholders:

ACC Members

Local Authorities and Public Bodies
London Boroughs: Newham, Greenwich, Bexley, Barking and Dagenham, Tower Hamlets
London Councils: Waltham Forest, Redbridge and Havering
Greater London Authority
Royal Docks Management Authority

Airport and Airport Users
London City Airport
Airline Operators Committee
London Chamber of Commerce and Industry
Guild of Travel Management Companies
Docklands Business Club
Canary Wharf Limited
Passenger Representative

Community Representatives
North Woolwich
Custom House
Canning Town
Silvertown
Beckton
West Silvertown
West Thamesmead

Non Voting ACC Attendees
Department for Transport
London TravelWatch
Metropolitan Police
LBN Airport Monitoring
Airport Chaplain

Airlines
Alitalia
Blue Islands Jersey
British Airways
CityJet
KLM
Lufthansa
Luxair
Sky Work
SunAir
Swiss International Airlines A

NATMAC[1]
AEF
AOA
AOPA UK
BA
BAA
BAE Systems
BALPA
BATA
BBAC
BBGA
BGA
BHA
BHPA
BMAA
BMFA
BPA
GASCo
GATCO
HCGB
Heavy Airlines
LAA
Light Airlines
Low Fares Airlines
PPL/IR Europe
UAVs Association
UKFSC/GAPAN
MOD (DAATM)

Others
HACAN East

[1] NATMAC stakeholders added at CAA request

5.2 London City Airport has been advised by the CAA that HACAN East have registered an interest in the change and have hence been included in the above list.

Media notification of Formal Consultation

a) A press release will be issued at the start of the consultation.

Consultation Documents

5.3 The consultation document is planned to comprise one document for all stakeholders. Electronic versions will be circulated, and will be available to download from the London City Airport website. This will facilitate further distribution to additional stakeholders as required.

5.4 The consultation document will be produced in English only.

5.5 SARG will be given the opportunity to review and comment on the consultation material prior to publication.

NATS Response to Consultation Feedback

5.6 Stakeholders' responses to the consultation exercise will be acknowledged with a standard reply, as soon as received. All issues raised will be collated and documented along with the NATS response. Once the consultation period has closed, a document detailing all responses, will be made available for download via the London City Airport website.

5.7 All responses to the consultation exercise will be provided to SARG as part of the ACP documentation set.

6. Environmental Analysis

6.1 The proposal is expected to increase concentration of traffic around the nominal centreline [Comment - please can you define somewhere in this document what is meant by "nominal centreline". The policy on replications relates to SIDs. If the intention is to replicate the SID, it would be better to say so, as paragraph 2.1 does], as is expected with RNAV1 replication of procedures. The sponsor does not intend to perform noise, CO_2 or LAQ analysis as per the guidance. [Comment – the consultation should explain why no analysis is not undertaken for these impacts, namely that no impact would be shown by such an analysis. I.e. the proposal will have no impact on Leq contours, no impact on SEL footprints, no impact on fuel burn, no impact on LAQ. The reason for there being no impact should be explained too.]

6.2 Information to enable an assessment of the environmental impact of the change will be presented in the consultation documents and ACP. In order to enable stakeholders to establish the potential impact of the changes on their area, this information will include:

a) Maps showing the nominal centre lines [comment – again, if this means SIDs, then it would be better to say so] of conventional and proposed procedures.
b) Maps showing trajectory density plots of existing traffic patterns.
c) Maps showing predicted trajectories and density of aircraft following the proposed procedures (for comparison with the existing traffic in (b)).

6.3 The CAA environmental checklist is included as Annex A. This details which analyses are expected to be delivered with the ACP.

7. Timescales (updated on 7 April 2014)

7.1 Consultation will be of twelve weeks duration.

7.2 The consultation is planned to commence July 2014.

7.3 The ACP will be delivered to SARG by 28th November 2014.

7.4 Due to the anticipated large volume of changes to the AIP that will be involved in the combined LAMP changes, the change will be promulgated using a triple AIRAC cycle.

7.5 The LAMP Phase 1 O-date (when the RNAV1 procedures will be operationally live) is planned to be 10-Dec-2015.

8. Issues to be addressed

8.1 Flyability validation plan to be agreed with CAA. (Now agreed)

8.2 A follow up briefing with CAA was arranged to present initial nominal centreline replication options. This took place on 7th April 2014, and notes of this meeting are included at Annex B.

Annex A: Environmental Requirements

This section details the proposal to fulfil the required elements of an Environmental Assessment to be submitted for the LCLRR development based upon CAP 725 – Appendix B (30 March 2007).

The requirements in this section are grouped by the degree of compliance expected from airspace change sponsors in following this guidance:

1. **Must** – change sponsors are to meet the requirements in full when this term is used.
2. **Should** – change sponsors are to meet these requirements unless there is sufficient reason which must be agreed in writing with the SARG case officer and the circumstances recorded in the formal airspace change documentation.
3. **May** – change sponsors decide whether this guidance is appropriate to the circumstances of the airspace change.

Table A1. Sponsors MUST provide:

Requirement		Ref.	Page	NATS proposed offering
A technical document containing a comprehensive and complete description of the airspace change including the environmental impact will be required and **must** be produced for all airspace changes.	General	Para 25	B-6	This will be provided for the London City Airport LAMP RNAV replication (LCLRR) ACP
The environmental assessment **must** include a high quality paper diagram of the airspace change in its entirety as well as supplementary diagrams illustrating different parts of the change. This diagram **must** show the extent of the airspace change in relation to known geographical features and centres of population	Airspace Design	Para 28	B-7	This will be provided for the LCLRR ACP
The Change Sponsor **must** provide SARG with a complete set of coordinates describing the proposed change in electronic format using World Geodetic System 1984 (WGS 84). In addition, the Sponsor **must** supply these locations in the form of Ordnance Survey (OS) national grid coordinates.	Airspace Design	Para 30	B-7	Procedure designs will be provided to fulfil this requirement.
This electronic version **must** provide a full description of the horizontal and vertical extent of the zones and areas contained within the airspace change. It **must** also include coordinates in both WGS 84 and OS national grid formats that define the centre lines of routes including airways, standard instrument departures (SID), standard arrival routes (STAR), noise preferential routes (NPR) or any other arrangement that has the effect of concentrating traffic over a particular geographical area.	Airspace Design	Para 30	B-7	This will be provided for the LCLRR ACP

Change Sponsors **must** provide a description of the vertical distribution of traffic in airways, SIDs, STARs, NPRs and other arrangements that have the effect of concentrating traffic over a particular geographical area	Airspace Design	Para 32	B-7	This will be provided for the LCLRR ACP
Change Sponsors **must** include traffic forecasts in their environmental assessment.	Traffic Forecasts	Para 35	B-8	This will be provided for the LCLRR ACP
Information on air traffic **must** include the current level of traffic using the present airspace arrangement and a forecast. The forecast will need to indicate the traffic growth on the different routes contained within the airspace change volume.	Traffic Forecasts	Para 35	B-8	This will be provided for the LCLRR ACP
The sources used for the forecast **must** be documented.	Traffic Forecasts	Para 35	B-8	This will be provided for the LCLRR ACP
Change Sponsors **must** produce $L_{eq,\ 16\ hours}$ noise exposure contours for airports where the proposed option entails changes to departure and arrival routes for traffic below 4,000 feet agl based on the published minimum departure and arrival gradients. Under these circumstances, at least three sets of contours **must** be produced: Current situation – these may already be available as part of the airport's regular environmental reporting or as part of the airport master plan; Situation immediately following the airspace change; and Situation after traffic has increased under the new arrangements (typically five years after implementation although this **should** be discussed with the SARG Project Leader).	Noise	Para 44	B-11	The proposed procedures will be presented over laid on the current $L_{eq,\ 16\ hours}$ noise exposure contours.
Contours **must** be portrayed from 57 dBA $L_{eq,\ 16\ hours}$ at 3 dB intervals.	Noise	Para 48	B-12	Not required for LCLRR, noise levels well below 57dBA $L_{eq,\ 16\ hours}$.
SEL footprints **must** be used when the proposed airspace includes changes to the distribution of flights at night below 7,000 feet agl and within 25 km of a runway. Night is defined here as the period between 2300 and 0700 local time. If the noisiest and most frequent night operations are different, then footprints **should** be calculated for both of them. A separate footprint for each of these types **should** be calculated for each arrival and departure route. If SEL footprints are provided, they **should** be calculated at both 90 dBA SEL and 80 dBA SEL.	Noise	Para 56	B-13	n/a for replication
Change Sponsors **must** demonstrate how the design and operation of airspace will impact on emissions. The kinds of questions that need to be answered by the sponsor are: Are there options which reduce fuel burn in the vertical dimension, particularly when fuel burn is high e.g. initial climb? Are there options that produce more direct routeing of aircraft, so that fuel burn is minimised? Are there arrangements that ensure that aircraft in cruise operate at their most fuel-efficient altitude, possibly with step-climbs or cruise climbs?	Climate Change	Para 102	B-22	n/a for replication

Change Sponsors **must** produce information on local air quality only where there is the possibility of pollutants breaching legal limits following the implementation of an airspace change. The requirement for local air quality modelling will be determined on a case by case basis as discussed with the SARG Project Leader and ERCD. This discussion will include recommendations of the appropriate local air quality model to be used. Concentrations **should** be portrayed in microgrammes per cubic metre ($\mu g.m^{-3}$). They **should** include concentrations from all sources whether related to aviation and the airport or not. Three sets of concentration contours **should** be produced: Current situation – these may already be available as part of the airport's regular environmental reporting or as part of the airport master plan; Situation immediately following the airspace change; and Situation after traffic has increased under the new arrangements – typically five years after implementation although this **should** be discussed with the SARG Project Leader.	Local Air Quality	Para 115	B-25	n/a for replication

Table A2. Sponsors SHOULD provide:

Requirement		Ref.	Page	NATS proposed offering
In order to ensure that the various areas for environmental assessment by SARG are addressed, Change Sponsors **should** submit the documentation with the following clearly defined sections: Description of the airspace change (refer to 28 – 33); Traffic forecasts (refer to 34 – 38); An assessment of the effects on noise (refer to Sections 4 and 5); An assessment of the change in fuel burn/CO_2 (refer to Section 6); An assessment of the effect on local air quality (refer to Section 7); and An economic valuation of environmental impact, if appropriate (refer to Section 9).	General	Para 2	B-1	 This will be provided This will be provided n/a n/a n/a n/a
Environmental assessment **should** set out the base case or current situation so that changes can be clearly identified.	General	Para 19	B-4	n/a
Environmental assessment **should** follow the Basic Principles listed in CAP 725.	General	Para 20	B-4	These principles have been borne in mind when providing the detailed response to the requirements listed in this set of tables. NATS seeks SARG agreement in principle to this document as confirmation that the NATS interpretation is appropriate.
The proposal **should** consider and assess more than one option, then demonstrate why the selected option meets safety and operational requirements and will generate an overall environmental benefit or, if not, why it is being proposed.	Airspace Design	Para 29	B-7	Discussion of options will be provided.
Change Sponsors **should** provide indications of the likely lateral dispersion of traffic about the centre line of each route. This **should** take the form of a statistical measure of variation such as the standard deviation of lateral distance from the centre line for given distances along track in circumstances where the dispersion is variable.	Airspace Design	Para 31	B-7	An illustration of the current day dispersal of the affected traffic streams will be provided in the form of a density plots of current radar data. It is assumed that the graphical representation described above will suffice given the nature of this development; therefore NATS do not intend to provide statistical descriptions of track dispersal.
For departing traffic, sponsors **should** produce profiles of the most frequent type(s) of aircraft operating within the airspace. They **should** show vertical profiles for the maximum, typical and minimum climb rates achievable by those aircraft.	Airspace Design	Para 32	B-7	This will be analysed by the procedure design and flyability assessments.

A vertical profile for the slowest climbing aircraft likely to use the airspace **should** also be produced.	Airspace Design	Para 32	B-8	This will be analysed by the procedure design and flyability assessments.
All profiles **should** be shown graphically and the underlying data provided in a spreadsheet with all planning assumptions clearly documented.	Airspace Design	Para 32	B-8	n/a
Change Sponsors **should** explain how consideration of CDA and LPLD is taken into account within their proposals	Airspace Design	Para 33	B-8	n/a
Typically, forecasts **should** be for five years from the planned implementation date of the airspace change. There **may** be good reasons for varying this – for example, to use data that has already been made available to the general public at planning inquiries, in airport master plans or other business plans	Traffic Forecasts	Para 36	B-8	Traffic forecasts for 5 years and beyond will be provided.
Traffic forecasts **should** contain not only numbers but also types of aircraft. Change Sponsors **should** provide this information by runway (for arrivals/departures) and/or by route with information on vertical distribution by height/altitude/flight level as appropriate.	Traffic Forecasts	Para 38	B-9	n/a
The contours **should** be produced using either the UK Aircraft Noise Contour Model (ANCON) or the US Integrated Noise Model (INM) but ANCON **must** be used when it is currently in use at the airport for other purposes.	Noise	Para 46	B-12	n/a
Terrain adjustments **should** be included in the calculation process (i.e. the height of the air routes relative to the ground are accounted for).	Noise	Para 47	B-12	n/a
Contours **should** not be produced at levels below 54 dBA $L_{eq,\ 16\ hours}$ because this corresponds to generally low disturbance to most people.	Noise	Para 48	B-12	n/a
A table **should** be produced showing the following data for each 3 dB contour interval: Area (km^2); and Population (thousands) – rounded to the nearest hundred.	Noise	Para 49	B-12	n/a
It is sometimes useful to include the number of households within each contour, especially if issues of mitigation and compensation are relevant: This table **should** show cumulative totals for areas/populations/households. For example, the population for 57 dBA will include residents living in all higher contours. The source and date of population data used **should** be noted adjacent to the table. Population data **should** be based on the latest available national census as a minimum but more recent updated population data is preferred. The areas calculated **should** be cumulative and specify total area within each contour including that within the airport perimeter.	Noise	Para 50	B-12	n/a

Contours for assessment **should** be provided to SARG in **both** of the following formats: Electronic files in the form of a comma delimited ASCII text file containing three fields as an ordered set (i.e. coordinates should be in the order that describes the closed curve) defining the contours in Ordnance Survey National Grid in metres: Field Field Name Units 1 Level dB 2 Easting six figure easting OS national grid reference (metres) 3 Northing six figure northing OS national grid reference (metres) Paper version overlaid on a good quality 1:50 000 Ordnance Survey map. However, it **may** be more appropriate to present contours on 1:25 000 or 1:10 000 Ordnance Survey maps.	Noise	Para 51	B-13	n/a
SEL footprints for assessment **should** be provided to SARG in **both** of the following formats: Electronic files in the form of a comma delimited ASCII text file containing three fields as an ordered set (i.e. coordinates should be in the order that describes the closed curve) defining the footprints in Ordnance Survey National Grid in metres: Field Field Name Units 1 Level dB 2 Easting six figure easting OS national grid reference (metres) 3 Northing six figure northing OS national grid reference (metres) Paper version overlaid on a good quality 1:50 000 Ordnance Survey map. However, it **may** be more appropriate to present footprints on 1:25 000 or 1:10 000 Ordnance Survey maps.	Noise	Para 57	B-14	n/a
Change Sponsors **should** estimate the total annual fuel burn/mass of carbon dioxide in metric tonnes emitted for the current situation, the situation immediately following the airspace change and the situation after traffic has increased under the new arrangements – typically five years after implementation. Sponsors **should** produce estimates for each airspace option considered.	Climate Change	Para 106	B-23	n/a
Change Sponsors **should** provide the input data for their calculations including any modelling assumptions made. They **should** state details of the aircraft performance model used including the version numbers of software employed.	Climate Change	Para 107	B-23	This will be provided for the LCLRR ACP
Where the need to provide additional airspace capacity, reduce delays or mitigate other environmental impact results in an increase in the total annual fuel burn/ mass of carbon dioxide in metric tonnes between the current situation and the situation following the airspace change, Sponsors **should** provide justification.	Climate Change	Para 108	B-23	n/a

Contours for assessment **should** be provided to SARG in similar formats to those used for noise exposure contours. Where Change Sponsors are required to produce concentration contours they **should** also produce a table showing the following data for concentrations at 10 $\mu.m^{-3}$ intervals: Area (km^2); and Population (thousands) – rounded to the nearest hundred.	Local Air Quality	Para 116	B-25	LAQ analysis not required.
The source and date of population data used **should** be noted adjacent to the table. Population data **should** be based on the latest available national census as a minimum but more recent updated population data is preferred.	Local Air Quality	Para 117	B-25	n/a

Table A3: Sponsors MAY provide:

Requirement		Ref.	Page	NATS proposed offering
It is considered unlikely that airspace changes will have a direct impact on animals, livestock and biodiversity. However, Change Sponsors should remain alert to the possibility and **may** be required to include these topics in their environmental assessment.	General	Para 18	B-4	NATS proposes that the nature of this airspace change will not affect flora and fauna.
It **may** be appropriate for Change Sponsors to produce a more general description of the airspace change and the rationale for its proposal in an easy-to-read style for public consumption. If such an additional separate document is produced, it **must** contain details of the environmental impact of the proposal.	General	Para 25	B-6	The consultation document will cover this for LCLRR ACP.
Sponsors **may** supply the outputs from simulation to demonstrate the lateral dispersion of traffic within the proposed airspace change or bring forward evidence based on actual performance on a similar kind of route. It may be appropriate for Sponsors to explain different aspects of dispersion e.g. dispersion within NPRs when following a departure routeing and when vectoring – where the aircraft will go and their likely frequency	Airspace Design	Para 31	B-7	This may be provided for the LCLRR ACP.
In planning changes to airspace arrangements, sponsors **may** have conducted real and/or fast time simulations of air traffic for a number of options.	Traffic Forecasts	Para 34	B-8	Fast time simulation (Desktop analysis) of options may be presented.
It **may** also be appropriate to provide forecasts further into the future than five years: examples are extensive airspace changes or where traffic is forecast to grow slowly in the five-year period but faster thereafter.	Traffic Forecasts	Para 36	B-8	Traffic Forecasts for more than 5 years may be provided in the LCLRR ACP.
It **may** be appropriate for Change Sponsors to outline the key factors [affecting traffic forecasts] and their likely impact. In these circumstances, Sponsors **should** consider generating a range of forecasts based on several scenarios that reflect those uncertainties – this would help prevent iterations in the assessment process.	Traffic Forecasts	Para 37	B-8	Low/base/high case forecasts may be provided in the LCLRR ACP.
Types of aircraft **may** be given by aircraft type/engine fit using ICAO type designators. If this is not a straightforward exercise, then designation by the UK Aircraft Noise Contour Model (ANCON) types or by seat size categories would be acceptable	Traffic Forecasts	Para 38	B-9	n/a
Change Sponsors **may** include the 54 dBA $L_{eq,\ 16\ hours}$ contour as a sensitivity analysis but this level has no particular relevance in policy making.	Noise	Para 48	B-12	n/a
It is sometimes useful to include the number of households within each contour, especially if issues of mitigation and compensation are relevant: Where Change Sponsors wish to exclude parts of the area within contours, for example, excluding the portion of a contour falling over sea – this **may** be shown additionally and separately from the main table of data; and Sponsors **may** include a count of the number of schools, hospitals and other special buildings within the noise exposure contours.	Noise	Para 50	B-12	n/a

Requirement		Ref.	Page	NATS proposed offering
Contours for a general audience **may** be provided overlaid on a more convenient map (e.g. an ordinary road map with a more suitable scale for publication in documents). The underlying map and contours **should** be sufficiently clear for an affected resident to be able to identify the extent of the contours in relation to their home and other geographical features. Hence, the underlying map **must** show key geographical features, e.g. street, rail lines and rivers.	Noise	Para 53	B-13	n/a
SEL footprints **may** be used when the airspace change is relevant to daytime only operations. If SEL footprints are provided, they **should** be calculated at both 90 dBA SEL and 80 dBA SEL.	Noise	Para 56	B-14	n/a
SEL footprints for a general audience **may** be provided overlaid on a more convenient map (e.g. an ordinary road map with a more suitable scale for publication in documents). The underlying map and footprints **should** be sufficiently clear for an affected resident to identify the extent of the footprints in relation to their home or other geographical features. Hence, this underlying map **must** show key geographical features, e.g. streets, rail lines and rivers. Calculations **should** include terrain adjustments as described in the section on L_{eq} contours	Noise	Para 58	B-14	n/a
Change Sponsors **may** use the percentage highly annoyed measure in the assessment of options in terminal airspace to supplement L_{eq}. If they choose to use this method, then the guidance on population data for noise exposure contours set out **should** be followed. Sponsors **should** use the expression and associated results in calculating the number of those highly annoyed. If they wish to use a variant method, then this would need to be supported by appropriate research references.	Noise	Para 65	B-15	n/a
Change Sponsors **may** use the L_{DEN} metric but, if they choose to do so, they **must** still produce the standard $L_{eq,\ 16\ hours}$ contours as previously described. If airspace change sponsors wish to use the L_{DEN} metric they **must** do so in a way that is compliant with the technical aspects of the Directive and any supplementary instructions issued by DEFRA. Sponsors **should** note the requirement for noise levels to be calculated as received at 4 metres above ground level. In particular, the guidance on how contours are to be portrayed, as described in the section dealing with L_{eq} contours applies. Calculations **should** include terrain adjustments as described in the section on L_{eq} contours. An exception regarding L_{DEN} contours is the production of a table showing numerical data on area, population and households which **should** be presented by band (e.g. 55 dBA to 60 dBA) rather than cumulatively as for UK L_{eq} contours (e.g. >55 dBA). Change Sponsors **should** make it clear where areas/counts are by band or cumulative.	Noise	Para 67 & 69 & 70	B-15 & B-16	n/a
Change Sponsors **may** use the L_{Night} metric within their environmental assessment and consultation. If they do so, SEL footprints **must** also be produced. Calculations **should** include terrain adjustments as described in the section on L_{eq} contours.	Noise	Para 73	B-16	n/a
Change Sponsors **may** use difference contours if it is considered that redistribution of noise impact is a potentially important issue.	Noise	Para 78	B-17	n/a

Requirement		Ref.	Page	NATS proposed offering
Change Sponsors **may** use PEI as a supplementary assessment metric.	Noise	Para 85	B-19	n/a
Change Sponsors **may** use the AIE metric as a supplementary assessment metric. If the sponsor uses PEI as a supplementary metric then AIE **should** also be calculated as both metrics are complementary.	Noise	Para 87	B-19	n/a
Change Sponsors **may** vary the information displayed in Operations Diagrams providing that the diagram is a fair and accurate representation of the situation portrayed.	Noise	Para 88	B-20	Noted.
Change Sponsors **may** use maximum sound levels (L_{max}) in presenting aircraft noise footprints for public consumption if they think that this would be helpful. This does not replace the obligation to comply with the requirement to produce sound exposure level (SEL) footprints, where applicable.	Noise	Para 95	B-21	n/a.
Change Sponsors **may** produce diagrams portraying maximum sound event levels (L_{max}) for specific aircraft types at a number of locations at ground level beneath the airspace under consideration. This may be helpful in describing the impact on individuals. It is usual to include a table showing the sound levels of typical phenomenon e.g. a motor vehicle travelling at 30 mph at a distance of 50 metres.	Noise	Para 96	B-21	n/a
Change Sponsors **may** wish to conduct an economic appraisal of the environmental impact of the airspace change, assessing the economic benefits generated by the change. If undertaken, this **should** be conducted in accordance with the guidance from HM Treasury in the Green Book (HM Treasury, 2003). If Change Sponsors include a calculation of NPV then they **must** show financial discount rates, cash flows and their timings and any other assumptions employed. The discount rate **must** include that recommended in the Green Book currently set at 3.5%. Additionally, other discount rates **may** be used in a sensitivity analysis or because they are representative of realistic commercial considerations	Economic Valuation	Para 124 & 126	B-27	n/a

Annex B: Minutes of follow-up meeting

London City Airport LAMP RNAV replications Airspace Development
Framework Briefing, Follow-up meeting
7th April 2014, CAA House,

CAA, Attendees:	NATS Attendees:
[redacted]	[redacted]

Agenda
Introductions
Presentation of preliminary designs
Discussion of design options
AOB

Introductions
[redacted] gave apologies for [redacted], explaining that he would act as London City representative.

Presentation of preliminary designs
[redacted] presented three design options for nominal centrelines as follows. The designs are shown in the accompanying presentation.

09 BPK 5U

A. FO-CF, based on the textual description, using a course to fix leg to the BPK VOR R149.
B. FO-DF, based on the textual description, using a direct to fix leg to the BPK VOR R149 D12 point
C. FO-CF/TF introducing a course to fix leg (to BPK R149 D12) which matches the main concentration from the heat plot.

27 SAM 6T (R27 DVR & CLN SIDs use same tracks)

A. FO-CF, based on the textual description, using a course to fix leg to the LON VOR R074
B. FO-DF, based on the textual description, using a direct to fix leg to the LON VOR R074 D18 point, (with this point as a fly-by waypoint)
C. FO- CF/TF introducing a course to fix leg (to the LON VOR R074 D18 waypoint) which matches the main concentration from the heat plot.

Discussion of design options
There was much discussion of design options.

[redacted] clarified that a procedure can have only one nominal centreline, which in effect represents the predicted worst-case flight trajectory, based on the highest speed (210kts) and the standard bank angle (20°). Where aircraft operators' standard procedures for a particular type recommend that they fly slower (eg 180kts) and use steeper angle of bank (e.g. 25 or 30°); then it would be expected that the aircraft would fly inside the published nominal track. This is something that will explored by the flyability simulation in due course.
It was confirmed by [redacted] that options A & B for both the turns examined were suitable candidates to be progressed as RNAV replications of the conventional SIDs. Option B was perceived as the least complex, also having the best compliance to PANS-OPS criteria.
Option C in both cases was deemed unsuitable; since by attempting to match the heat plot it introduced additional complexity, and speed restrictions which could result in the procedure being unflyable by certain aircraft types.
It was suggested that an informal survey of aircraft operators at LCY would be useful to ascertain what their standard operating procedures are (with respect to speed on initial climb-out, and maximum angle of bank used). [redacted] also suggested that NATS PDG should ascertain how existing conventional procedures are coded up by such operators as BA, BA City Flyer and City Jet. ([redacted] thought that this had been mentioned at the FWB on 3 March.

AOB

[redacted] asked whether changes to the conventional SIDs further downstream (e.g. beyond BEMID/GINTI) would be covered by this ACP. [redacted] clarified that any such changes were outside of the London City ACP scope, and if required would be covered by the NATS LAMP phase 1 ACP.